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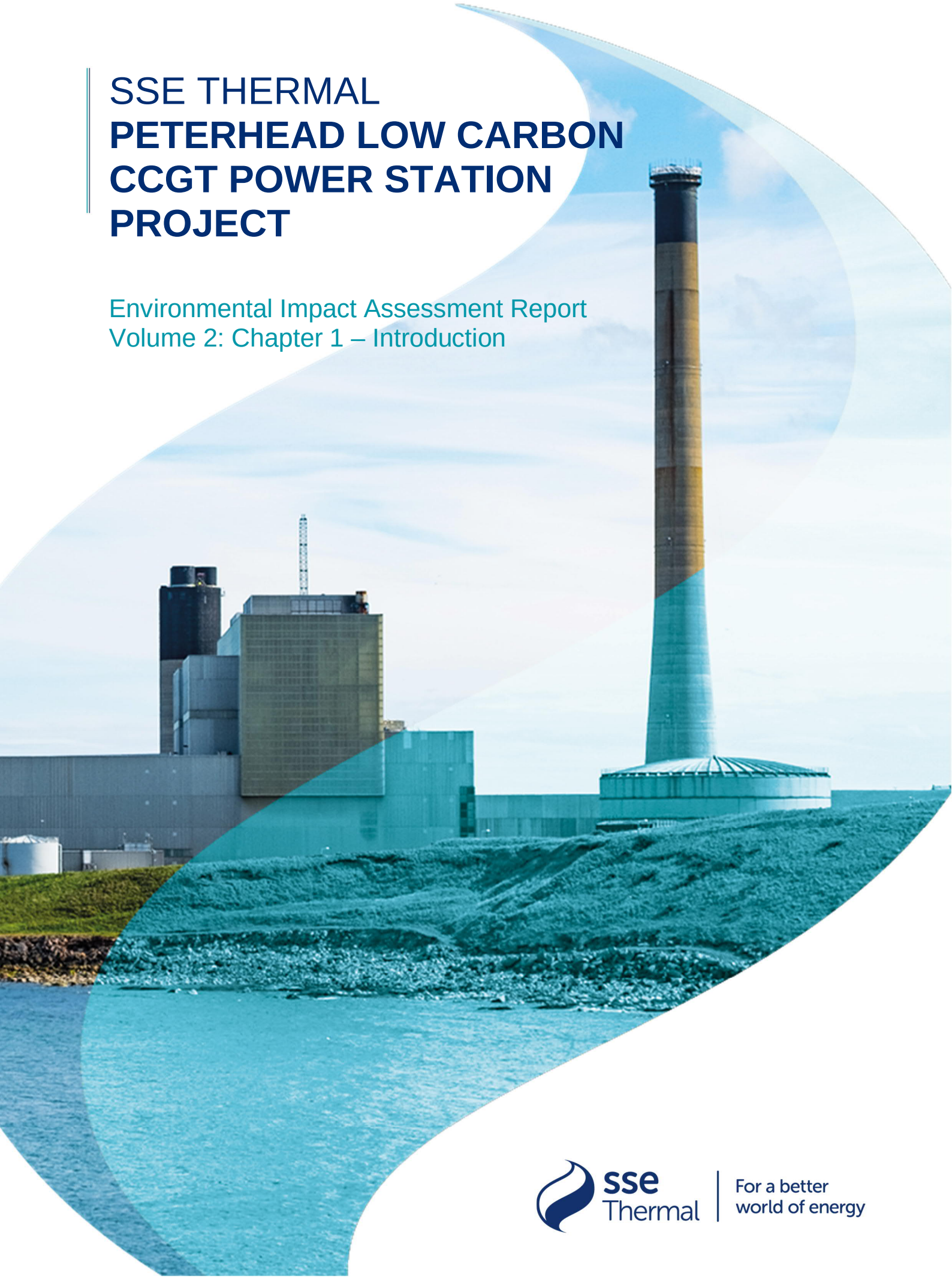
PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 1 – Introduction



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1. Introduction

1.1. BACKGROUND

1.1.1. BACKGROUND

1.1.1.1. This Environmental Impact Assessment Report (EIA Report) has been prepared by AECOM Ltd (AECOM) on behalf of SSE Thermal Generation (Scotland) Ltd ('The Applicant') to accompany an application for consent ('the Application') for the construction, operation and maintenance of a proposed low carbon Combined Cycle Gas Turbine (CCGT) Generating Station with carbon capture plant (CCP) ('the Proposed Development') on land at, and in the vicinity of, the existing Peterhead Power Station, Boddam, Peterhead, Aberdeenshire, AB42 3BZ (hereafter referred to as the 'Proposed Development Site'). The Application has been submitted to the Scottish Ministers, for a decision whether to grant consent under Section 36 of the Electricity Act 1989 (hereafter referred to as the Act). This EIA Report presents the findings of the Environmental Impact Assessment (EIA) of the Proposed Development.

1.1.1.2. Consent under Section 36 of the Act (referred to as 's36 consent') would provide the necessary authorisation for the construction and operation (including maintenance) of a new gas fired power station of up to 910 megawatts (MW) gross electrical generation capacity, for export onto the transmission system. The Proposed Development Site is located within the existing Peterhead Power Station site and associated land within the ownership or control of the Applicant. All elements of the Proposed Development are within the administrative boundary of Aberdeenshire Council.

1.1.1.3. This chapter is supported by **Figure 1.1** (EIA Report Volume 3), which illustrates the Proposed Development Site location within the wider setting and **Figure 3.1** (EIA Report Volume 3) illustrates the Proposed Development Site boundary.

1.2. THE APPLICANT

1.2.1. THE APPLICANT

1.2.1.1. The Applicant is part of the FTSE-listed SSE plc, one of the UK's largest and broadest-based energy companies, and the UK's leading generator of renewable energy. Over the last 20 years, the SSE Group has invested over £20 billion to deliver industry-leading offshore wind, onshore wind, CCGT, energy from-waste, biomass, energy networks, gas storage projects, and develop carbon capture & storage (CCS) projects. The Applicant owns and operates the existing Peterhead Power Station.

1.2.1.2. The Applicant is jointly developing the project with Equinor UK Ltd. Equinor has been operating in the UK for over 35 years and is one of the country's leading energy providers, supplying natural gas, oil and electricity. Headquartered in Norway, the company aims to reach net zero emissions globally by 2050. In the UK, Equinor operates one offshore oil field and three offshore wind farms including Hywind Scotland, the world's first floating wind farm whose operations and maintenance base is located in Peterhead. Equinor is also a leader in CCS and hydrogen, developing the H2H Saltend hydrogen production plant at the heart of the Zero Carbon Humber alliance, and partnering in the Net Zero Teesside project and the Northern Endurance Partnership.

1.2.1.3. SSE produced a 'Greenprint' document (SSE, 2020) that sets out a clear commitment to investment in low carbon power infrastructure, working with the UK government and other stakeholders to create a Net Zero power system by 2040. This includes investment in flexible sources of electricity generation and storage for times of low renewable output which will complement other renewable generating sources, either using low-carbon fuels and/ or capturing and storing carbon emissions.

1.2.1.4. The design of the Proposed Development demonstrates this commitment. The Proposed Development will be built with a clear route to decarbonisation, being equipped with post-combustion carbon capture technology. This is consistent with SSE's commitment to reduce the carbon intensity of electricity generated by 60% by 2030, compared to 2018 levels.

1.3. THE PROPOSED DEVELOPMENT

1.3.1. THE PROPOSED DEVELOPMENT

1.3.1.1. The Proposed Development comprises the construction, operation and maintenance of a low carbon CCGT generating station with a capacity of approximately 910MW gross electrical output.

1.3.1.2. The CCGT generating station will be fuelled by natural gas, with a post- combustion CCP installed such that the plant will generally be operated as a dispatchable low carbon generating station. The Proposed Development therefore incorporates equipment required for the capture and compression of carbon dioxide (CO_2) emissions from the generating station, so that they can be directed to permanent geological store instead of being released to atmosphere. The CO_2 transport and storage infrastructure is being developed by third parties (see below) and does not form part of the Proposed Development.

1.3.1.3. The Proposed Development Site ('the Site') is within the wider Peterhead Power Station site, north west of the existing Power Station. The Site encompasses an area of approximately 89 hectares (ha) of which approximately 15ha comprises the temporary construction laydown areas. Within the Site, the area proposed for the location of the CCGT and CCP core infrastructure (herein after referred to as 'CCGT and CCP area' and shown on **Figure 3.3** EIA Report Volume 3) would occupy approximately 5.9ha.

1.3.1.4. A detailed description of the Proposed Development is set out in **Chapter 4: The Proposed Development** (EIA Report Volume 2). The technology supplier cannot be confirmed at this stage in the development of the Project, as it will be determined by various technical and commercial considerations following completion of detailed design of the plant. The design of the Proposed Development, therefore, incorporates a necessary degree of flexibility, to allow for the future selection of the preferred technology and layout of core equipment. Further work will be required to optimise the design layout upon appointment of the technology supplier; plant layout will be confirmed at the next stage of Front-End Engineering Design (FEED).

1.3.1.5. Subject to the necessary consents being granted and an investment decision being made, construction of the Proposed Development could potentially start as early as Quarter 4 (Q4) 2023. Construction activities are expected to be completed within three to four years, including commissioning. However, as there is an interface with the CO_2 transport network and storage infrastructure being developed by third parties, the start of construction may be delayed to align with that development programme.

1.3.2. THE ACORN PROJECT

1.3.2.1. The Proposed Development will be a key customer to the Acorn CCS Project. This project is led by Storegga with their partners Harbour Energy, Shell and North Sea Midstream Partners (NSMP), with funding support from the UK and Scottish Governments, and the European Union. Based at the St. Fergus gas terminal in North East Scotland, the Acorn Project will make use of existing gas pipelines and infrastructure to transport CO_2 directly to the Acorn CO_2 storage site below the Central North Sea for safe storage.

1.3.2.2. The Applicant will be responsible for the development of the equipment required on-site for the capture and compression of CO_2 emissions from the generating station. The Applicant would not build the CCGT without the CCP as the Applicant is fully committed to building a generating station which has a clear route to decarbonisation.

1.3.2.3. The Acorn Project will be responsible for the both the onshore and offshore sections of the CO_2 transport pipeline to the geological store under the North Sea, as well as the CO_2 injection wells and associated works. The CO_2 transport/export pipeline therefore does not form part of this Section 36 application but will be subject to a separate consent application to be undertaken by the Acorn Project partners, including geological appraisals to demonstrate suitability for the development proposed. However, an indication of likely cumulative effects (based on currently available information) is considered in this EIA Report.

1.4. THE CONSENTING PROCESS

1.4.1. THE CONSENTING PROCESS

1.4.1.1. As the Proposed Development comprises an electricity generating station with a gross electrical output in excess of 50MW, consent to construct and operate it will be required from the Scottish Ministers under Section 36 'Consent required for construction etc. of generating stations' of the Act. The Section 36 application has been prepared in accordance with the requirements of the Act and related regulations, in particular The Electricity (Applications for Consent) Regulations 1990 (the 1990 Regulations), for submission to the Energy Consents Unit (ECU) of the Scottish Government.

1.4.1.2. The Section 36 application has also been prepared in accordance with the Applicant's statutory duties under the Act including Section 9 which states that it is the duty of a licence holder to "*develop and maintain an efficient, co-ordinated and economical system of electricity transmission*" and Schedule 9 which states that, when formulating proposals, it is necessary for the licence holder to have regard to the *'desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest'.*

1.4.1.3. The Proposed Development is a Schedule 1 development under Regulation 2(1) of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (here after referred to as the 'EIA Regulations') "*Thermal power stations and other combustion installations with a heat output of 300 megawatts or more*".

1.4.1.4. This Act also governs the form, content and accompanying documents that are required as part of a Section 36 application. Regulations 3 and 4 of the EIA Regulations require that an application must be accompanied by an EIA Report, where a development is considered to be 'EIA development'.

1.4.1.5. This EIA Report is to accompany the application for consent for the Proposed Development has been submitted to the ECU acting on behalf of Scottish Ministers. Subject to the Application being accepted, the ECU will then examine it and make a recommendation to Scottish Ministers, who will then decide whether to grant consent.

1.4.1.6. The Scottish Ministers will also be requested to give a direction for planning permission to be deemed to be granted under Section 57(2) of the Town and Country Planning (Scotland) Act 1997.

1.4.1.7. It is recognised that other consents, permits and licenses are required for the construction and operation phase of the Proposed Development. At present it has been identified that the following may be required:

- PPC permit will be sought from SEPA (under the Pollution Prevention and Control (Scotland) Regulations 2012 (PPC, 2012)) for operation of the scheme as it falls under Pollution Prevention and Control Part A legislation. The abstraction and discharge volumes contained within the existing permit are to be maintained, but there are likely to be variations such as the effluent quality standards that are applied.
  - Additional PPC Permits required for medium combustion plant if temporary generators are required during the construction phase.
- Section 56 Agreement (Roads (Scotland) Act 1984) to allow the construction of the highway works at both the Gatehouse and Sandford Lodge junctions with the A90;
- A waste management licence (either a mobile plant licence or site licence) for any contaminated soil treatment.
- The temporary core path diversions, including their management and timings for reinstatement, will be agreed with the Local Planning Authority prior to the commencement of the Proposed Development.

European Protected Species (EPS) Licences

- Small numbers of common pipistrelle bats were found roosting in the outbuildings near to Sandford Lodge. While these buildings will not be directly impacted by the Proposed Development and will be retained, all species of bats are protected from disturbance while using a roost by the Habitats Regulations. It may therefore be necessary to obtain a European Protected Species licence from NatureScot for any activities which could result in disturbance of bats roosting in these buildings. This could include the movement of heavy plant and machinery along the proposed access track, and any other construction-related works which take place within at least 30m of the buildings.
- At this stage, it is not expected that construction of the Proposed Development will cause any disturbance of badgers when occupying a sett. However, should pre-construction surveys or during construction monitoring determine that this is possible, a derogation licence will be required from NatureScot to allow construction activities which could cause disturbance to proceed.

1.5. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS

1.5.1. OVERVIEW

1.5.1.1. The Proposed Development is a ‘Schedule 1’ development under the EIA Regulations as it constitutes a *“Thermal power station and other combustion installations with a heat output of 300 megawatts or more”*. As such, an EIA is required for the Proposed Development and this

EIA Report has been prepared in accordance with these Regulations to accompany the Application.

1.5.1.2. The Applicant has formally notified the Scottish Ministers on 1 March 2021 in writing under Regulation 13 of the EIA Regulations that an EIA Report would be prepared in respect of the Proposed Development.

1.5.1.3. Plate 1.1 demonstrates the EIA process from project inception to completion.

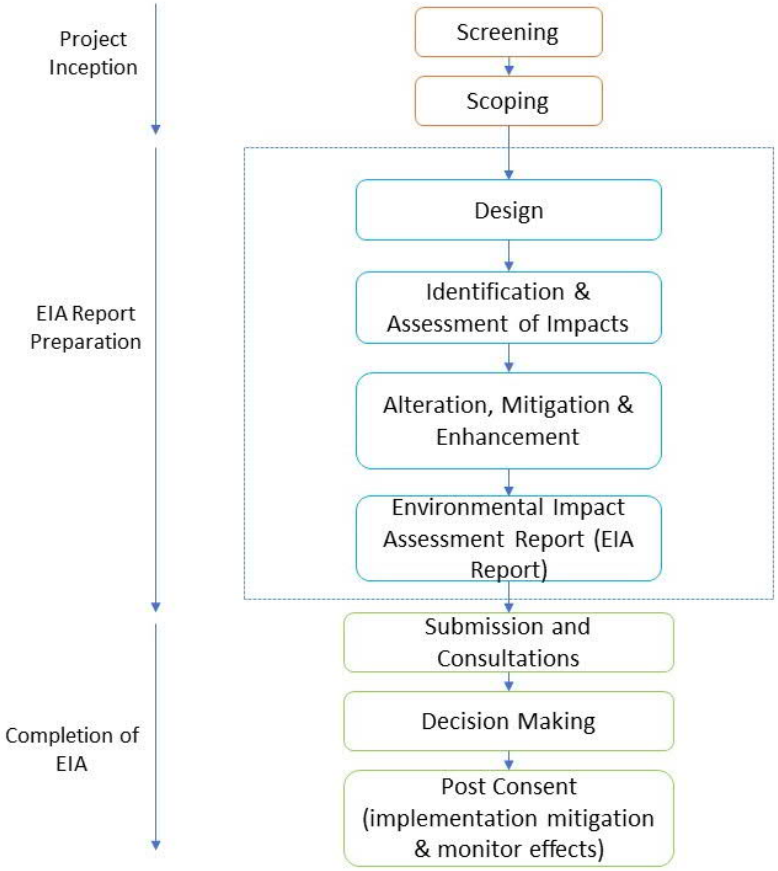

Plate 1-1: EIA Process (IEMA, 2011)

1.5.2. THE EIA SCOPING PROCESS

1.5.2.1. A Screening Opinion was not sought as the Proposed Development is a Schedule 1 development and as such an EIA is required.

1.5.2.2. An EIA Scoping Report (**Appendix 1A** EIA Report Volume 4) was submitted by the Applicant to the Scottish Ministers pursuant to Regulation 12 of the EIA Regulations on 11 May 2020, which identified the issues that the Applicant considered the EIA should address.

1.5.2.3. The EIA Scoping Report was developed with reference to standard guidance and best practice following initial consultation with several statutory consultees and was informed by the EIA team's experience of working on a number of similar projects.

1.5.2.4. The Scottish Minister's Scoping Opinion was received on 29 July 2021, including the formal responses received by the Energy Consents Unit from consultees, and is presented within **Appendix 1B** (EIA Report Volume 4). Key issues raised in the Scoping Opinion are summarised at the start of each technical chapter of the EIA Report, with all identified matters having been considered during the EIA process. **Appendix 1C Gatecheck Report** (EIA Report

Volume 4) provides a summary of how issues raised in the Scoping Opinion have been addressed in the EIA Report.

1.5.3. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

1.5.3.1. Environmental impacts scoped in through the foregoing process have been studied systematically as part of the EIA process, and the results are presented within this EIA Report. The baseline for the assessment has been derived from measurements and studies in and around the Proposed Development Site. This is explained further in **Chapter 2: Assessment Methodology** (EIA Report Volume 2) and in the methodology section of each technical assessment chapter (**Chapters 8-19** EIA Report Volume 2).

1.5.3.2. The EIA process has considered impacts resulting from the construction, operation (including maintenance) and decommissioning periods of the Proposed Development. Measures to avoid, reduce or mitigate any significant adverse effects on the environment and, where reasonably practical, enhance the environment have been considered. The need for monitoring strategies to track the delivery and success of design elements are reported, where relevant, in topic specific chapters. The EIA has also identified any likely significant 'residual' effects, defined as effects remaining following the implementation of mitigation measures.

1.5.3.3. The potential cumulative effects of the Proposed Development with other relevant known proposed or consented schemes have been outlined in the technical chapters and summarised in **Chapter 20: Summary and Likely Combined Effects and Residual Effects** (EIA Report Volume 2).

1.6. CONSULTATION

1.6.1. INTRODUCTION

1.6.1.1. Consultation is integral to developing the proposals and related assessments that underpin an application for consent and in particular, the EIA process. The views of consultees and opinions provided by the local community serve to focus the environmental studies and to identify specific issues that require further investigation, as well as to inform aspects of the design of the Proposed Development.

1.6.2. PUBLIC CONSULTATION

1.6.2.1. Two stages of public consultation were undertaken by the Applicant; Stage 1 took place between 10 May 2021 to 7 June 2021 and Stage 2 ran between 23 August to 1 October 2021. Feedback from all stages of consultation was given regard during preparation of the Application and this EIA Report. The pre-application consultation undertaken by the Applicant of particular relevance to the EIA included:

- Pre-Application consultation with statutory consultees, encompassing:
  - Early meetings and discussions with the ECU, Aberdeenshire Council, SEPA and NatureScot.
  - Agreement of method statements with SEPA and Aberdeenshire Council.
- Pre-Application consultation with non-statutory consultees, comprising:
  - Introductory meetings with community councils (CC) including Peterhead CC, Boddam CC and Cruden CC.

- Consultation with the local community including the Stage 1 consultation which introduced the project to the local community through a newsletter and virtual exhibition. At Stage 2 these materials were updated with preliminary environmental findings and in person and virtual events were held to provide more information on the Proposed Development as well as online webinar events.
- Meetings and further engagement directly with consultees following the Scoping Opinion such as Transport Scotland and the Ministry of Defence.

1.6.2.2. A Gatecheck Report (**Appendix 1C** EIA Report Volume 3) was submitted in October 2021 which summarised the consultation to date and how the EIA Report would address any comments from consultees. Comments received on the Gatecheck Report are summarised in the Pre-Application Consultation (PAC) Report and have been addressed within this EIA Report in the individual topic chapters.

1.6.2.3. Feedback on the consultation received from all consultees, along with a summary of matters raised during consultation relevant to the EIA, has informed the EIA process and the findings presented in this EIA Report. A full consultation log including the approach to consultation and how the Applicant has considered the responses received is fully documented within the PAC Report to be submitted alongside the Section 36 Application and summarised in each relevant technical chapter (**Chapters 8 - 19**) of this EIA Report.

1.6.2.4. Ongoing refinement of the concept design, together with feedback from the consultation process has resulted in the evolution of the project design and definition. This is described in detail in **Chapter 4: The Proposed Development** (EIA Report Volume 2).

1.7. ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1.7.1. THE EIA REPORT

1.7.1.1. The EIA Report is submitted as part of the suite of documents accompanying the Application. The information presented in the EIA Report describes the findings of the EIA. The EIA adopts a reasonable worst-case assessment basis, based on the Proposed Development design as it currently stands. As discussed previously, as the final technology selection and main plant layout configuration has not been made, some specific parameters cannot yet be fixed for the Proposed Development, and therefore different alternative layout options and associated parameters are presented and assessed using the Rochdale Envelope approach. This is detailed further in **Chapter 4: The Proposed Development** (EIA Report Volume 2).

1.7.1.2. Table 1.1 identifies where the information defined by Regulation 5(2) of the EIA Regulations can be found within this EIA Report. It should be noted that relevant information may be found in Volume 2 EIA Report, Volume 3 Figures and Volume 4 Appendices and in other documents (as referenced) accompanying the Application.

Table 1-1: Location of information required by Regulation 5(2) within this EIA Report.

Specified Information	Where information is provided (within this EIA Report unless otherwise stated)
a) a description of the development comprising information on the site, design, size and other relevant features of the development	Chapter 3: The Site and Surrounding Area; Chapter 4: The Proposed Development; Chapter 5: Construction Programme and Management; and Chapter 6: Consideration of Alternatives of EIA Report Volume 2 and supporting figures and appendices to these chapters in EIA Report Volume 3 and EIA Report Volume 4.
b) a description of the likely significant effects of the development on the environment	EIA Report Volume 2 Chapters 8 - 19, 'Likely Impacts and Effects' sections.
c) a description of the features of the development and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment	EIA Report Volume 2 Chapter 4: The Proposed Development and Chapters 8 - 19, 'Development Design and Impact Avoidance' and 'Mitigation and Enhancement Measures' sections.
d) a description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment	EIA Report Volume 2 Chapter 6: Consideration of Alternatives.
e) a non-technical summary of the information referred to in subparagraphs (a) to (d)	EIA Report Volume 1: Non-Technical Summary (NTS).
f) any other information specified in Schedule 4 relevant to the specific characteristics of the development and to the environmental features likely to be affected.	Baseline conditions relevant to each assessment are described in EIA Report Volume 2 Chapters 8 - 19, 'Baseline Conditions' sections. Assessment methods are described in EIA Report Volume 2, Chapter 2: Assessment Methodology and Chapters 8 - 19, 'Assessment Methodology and Significance Criteria' sections Any limitations and/ or difficulties with the assessments are described in EIA Report Volume 2 Chapters 8 - 19, 'Limitations or Difficulties' sections. The Combined Heat and Power Assessment, The Indicative Lighting Strategy, and Framework Construction Environmental Management Plan.

1.7.1.3. The structure of this EIA Report reflects the assessment topics agreed through the EIA Scoping process.

1.7.1.4. Volume 2 of the EIA Report is structured into chapters, as follows:

- Chapters 1 and 2 – an introduction to the EIA Report and EIA approach.

- Chapters 3 to 6 – a description of the Proposed Development Site and Proposed Development including information available on likely construction methods, timescales and alternatives considered.
- Chapter 7 – the legislative and planning policy context.
- Chapters 8 to 19 – assessments of the likely significant effects of the Proposed Development in relation to the environmental topics scoped into the EIA.
- Chapter 20 – assessment of combined amenity effects and summary of the likely inter-relationships between the topics covered in Chapters 8 to 19, and between the Proposed Development and other planned developments in the surrounding area (cumulative effects)
- Chapter 21 - summary of the likely significant residual effects.
- Volumes 3 and 4 of the EIA Report comprise the figures and technical appendices that accompany each chapter of Volume 2.
- Volume 1 provides a Non-Technical Summary of this EIA Report.
- The Application is accompanied by several statements that this EIA report references and should be read in conjunction with including:
  - Design and Access Statement.
  - Combined Heat and Power Readiness Assessment.
  - Carbon Capture Statement.
  - Habitat Regulations Assessment Screening Report.
  - Pre-Application Report.
  - Planning Statement.
  - Pre-Application Consultation (PAC) Report.

1.8. STATEMENT OF COMPETENCE

1.8.1. STATEMENT OF COMPETENCE

1.8.1.1. As required under Regulation 5(5b) of the EIA Regulations, an EIA Report must be accompanied by a statement outlining the relevant expertise or qualifications of those involved in its preparation. A statement of competence of the EIA coordinators and the technical specialists that have provided expert input to the EIA report is included as **Appendix 1D** (EIA Report Volume 4).

1.9. REFERENCES

Institute of Environmental Management and Assessment, (IEMA), 2011, *Special Report – The State of Environmental Impact Assessment Practice in the UK.*

PPC (2012) Pollution Prevention and Control (Scotland) Regulations 2012

SSE (2020) A Greenprint for Building a Cleaner More Resilient Economy. Available online: https://www.sse.com/media/vgqbcirq/sse-a-greenprint-for-building-a-cleaner-more-resilient-economy.pdf

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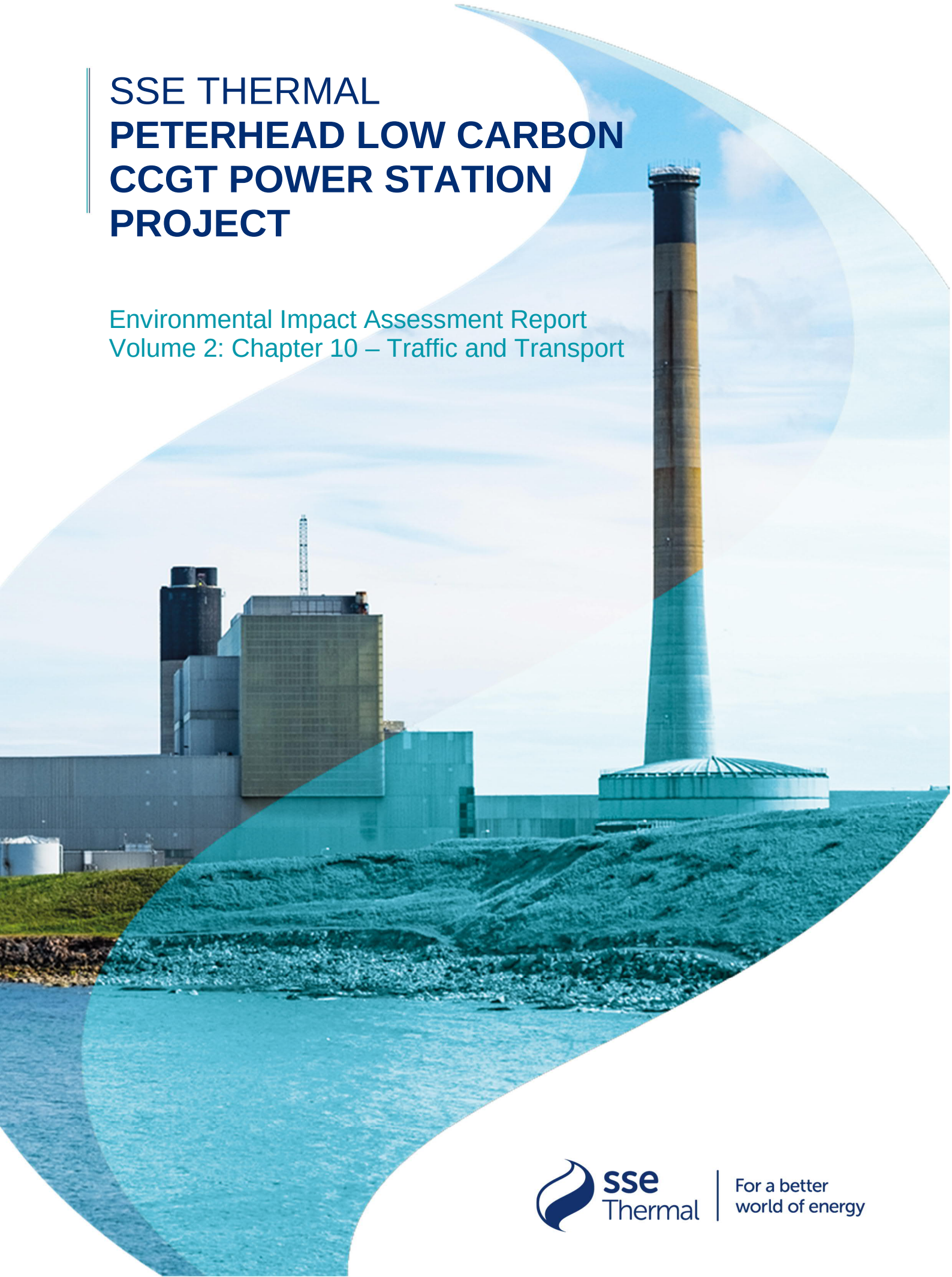
Environmental Impact Assessment Report
Volume 2: Chapter 10 – Traffic and Transport



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TABLES

10. Traffic and Transport

10.1. INTRODUCTION

10.1.1. INTRODUCTION

10.1.1.1. This chapter of the Environmental Impact Assessment Report (EIA Report) addresses the potential effects of the Proposed Development on traffic and transport. The assessment considers:

- The present day and future baseline conditions during construction and at opening;
- The effects of construction traffic on the strategic road network as a result of the Proposed Development;
- The effects of operational traffic (including maintenance) on the local road network because of the Proposed Development; and
- The potential effects of the eventual decommissioning of the Proposed Development.

10.1.1.2. The assessment of cumulative traffic and transport effects associated with the Proposed Development and other committed developments in the vicinity are described in the Transport Assessment (**Appendix 10A** EIA Report Volume 4).

10.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

10.2.1. INTRODUCTION

10.2.1.1. The following policy and guidance documents are applicable to the Proposed Development in terms of transport and accessibility.

10.2.2. SCOTTISH PLANNING POLICY

10.2.2.1. The Scottish Planning Policy (SPP) (Scottish Government, 2014) is an integral planning document which provides an overarching framework and identifies priorities within the planning system from a national perspective. It has three key applications and can be used for the preparation of development plans, the design of new developments as well as the determination of planning applications and appeals.

10.2.2.2. SPP stresses the importance of sustainable and active travel for a more connected place. Paragraph 270 of SPP states that the planning system should support patterns of development which:

- Optimise the use of existing infrastructure;
- Reduce the need to travel;
- Provide safe and convenient opportunities for walking and cycling for both active travel and recreation, and facilitate travel by public transport;
- Enable the integration of transport modes; and
- Facilitate freight movement by rail or water.

10.2.2.3. Paragraph 271 states that development plans and development management decisions should take account of the implications of development proposals on traffic, patterns of travel and road safety.

10.2.3. NESTRANS REGIONAL TRANSPORT STRATEGY

10.2.3.1. Nestrans' Regional Transport Strategy for the north-east provides a regional policy context for the site in question. The document sets out an integrated approach to meet future transport needs and bring sustainable improvements to transport across the region between 2008 and 2035. Nestrans published their draft RTS 2040 for consultation in 2020 to look ahead to the next 20 years of transport within the north-east. The Strategy seeks to build on the investment already made and shifts the focus from infrastructure investment to focus on making the best use of current infrastructure to emphasise climate change, health, equality, and technology.

10.2.4. TRANSPORT ASSESSMENT GUIDANCE

10.2.4.1. Scottish Transport Assessment Guidance (TAG) produced by Transport Scotland in 2012, provides guidance and information as to the content, methodology and approach of Transport Assessments, Transport Statements and Travel Plans produced in support of proposed development sites. It details the importance of establishing the existing transport infrastructure and travel characteristics, as well as the development proposal itself and the measures which will be included to improve infrastructure and services to encourage sustainable travel to the site.

10.2.5. PLANNING ADVICE NOTE 75 – PLANNING FOR TRANSPORT

10.2.5.1. Scottish Planning Advice Note (PAN) 75 – Planning for Transport is a planning policy document produced by the Scottish Government which provides good practice on planning and transport. This includes guidance on integrating transport, transport modelling, policy development, development management, planning agreements and environmental assessment.

10.3. ASSESSMENT METHODOLOGY

10.3.1. CONSULTATION

10.3.1.1. The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal Scoping Opinion and in response to other pre-application engagement is summarised in Table 10.1.

Table 10-1: Consultation Responses

Consultee or Organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
Aberdeenshire Council	July 2021 (Scoping Opinion)	It is noted that there are likely significant impacts during the construction, operational and decommissioning phase of the proposed development from road deliveries, traffic increase, oversize vehicles and accessibility for increased staff. The suggested mitigation of increasing car parking spaces, using a Construction Traffic Management Plan (CTMP) to minimise impacts during the construction phase and looking into the use of a secondary access point is welcomed.	A Framework CTMP has been prepared and included (see **Appendix 10B** EIA Report Volume 4). Two access points to the Proposed Development Site are proposed (Gatehouse Road access and the Sandford Lodge access track).
		A travel plan will be necessary to co-ordinate staff travel.	A Framework Construction Worker Travel Plan (CWTP) has been prepared and included (see **Appendix 10C** EIA Report Volume 4).
		Infrastructure Services (Road Development) request details of all traffic movements associated with the construction and operation of the proposed development to allow assessment of the suitability of the local road network in accommodating the new development. Additionally, details of the access arrangements should be included within the EIAR.	This is noted. Details are provided within the Transport Assessment (**Appendix 10A** EIA Report Volume 4).
Transport Scotland	July 2021 (Scoping Opinion)	An assessment of potential trunk road related environmental impacts such as driver delay, pedestrian amenity, severance, safety etc will required to be considered where appropriate (i.e. where the Institute of Environmental Management and Assessment Guidelines for further assessment are breached).	This is noted and is set out in this Traffic and Transport Chapter.

Consultee or Organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
		A full Abnormal Loads Assessment report should be provided as a technical appendix to the EIAR that identifies key pinch points on the trunk road network. Swept path analysis should be undertaken and details provided with regard to any required changes to street furniture or structures along the route.	This is noted. Details are provided within Appendix E of the Transport Assessment (**Appendix 10A** EIA Report Volume 4).
Transport Scotland	October 2021 (TA Scoping Opinion)	It is requested that in addition to the A90 / Gatehouse Road junction, junction modelling is undertaken at the A90(T) / Sanford Road junction.	This is noted. Details are provided within the Transport Assessment (**Appendix 10A** EIA Report Volume 4).
		Transport Scotland will need to be satisfied that any abnormal loads can negotiate the selected route and that their transportation will not have any detrimental effect on structures within the trunk road route path. A full Abnormal Loads Assessment report should be provided that identifies key pinch points on the trunk road network. Swept path analysis should be undertaken and details provided with regard to any required changes to street furniture or structures along the route.	This is noted. Details are provided within Appendix E of the Transport Assessment (**Appendix 10A** EIA Report Volume 4).

10.3.2. OVERVIEW

10.3.2.1. The environmental impact of the traffic predicted to be generated by the Proposed Development has been assessed with reference to the Guidelines for the Environmental Assessment of Road Traffic (GEART) (IEA, 1993). In accordance with guidance, issues including severance, driver delay, pedestrian amenity, accidents and safety associated with the Proposed Development have been investigated and are reported below.

10.3.2.2. Any likely significant environmental effects relating to air quality and noise and vibration generated by traffic associated with the Proposed Development are considered in the relevant chapters of this EIA Report.

10.3.3. STUDY AREA

10.3.3.1. The study area for this assessment has been defined by reference to the GEART (IEA, 1993). The guidelines set out two rules as follows:

- Rule 1 – include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGV is predicted to increase by more than 30%); and
- Rule 2 – include any other specifically sensitive areas where the traffic flow (or HGV component) are predicted to increase by more than 10%.

10.3.3.2. To define the study area, a network of road links has been identified and then tested against Rules 1 and 2. The road links that have been considered in determining if the above rules are satisfied, and which form the study area, are listed below and shown on **Plate 10.1** below:

- A90 (to the north of Gatehouse Road);
- A90 (to the south of Gatehouse Road);
- A90 (between the A950 and A982); and
- A982 South Road.

Plate 10-1: Highway Links within the Study Area

10.3.4. SENSITIVITY OF RECEPTORS

10.3.4.1. The sensitivity of a road, or the immediate area through which it passes, can be defined by the type of user groups who may use it. Vulnerable users may include elderly residents and children. It is also necessary to consider footpath and cycle route networks that may cross the roads within the study area.

10.3.4.2. A desktop exercise has been undertaken to classify the sensitivity of the routes within the study area. The classification of the link sensitivity is based on professional judgement. For example, if the route passes a school, care home or similar it would have a higher sensitivity due to the presence of vulnerable users. Similarly, if the route went through the middle of a town or village, it would have a higher sensitivity than if there was limited frontage development in the study corridor. Table 10.2 below identifies the links, the assigned sensitivity rating, and the associated justification.

Table 10-2: Sensitivity of Receptors

Link No.	Link Description	Link Sensitivity	Rationale
1	A90 (north of Gatehouse Road)	Low	The A90 between Gatehouse Road and the A982 passes through open country. It is a single carriageway road and is subject to the 60mph national speed limit for single carriageway roads. There is a shared pedestrian / cycle footway along the eastern side of the carriageway running the full length of the A90 between Gatehouse Road and the A90. Frontage development is limited to two houses located on this section of the A90.

Link No.	Link Description	Link Sensitivity	Rationale
2	A90 (south of Gatehouse Road)	Medium	The A90 to the south of Gatehouse Road is a single carriageway road and is subject to a 60mph national speed limit reducing to 40mph as the road passes through the village of Stirling. Footways are provided on either side of the carriageway before terminating at the southern end of the village. There is residential frontage development along the A90 through Stirling consisting of approximately 20 dwellings.
3	A90 (between A982 and A950)	Low	The A90 between the A982 and the A950 is a single carriageway road subject to a 60mph national speed limit. There is a shared pedestrian / cycle footway along the eastern side of the carriageway. There is a large residential area to the east of the carriageway however this does not front onto the A90 itself.
4	A982	Medium	The A982 is a single carriageway road subject to a 60mph national speed limit reducing to 40mph and then 30mph heading north on the approach into Peterhead town. There is a shared pedestrian / cycle footway along the length of the eastern side of the carriageway. Residential frontage is located to the west of the A982 though this is set a good distance back from the carriageway.

10.3.5. ASSESSMENT METHODS

10.3.5.1. The assessment methodology adopted in this chapter, as contained in the GEART (IEA, 1993), is recognised as the industry standard methodology for the assessment of traffic and highway impacts. The guidelines outline the issues and the respective changes in volume and composition of traffic regarded as necessary before each issue results in traffic and transport impacts.

10.3.5.2. Based on the proposed construction programme for the Proposed Development, the following assessment scenarios have been considered:

- Construction phase (subject to the necessary consents being granted and an investment decision being made, construction of the Proposed Development could potentially start in Q4 2023, with a peak of construction in 2026);
- Opening year (for the purposes of assessment in this chapter, 2027); and
- Decommissioning (it is envisaged that the Proposed Development would have a design life of circa 25 years although it could remain operational for longer. Taking into account the assessed opening year, decommissioning activities within this chapter are assumed to commence after 2052).

10.3.5.3. The following environmental effects are susceptible to changes because of the Proposed Development.

- **Severance:** Severance occurs in a community when a major artery separates people from places and other people. Severance occurs from difficulty of crossing a road or where the road itself creates a physical barrier. Severance can be caused to pedestrians or motorists. The GEART (IEA, 1993) suggest that changes in total traffic flow of 30%, 60% and 90% result in slight, moderate and substantial changes in severance respectively.
- **Pedestrian Amenity:** Pedestrian amenity is broadly defined as the relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition, pavement width and separation between vehicles and pedestrians. The impact manifests itself in fear and intimidation, exposure to noise and vehicle emissions. The GEART (IEA, 1993) suggest that a doubling or halving of total traffic flow or the HGV composition could lead to perceptible negative or positive impacts upon pedestrian amenity.
- **Fear and Intimidation:** The volume of traffic and its HGV composition are the factors that contribute to fear and intimidation. In the absence of thresholds set out in the GEART (IEA, 1993), this EIA Report considers that changes in total traffic flow of 30%, 60% and 90% are considered to result in slight, moderate or substantial impacts.
- **Highway Safety:** Highway safety is assessed by the frequency and severity of injury accidents that are attended by the police and recorded in official accident statistics. Intensification of use or changes in the composition of traffic has the potential to have an effect on collision rates. The examination of recent collision statistics on routes within the study area will highlight any hotspots that need further examination.
- **Driver Delay:** The use of industry standard junction capacity modelling programs provides a methodology to quantify junction delay. Driver delay is only likely to be significant where the existing study area highway network is at or close to capacity.
- **Hazardous Loads:** Assessed based on the estimated number and composition of such loads. Where the number of movements is considered to be significant, a risk analysis should be undertaken to illustrate the potential for an accident to happen and the likely effect of such an event.

10.3.6. SIGNIFICANCE CRITERIA

10.3.6.1. Using the information set out above, the magnitude of traffic impacts is defined in Table 10.3.

Table 10-3: Sensitivity of Receptors

Type of Impact	Magnitude of Impact			
	Very Low	Low	Medium	High
Severance	Change in total traffic flow of <30%	Change in total traffic flow of 30% to 60%	Change in total traffic flow of 60% to 90%	Change in total traffic flow of >90%
Pedestrian Amenity	Change in traffic flow (or HGV Component) <50%	Change in traffic flow (or HGV Component) of 51% to 100%	Change in traffic flow (or HGV Component) of 101% to 150%	Change in traffic flow (or HGV Component) of >151%

Type of Impact	Magnitude of Impact			
	Very Low	Low	Medium	High
Fear and Intimidation	Change in total traffic flow of <30%	Change in total traffic flow of 30% to 60%	Change in total traffic flow of 60% to 90%	Change in total traffic flow of >90%
Highway Safety	Magnitude of impact derived using professional judgement informed by the frequency and severity of collisions within the study area and the forecast increase in traffic.			
Driver Delay	Magnitude of impact derived using professional judgement informed by the increase in vehicle delay and informed by whether a junction is at, or close to capacity.			
Hazardous Loads	Based on the probability of a personal injury collision, categorised as fatal or serious, involving a hazardous load occurring.			

10.3.6.2. By combining the receptor sensitivity with the magnitude of impact using the assessment matrix shown in Table 10.4, traffic effects are classified as negligible, minor, moderate or major (adverse or beneficial).

Table 10-4: Classification of Effects

Type of Impact	Sensitivity / Importance of Receptor			
	High	Medium	Low	Very Low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

10.3.6.3. Only moderate and major effects are considered to be significant for the purposes of this EIA; minor and negligible effects are 'not significant'.

10.3.7. SOURCES OF INFORMATION / DATA

10.3.7.1. As set out in further detail in the Transport Assessment (**Appendix 10A** EIA Report Volume 4), as agreed with both Transport Scotland and Aberdeen Council, a series of 7-day automated traffic counts (ATCs) were undertaken the week commencing Monday 16th August 2021 at the following locations to provide a baseline for comparison on the following roads:

- A90 (to the north of Gatehouse Road);
- A90 (to the south of Gatehouse Road);
- A90 (between the A950 and A982); and
- A982 South Road.

10.3.7.2. In addition to the ATC counts, the impact of the Proposed Development has been examined at the following junctions on the strategic highway network for the overall network morning (AM) and evening (PM) peak hours:

- A90 / Gatehouse Road; and
- A90 / New Access at Sandford Lodge.

10.3.7.3. The junction count at the A90 / Gatehouse Road was undertaken on Wednesday 18th August 2021.

10.3.8. ASSESSMENT ASSUMPTIONS AND LIMITATIONS

10.3.8.1. As described in **Chapter 4: The Proposed Development** (EIA Report Volume 2), three indicative site layout options have been considered in this EIA for the placement of the core infrastructure within the Proposed Development Site. Each of the site layout options considered for the Proposed Development may produce slightly different impacts in terms of height and massing of structures, emissions to air, discharges to water and generation of waste. This chapter has assessed the reasonable worst-case for each environmental effect (from these three indicative layouts) in terms of construction workers and traffic movements to define the reasonable worst-case.

10.4. BASELINE CONDITIONS

10.4.1. EXISTING BASELINE

10.4.1.1. The Proposed Development Site is immediately north of Boddam and a short distance south of the town of Peterhead. It is bounded to the south by Boddam, to the north and east by the North Sea and to the west by the A90 trunk road (T).

10.4.1.2. It is proposed that all construction workers would access the Proposed Development Site via the Gatehouse Road entrance used for access to the existing Peterhead Power Station, located off the A90(T). It is proposed that Abnormal Indivisible Loads would use the Sandford Lodge access track located 1km to the north of the Gatehouse Road entrance, off the A90(T).

10.4.1.3. Access for Construction HGV traffic will be provided via the A90 Sanford Lodge junction and/or via the A90 Gatehouse Road junction. Both junction access options have been tested.

10.4.1.4. The A90(T) falls under the control of Transport Scotland as part of the national trunk road network. Ultimately the A90(T) connects Fraserburgh with Edinburgh, however in this location it is also fulfilling a regional role of connecting the Buchan area with Aberdeen and other parts of Aberdeenshire to the south and a local role of connecting the rural area and villages to the south of Peterhead with the town itself.

10.4.1.5. All streets extending from the A90(T) fall under the authority of Aberdeenshire Council.

10.4.2. EXISTING BASELINE TRAFFIC FLOWS

10.4.2.1. The following highway links form the agreed highway network of interest for this assessment:

- A90 (to the north of Gatehouse Road);
- A90 (to the south of Gatehouse Road);
- A90 (between the A950 and A982); and
- A982 South Road.

10.4.2.2. Baseline 24-hour annual average daily traffic (AADT) two-way link flows in 2021 for the study area are provided in Table 10.5. Further details of the baseline traffic data are provided in the Transport Assessment (**Appendix 10A** EIA Report Volume 4).

Table 10-5: 2021 Baseline Traffic Flows (24-hour AADT)

Link	Link Description	Total Vehicles	Total HGVs
1	A90 (to the north of Gatehouse Road)	12,539	1,735
2	A90 (to the south of Gatehouse Road)	12,455	1,590
3	A90 (between the A950 and A982)	7,949	843
4	A982 South Road	11,248	1,358

10.4.3. BASELINE ACCIDENT RECORD

10.4.3.1. Personal Injury Accident (PIA) data has been obtained from the Crashmap website for the five-year period 2016 to 2020 for the study area, which includes a section of the A90 from its junction with Invernettie Roundabout to its junction with the B9108 Station Road.

10.4.3.2. There has been a total of four collisions within the study area over the five-year period which covers an approximate distance of 1.3 miles. Of these, two were recorded slight in severity and two were serious in severity. No fatal collisions are recorded.

10.4.3.3. Of the accidents of slight severity, one occurred on the A90 at the junction with the B9108 Station Road in May 2016 and involved a car turning right colliding with another car proceeding normally along the carriageway. The other accident of slight severity occurred at the junction of the A90 and an unnamed road, 650 metres north of Gatehouse Road. This accident occurred in June 2019 and involved a car turning right colliding with another car proceeding normally along the carriageway.

10.4.3.4. The two accidents of serious severity both occurred in 2016 on the A90 in the vicinity of the Sanford Lodge junction. Of these, one involved a car proceeding normally along the A90 and colliding with a car that was parked on the carriageway. The other accident of serious severity involved a car and HGV colliding on the A90.

10.4.3.5. Analysis suggests that the accidents were attributed to driver/rider error such as a failure to judge the other person's path or speed, a failure to look properly and/ or loss of control. None of the accidents can be attributed to an inadequate highway design.

10.4.4. FUTURE BASELINE

10.4.4.1. It is currently anticipated that construction work would commence at the earliest in Q1 2024 with the peak of construction occurring in Q1 2026.

10.4.4.2. Future year baseline flows for 2026 have been derived by applying the standard Trip End Model Presentation Programme (TEMPRO) to derive traffic growth factors, as indicated in Table 10.6. These growth factors have been considered when comparing the baseline and future traffic scenarios.

Table 10-6: TEMPRO traffic growth factors (average day)

YEAR	GROWTH FACTOR
2021 - 2026	1.0365

10.4.4.3. Future year baseline scenarios are not detailed for 2027 (opening) due to the very low traffic flows generated by the operation of the Proposed Development. Therefore, a quantitative assessment of operational traffic has not been necessary, as the vehicle numbers generated would be considerably lower than those that would be experienced during the construction period.

10.4.4.4. During an outage, it could be expected that up to 200 additional staff could be on-site on any one day. However, outages are expected to occur infrequently (once every 2-5 years) and are short-lived (approximately 3 months). Therefore, it is considered that the effects of operational traffic during these maintenance periods would be negligible as the vehicle numbers generated would be considerably lower than those that would be experienced during construction and are assessed herein. A detailed assessment of the operational (including maintenance) phase of the development is therefore not required within the Transport Assessment.

10.4.4.5. Future year baseline traffic flows for the assessment year of 2026 peak of construction are presented in Table 10.7.

Table 10-7: 2026 Baseline Traffic Flows (24-hour AADT)

Link	Link Description	Total Vehicles	Total HGVs
1	A90 (to the north of Gatehouse Road)	12,997	1,799
2	A90 (to the south of Gatehouse Road)	12,910	1,648
3	A90 (between the A950 and A982)	8,239	874
4	A982 South Road	11,659	1,407

10.4.4.6. The following committed developments have been considered but are not included within the future baseline for reasons as set out in Table 10.8 below.

Table 10-8: Projects considered but not included within the assessment

Application Reference	Local Planning Authority	Description	Material Consideration
APP/2021/0538	Aberdeenshire	Installation and Operation of up to 31 High-Speed Diesel Generators up to 18MW, Associated Electrical Infrastructure and Associated Fuel Storage.	This is an ancillary development to support the existing power station with no material increase in traffic generation within our study area.

Application Reference	Local Planning Authority	Description	Material Consideration
APP/2019/0982	Aberdeenshire	Erection of Electricity Substation Comprising Platform Area, Control Building, Associated Plant and Infrastructure, Ancillary Facilities, Landscape Works and Road Alterations and Improvement Works	This development is currently under construction and will be completed prior to the peak construction year of the Proposed Development in 2026. Traffic generated by this development once operational will be minimal as the site will be unmanned.
APP/2019/0506	Aberdeenshire	Reinforcement of 400kV Overhead Lines Between Blackhillock Peterhead Substation And Kintore Substation	A detailed programme presented in Appendix E of CTMP (document called "21/00771/DISCON - CTMP - ACCEPTED" on Moray Council Portal) states the development is to be completed in Q4 2024; this is prior to the peak construction year of the Proposed Development in 2026. Traffic generated by this development once operational will be minimal.
APP/2019/0005	Aberdeenshire	Erection of Biomass Boiler and Installation of Ground Source Heat Pump	Transport impact considered to be insignificant based on the scale of development proposed; no TA/TS was submitted in support of the planning application.
APP/2017/0608	Aberdeenshire	Erection of 210 Dwelling houses with Associated Infrastructure (Amended Road Layout) to Planning Permission Reference APP/2016/0720	This development is already built out. Development flows associated with this development are included within traffic counts undertaken in August 2021.
APP/2018/1831	Aberdeenshire	Installation of Underground HVDC Cables	The supporting TS identifies that the additional 44 two-way vehicle movements are unlikely to significantly add to vehicle movements on the road network surrounding the site. We would agree with this conclusion and any traffic would be included within the normal background growth taken from TEMPRO.

Application Reference	Local Planning Authority	Description	Material Consideration
APP/2020/2155	Aberdeenshire	Erection of Pavilion and Formation of Multi Use Games Area (MUGA), BMX Pump Track, Mini Golf Area, Exercise Area, Gardens, Picnic Area, Play Area, Car Park and Associated Works	Transport impact considered to be insignificant based on the scale of development proposed; no TA/TS was submitted in support of the planning application. .
APP/2016/3211	Aberdeenshire	Alterations and Extension to Landfill Site and Erection of Waste Transfer Building without compliance with condition 10 (Blasting) of Approved Planning Permission N992222PF	No transport effects identified. Application seeks to permit a temporary non-compliance with condition 10 (blasting).
APP/2018/1288	Aberdeenshire	Formation of Supply Base Including Provisions for Warehousing, Offices and Pipe Storage without Compliance with Condition 3 (Investigation of Potentially Contaminated Sites) and Condition 4 (Remedial Works) of Permission Reference APP/2015/0327	Transport impact considered to be insignificant based on the scale of development proposed; no TA/TS was submitted in support of the planning application. .
APP/2017/0050	Aberdeenshire	Erection of 150 Dwelling houses, Provision of Land for Future Affordable Housing, Associated Landscaping and Infrastructure	Development is considered to fall outside the area of influence for the Proposed Development. Any traffic associated with the development would be incorporated within background growth applied to the 2021 baseline flows
ECU00001807	Energy Consents Unit	Overhead line works to connect into proposed Peterhead 400kV substation.	Project will be operational prior to the peak construction year of the Proposed Development in 2026. Traffic generated by the development once operational will be minimal.

Application Reference	Local Planning Authority	Description	Material Consideration
ECU00001995	Energy Consents Unit	St Fergus 132/11kV Transformer Replacement New Tower and Cable Sealing End Compound (ties into the proposed substation with reference number APP/2019/0982)	Project will be operational prior to the peak construction year of the Proposed Development in 2026. Traffic generated by the development once operational will be minimal.
APP/2015/1121	Aberdeenshire	NorthConnect Converter Station Address: Site At Four Fields Boddam Peterhead	Application states construction period 2020 – 2023, this therefore does not therefore correspond with our peak construction period of 2026
APP/2021/2681	Aberdeenshire	Erection of HVDC Electrical Converter Station and Associated Access Tracks, Drainage Works and Landscaping Including Enclosure Address: Site to the north of Four Winds Buckie Farm, Boddam, Aberdeenshire	Estimated construction start date of 2023, this therefore does not therefore correspond with our peak construction period of 2026
APP/2021/2392	Aberdeenshire	Construction of Synchronous Condenser and Associated Infrastructure Address: Land to the east of Buckie Farm, Boddam, Aberdeenshire, AB42 3AJ	Estimated construction start date of 2023, this therefore does not therefore correspond with our peak construction period of 2026

10.5. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

10.5.1. CONSTRUCTION

10.5.1.1. The Applicant would implement a range of good practice mitigation measures during the construction phase to minimise traffic impacts upon the strategic and local highways, including:

- Implementation of the CWTP will include measures and procedures to encourage construction workers to adopt modes of transport which reduce reliance on single

occupancy private car use. A Framework CWTP is included at **Appendix 10C** EIA Report Volume 4.

- Liaison with the appointed contractor for the potential to implement construction worker minibuses and car sharing options (considered as part of the CWTP);
- Implementation of a CTMP to include measures to control the routing and impact of HGVs on the local road network during construction. A Framework CTMP is included at **Appendix 10B** EIA Report Volume 4.
- During the commissioning (and operational) phase, working with suppliers to ensure that all materials (including chemicals) bought to the Proposed Development Site that are classified as hazardous are transported in compliance with applicable regulations including the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (CDG Regs) (as amended). This will include, for example:
  - Consignments being marked with the familiar “Emergency Action Codes”; and
  - Including a telephone number for advice in the event of an emergency.

10.5.2. OPERATION

10.5.2.1. Once the Proposed Development is operational, up to 50 permanent operational roles (working in shifts) would be created. Due to the very low traffic flows this would generate, no additional impact avoidance measures are proposed.

10.5.2.2. Chemicals and wastes transported to/from the Proposed Development Site, where they are deemed to be hazardous, will be transported in fit for purpose vehicles and will comply with existing legal and regulatory duties. Regulation of hazardous loads is currently via the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) (United Nations, 2019). ADR sets out the requirements for the classification, packaging, labelling, and certification of dangerous goods. It also includes specific vehicle and tank requirements and other operational requirements. The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 apply ADR in Great Britain.

10.5.2.3. The specific details for the expected hazardous substances and related quantities to be delivered and removed from the Proposed Development Site during the operational phase are not yet known but preliminary information has been compiled and it is estimated that there would be circa 1 HGV per day delivering chemicals and up to 5 HGV per day coming to remove waste (mainly acid wash effluent if this design option is selected). On this basis the number of movements is not considered to be significant.

10.5.2.4. Given the circa 200 additional staff that could be on-site on any one day during an outage which may occur infrequently (once every 2-5 years) and be short-lived (approximately 3 months), no additional impact avoidance measures are considered necessary as both the HGV and staff vehicle numbers would be considerably lower than during construction.

10.5.3. DECOMMISSIONING

10.5.3.1. Decommissioning would be expected to require some traffic movements associated with the removal (and recycling, as appropriate) of material arising from demolition and potentially the import of materials for land restoration and re-instatement. To minimise the impacts of decommissioning upon strategic and local highways, it is anticipated that controls on traffic management would be secured via the Decommissioning Environmental Management Plan (DEMP) that would be prepared prior to demolition activities commencing.

10.6. LIKELY IMPACTS AND EFFECTS

10.6.1. CONSTRUCTION

10.6.1.1. Access to and from the Proposed Development Site for all construction workers would be via the existing Gatehouse Road entrance located off the A90(T).

10.6.1.2. Access for Construction HGV traffic will be provided via the A90 Sanford Lodge junction and/or via the A90 Gatehouse Road junction. Both junction access options have been tested.

10.6.1.3. Given the lack of right turn facilities at the A90/ Sandford Lodge junction, with this option, construction HGVs utilising the A90 Sandford Lodge access track will be required to enter the site from the A90 north turning left in and left out on departing the site.

10.6.1.4. Prior to the main construction works commencing, an Early Preparation Works phase including the widening of the A90/Gatehouse Road to incorporate a right turn lane into the site and the widening of the entrance to Sandford Lodge at the junction with the A90 to allow for HGV deliveries will be completed.

10.6.1.5. The provision of the right turn lane at the A90/ gatehouse junction is required for capacity reasons to allow the traffic turning right into the Proposed Development Site to wait without blocking traffic heading north on the A90. The works to the Sandford Lodge junction are required to provide a layout that is to the correct standard as it is currently a very simple track access road and is not suitable for HGV use. The proposed layout of the junctions is included within Appendix B of the supporting Transport Assessment (**Appendix 10A** EIA Report Volume 4).

10.6.1.6. Both junctions would then be approved and implemented through a Section 56 Agreement (Roads (Scotland) Act 1984) following a detailed highway design process to follow at the appropriate time should the Proposed Development be granted a consent.

10.6.1.7. It is currently anticipated that (subject to the necessary consents being granted and an investment decision being made), the earliest start date that construction work could commence is Q1 2024 lasting around 42 months.

10.6.1.8. It is expected that the construction workforce could peak at circa 1,300 workers per day in months 26 – 27 (i.e. Q1 2026 at the earliest). A profile of the anticipated daily workforce each month through the construction period is provided in the Transport Assessment (**Appendix 10A** EIA Report Volume 4).

10.6.1.9. Core construction working hours for the Proposed Development would be 07:00 to 19:00 Monday to Friday (except bank holidays) and 08:00 to 13:00 on Saturday. However, it is likely that some construction activities may need to be undertaken outside of these core working hours.

10.6.1.10. Where on-site works are to be conducted outside the core hours, they would comply with any restrictions agreed with the local planning authority, in particular regarding control of noise and traffic. Any such works will be minimised and will be carefully managed to reduce effects on local people.

10.6.1.11. HGV deliveries would not be undertaken outside of core working hours, unless previously agreed with the local planning authority on a case-by-case basis.

10.6.1.12. Based on the methodology contained within Section 4.3 of the Transport Assessment (**Appendix 10A** EIA Report Volume 4), the weekday construction worker shift is likely to

generate approximately 558 vehicular trips (one-way) during the AM arrival and PM departure periods at the peak of construction, a total of 1,116 two-way movements over the full day.

10.6.1.13. HGV delivering construction materials would access the Proposed Development Site via the A90 Sanford Lodge and/or A90 Gatehouse Road junctions, (with associated improvements to both junctions where they meet the A90).

10.6.1.14. The volume of construction HGV on the network is predicted to be at its maximum of around 120 two-way daily HGV movements (60 in and 60 out) from month 24 to month 35 of construction. During month 3 to month 6 of the programme, construction HGVs on the network is predicted to be 112 two-way daily HGV movements (56 in and 56 out). This is associated with the potential removal of spoil to landfill, should this be required. During the remainder of the construction period 60 two-way daily HGV movements (30 in and 30 out) are expected from months 9 to 23 and from months 36 to 42 of construction and 10 two-way daily HGV movements (5 in and 5 out) from months 1 to 2 and 7 to 8 of the construction programme. This is summarised in Table 10.9 below.

Table 10-9: Daily two-way HGV movements during construction

Month	HGV Arrivals	HGV Departures	Total Two-Way HGVs
1 - 2	5	5	10
3 - 6	56	56	112
7 - 8	5	5	10
9 - 23	30	30	60
24 - 35	60	60	120
36 - 42	30	30	60

10.6.1.15. Combining construction workforce vehicle movements with construction HGV movements over the entire construction programme shows the overall peak to occur in Months 26 and 27 when 1,236 two-way vehicle movements are anticipated (1,116 two-way car/ van movements and 120 two-way HGV movements per day).

10.6.1.16. Table 10.10 summarises the expected profile of construction phase peak traffic levels.

Table 10-10: Daily Construction Vehicle Profile (Peak Month of Construction)

Hour Beginning	Construction Worker Vehicles (Plant)		Plant Construction HGV	
	Arrival	Departure	Arrival	Departure
06:00	167	0	0	0
07:00	307	0	5	5
08:00	56	0	5	5
09:00	28	0	5	5

Hour Beginning	Construction Worker Vehicles (Plant)		Plant Construction HGV	
	Arrival	Departure	Arrival	Departure
10:00	0	0	5	5
11:00	0	0	5	5
12:00	0	0	5	5
13:00	0	0	5	5
14:00	0	0	5	5
15:00	0	0	5	5
16:00	0	56	5	5
17:00	0	84	5	5
18:00	0	390	5	5
19:00	0	28	0	0
Total	**558**	**558**	**60**	**60**

10.6.1.17. Based on the vehicle assignment contained within the Transport Assessment (**Appendix 10A** EIA Report Volume 4), Table 10.11 summarises the likely changes in link flows within the study area for the assessment year 2026, peak of construction. It is assumed that all construction HGV traffic will arrive and depart to the south. Further details regarding the distribution and assignment of construction worker vehicles and construction HGVs is provided within the Transport Assessment (**Appendix 10A** EIA Report Volume 4).

10.6.1.18. To provide a robust (reasonable worst case) assessment, the following table assesses the scenario whereby all HGVs access the site via the A90 / Sandford Lodge junction, thus travelling along the A90 (north of Gatehouse Road).

10.6.1.19. As all HGVs are assumed to arrive / depart from the south the flow on the A90 (south of gatehouse Road) is the same in either access option.

Table 10-11: 2026 Base + Peak of Construction Daily Two-Way Traffic Flows

Link No.	Link Description	Baseline Flow		Construction Traffic		Percentage Increase	
		Total veh.	Total HGV	Total veh.	Total HGV	Total veh.	Total HGV
1	A90 (to the north of Gatehouse Road)	12,997	1,799	149	120	1.1%	6.7%
2	A90 (to the south of Gatehouse Road)	12,910	1,648	1,205	120	9.3%	7.3%
3	A90 (between the A950 and A982)	8,239	874	11	0	0.1%	0.0%
4	A982 South Road	11,659	1,407	18	0	0.2%	0.0%

10.6.1.20. The additional traffic due to the Proposed Development construction activities will result in some increases in traffic flows including HGV on the observed roads leading to the Proposed Development Site.

10.6.1.21. In accordance with GEART, only those sensitive links that show a greater than 10% increase in traffic flows (or HGV component) or, for all other links, a greater than 30% increase in total traffic or the HGV component are considered when assessing the traffic impacts upon receptors. The assessment has been completed using the matrix provided in Table 10.4 to assess the transportation effects associated with construction traffic at the peak of construction.

10.6.1.22. AIL movements are expected to be required during the construction programme associated with the delivery of large items of plant and equipment. The exact number and size/ weight is not known at this stage and is based on specific construction methodologies and will be confirmed at the detailed design stage.

10.6.1.23. It is expected that the larger abnormal loads will be delivered to Peterhead Port using south base (Asco). Deliveries from south base will pass along South Base Road before joining the A90(T) at Invernettie Roundabout and heading south to the Sandford Lodge access.

Severance

10.6.1.24. The predicted change in total traffic associated with Proposed Development construction activities is considerably less than 30% on each link road (very low impact). Therefore, the severance effect would be **negligible** (**not significant**).

Pedestrian Amenity

10.6.1.25. The change in total traffic (or HGV component) is considerably less than 50% on each link road (very low impact). Therefore, the significance of effect for pedestrian amenity would be **negligible** (**not significant**).

Fear and Intimidation

10.6.1.26. The change in total traffic is considerably less than 30% on each link road (very low impact). Therefore, the significance of effect on fear and intimidation would be **negligible** (**not significant**).

Highway Safety

10.6.1.27. Accident data for the most recent five years has been acquired for the study area and is summarised in Section 10.4. The statistics provide information on the location and severity of each PIA. Given that the level of increase in traffic flow resulting from the Proposed Development on road links is negligible, the signifciance of effect on highway safety is considered **negligible** (**not significant**).

Driver Delay

10.6.1.28. The performance of a junction is judged by the ratio of flow to capacity (RFC). As a general guide, a junction operating below a threshold of 0.85 is considered to operate within its design capacity. Junction modeliing has been undertaken at the A90 / Gatehouse Road site access which will include a proposed right turn lane and the A90 / Sandford Lodge access which will be widened in order to accommodate construction HGVs. These improvements will improve driver delay and capacity by in the case of the Gatehouse junction removing right turning traffic from the ahead traffic, thus removing any delay to cars wishing to travel north on theA90, and the banning of the right turn into the Sandford Lodge access will remove any delay to northbound ahead traffic at this junction.

10.6.1.29. The results are provided in the Transport Assessment (**Appendix 10A** EIA Report Volume 4) for the AM and PM peak hours (07:00 – 08:00 and 16:00 – 17:00). This demonstrates that both junctions would operate within their design capacity at the peak of construction (Q1 2026). Junction modelling, therefore, indicates that the significance of effect on driver delay would be **negligible** (**not significant**).

Overview

10.6.1.30. In summary, the significance of effects of the Proposed Development construction traffic on all road links and junctions within the study area are considered to be **negligible** (**not significant**).

10.6.2. OPENING AND OPERATION

10.6.2.1. Once operational, up to 50 permanent operational roles would be created plus there will be several HGV deliveries, which are discussed below. Depending on the degree of integration with the existing Peterhead Power Station, these may be new jobs or roles undertaken by personnel at the existing power station. It is anticipated that staff would work a two-shift system 07:00 – 19:00 and 19:00 – 07:00. Administrative staff are anticipated to work an office-hour pattern between 08:30 and 18:00. Conservatively, assuming a car occupancy of one, this could equate to an additional 50 cars accessing the Proposed Development Site per day (100 vehicle movements).

10.6.2.2. There would also be additional HGV traffic generated by deliveries associated with operations and maintenance plant/ equipment.

10.6.2.3. Fuel (natural gas) would be delivered by pipeline therefore, there would be no vehicular movements associated directly with the transport of gas to the Proposed Development Site.

10.6.2.4. Regarding the delivery and removal of hazardous loads associated with the CCP Plant, the GEART (IEA, 1993) notes that some developments may involve the transportation of dangerous or hazardous loads by road and that, where this is likely to occur, an EIA Report should clearly outline the estimated number and composition of such loads. Where the number of movements is considered to be significant, a risk analysis is required to illustrate the potential for an accident to happen and the likely effect of such an event.

10.6.2.5. The specific details for the expected hazardous substances and related quantities to be delivered and removed from the Proposed Development Site during the operational phase are not yet known but preliminary information has been compiled and it is estimated that there would be circa 1 HGV per day delivering chemicals and up to 5 HGV per day coming to remove waste (mainly acid wash effluent if this design option is selected). On this basis the number of movements is not considered to be significant against the assessment screening criteria and based on the baseline road traffic volumes on the primary route to Proposed Development Site and therefore no further assessment is required. Legal compliance measures are outlined in Section 10.5 to ensure the appropriate carriage of hazardous goods to and from the Proposed Development Site.

10.6.2.6. Routine maintenance will be undertaken annually with major overhauls occurring approximately once every two to five years depending on the nature of plant operations in that period. These maintenance activities will require around 200 additional contractors to work on the Proposed Development Site. There will be very low traffic flows once the Proposed Development is operational (for the purposes of this assessment, assumed to be 2027), the vehicle numbers generated would be considerably lower than experienced during the construction period. The overall significance of effects during operation are therefore considered to be **negligible** (**not significant**).

10.6.3. DECOMMISSIONING

10.6.4. DECOMMISSIONING

10.6.4.1. The activities involved in the decommissioning process for the Proposed Development are not yet known in detail, as it has a design life of 25 years and an operational life that could extend longer than that. There would be expected to be some traffic movements associated with the removal (and recycling, as appropriate) of material arising from decommissioning and potentially the import of materials for land restoration and re-instatement. However, vehicle numbers are not expected to be higher than those experienced during the construction period.

10.6.4.2. Current baseline data collected for the purposes of this assessment would not be valid at the year of decommissioning (i.e. for the purposes of this assessment after circa 2052). However, as it is unlikely that baseline traffic figures on local roads would reduce appreciably over the next 25 years, it is considered that the percentage increase in traffic due to decommissioning would be negligible and that overall, the effects of decommissioning traffic would be no greater than that of construction traffic. The significance of effects are therefore assessed as likely to be **not significant**.

10.7. MITIGATION, MONITRING AND ENHANCEMENT MEASURES

10.7.1. OVERVIEW

10.7.1.1. No additional mitigation measures or enhancement measures other than those set out in Section 10.5 are considered necessary. However, the Contractor will review options for the use of waterborne transport when sourcing construction materials.

10.8. CUMULATIVE EFFECTS

10.8.1. CUMULATIVE EFFECTS

10.8.1.1. The cumulative assessment was covered within TEMPRO to incorporate the future baseline, with the identified other developments being covered within background traffic growth, and therefore there is not a separate cumulative effects assessment.

10.9. LIMITATIONS OR DIFFICULTIES

10.9.1. OVERVIEW

10.9.1.1. Detailed construction information is not yet available as the construction contractor has not yet been appointed. Therefore, this assessment draws upon the experience and assessments undertaken for other similar projects. It is considered that the assumptions made have resulted in the assessment being robust.

10.10. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

10.10.1. SUMMARY

10.10.1.1. The additional traffic due to Proposed Development construction activities would result in small, temporary increases of traffic flows, including HGV, on the roads leading to the Proposed Development Site. In line with the significance criteria presented herein and in the Transport Assessment (**Appendix 10A** EIA Report Volume 4), the significance of effects of construction traffic on all road sections and junctions are anticipated to be negligible and thus not significant. Notwithstanding this, several traffic management measures would be implemented during the Proposed Development construction phase to minimise traffic impacts upon the local road network (refer to Section 10.5).

10.10.1.2. The generation of traffic during Proposed Development operation would be minimal when compared to the construction phase. Therefore, the significance of operational phase traffic effects are also considered to be negligible and thus not significant.

10.10.1.3. The generation of traffic during the decommissioning phase is expected to involve traffic movements associated with the removal (and recycling, as appropriate) of material arising from demolition and potentially the import of materials for land restoration and re-instatement. However, the significance of effects of decommissioning traffic would be no greater than that of the construction traffic and are, therefore, anticipated to be negligible and thus not significant.

10.11. REFERENCES

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SSE THERMAL

PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 11 – Biodiversity and Nature Conservation

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CONTENTS

TABLES

11. Biodiversity and Nature Conservation

11.1. INTRODUCTION

11.1.1 INTRODUCTION

11.1.1.1 This chapter addresses the potential impacts and effects of the construction, operation (including maintenance) and decommissioning / restoration of the Proposed Development on biodiversity and nature conservation. It considers terrestrial and freshwater habitats and species, including bird species that forage in the marine environment, and grey seal *Halichoerus grypus*[1]. Throughout this chapter, the term 'ecological feature' is used to refer to sites designated for nature conservation, habitats, and floral and faunal species.

11.1.1.2 Where appropriate, it provides details of committed mitigation and/or enhancement measures identified to minimise or compensate for adverse effects on ecological features.

11.1.1.3 Due to the interdisciplinary nature of effects, this chapter cross references to other chapters including **Chapter 4: The Proposed Development**, **Chapter 7: Legislative Context and Planning Policy**, **Chapter 8: Air Quality**, **Chapter 12: Water Environment,** and **Chapter 15: Landscape and Visual Amenity** (EIA Report Volume 2). It is also supported by **Figures 11.1** to **11.5** (EIA Report Volume 3) and the following appendices and their associated figures (EIA Report Volume 4):

- **Appendix 11A: Method for Assessment of Ecological Impacts**;
- **Appendix 11B: Bats**;
- **Appendix 11C: Protected and Notable Mammals**;
- **Appendix 11D: Breeding and Non-breeding Birds**;
- **Appendix 11E: Aquatic Ecology**;
- **Appendix 11F: Statement to Inform Habitats Regulations Appraisal**; and
- **Confidential Appendix 11G: Badger Setts**.

11.1.1.4 Also relevant to this chapter is the Statement to Inform Habitats Regulations Appraisal submitted as part of the Section 36 Application in support of the Proposed Development. This describes the assessment conducted to test for likely significant effects from the Proposed Development on the qualifying features of European sites, which comprise Special Areas of Conservation (SAC) and Special Protection Areas (SPA). Where appropriate, reference is made in this chapter to analysis presented in **Appendix 11F: Statement to Inform Habitats Regulations Appraisal** (EIA Report Volume 4).

11.1.1.5 Throughout this chapter, species are given their common and scientific names when first referred to and their common names only thereafter. All distances are cited as the shortest distance 'as the crow flies', unless otherwise specified. The term the 'Proposed Development Site' refers to the area within the red line boundary, as shown on **Figure 3.1: Proposed Development Site Boundary,** and **Figure 3.3: Proposed Development Layout** (EIA Report Volume 3).

[1] Assessment of marine ecology was initially scoped out in the EIA Scoping Report. However, due to observations of a relatively large number of grey seals on rocks near Boddam Harbour, this species has been considered in this chapter. No other marine ecological features have been scoped into the assessment.

11.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

11.2.1 LEGISLATIVE BACKGROUND

11.2.1.1 The Ecological Impact Assessment (EcIA) presented in this chapter has been carried out within the context of the following relevant legislative instruments:

- Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the 'Habitats Regulations');
- Wildlife and Countryside Act 1981 (as amended) (the 'WCA');
- Nature Conservation (Scotland) Act 2004 (as amended);
- Wildlife and Natural Environment (Scotland) Act 2011 (as amended);
- Protection of Badgers Act 1992 (as amended);
- Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003;
- Marine (Scotland) Act 2010 and the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 (as amended);
- Conservation of Seals Act 1970;
- Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR); and
- Water Environment and Water Services (Scotland) Act 2003.

11.2.2 PLANNING POLICY CONTEXT

11.2.2.1 Detailed information on relevant planning policy can be found in **Chapter 7: Legislative Context and Planning Policy** (EIA Report Volume 2), as well as the Planning Statement submitted as part of the Section 36 application for the Proposed Development.

National Planning Policy

11.2.2.2 Existing Scottish Planning Policy states, in Paragraph 194, that the planning system should:

- *"conserve and enhance protected sites and species, taking account of the need to maintain healthy ecosystems and work with the natural processes which provide important services to communities;*
- *promote protection and improvement of the water environment, including rivers, lochs, estuaries, wetlands, coastal waters and groundwater, in a sustainable and co-ordinated way;*
- *protect and enhance ancient semi-natural woodland as an important and irreplaceable resource, together with other native or long-established woods, hedgerows and individual trees with high nature conservation or landscape value; and*
- *seek benefits for biodiversity from new development where possible, including the restoration of degraded habitats and the avoidance of further fragmentation or isolation of habitats."*

11.2.2.3 At the time of preparing this chapter, Scottish Government had published a draft version of National Planning Framework 4 (NPF4) for public consultation. Although not yet adopted, and subject to change, the draft version of NPF4 states that the planning system should "*protect, restore and enhance Scotland's natural assets; make best use of nature-based solutions; and… reverse biodiversity loss, including by delivering positive effects for biodiversity from new developments*" (https://www.gov.scot/publications/scotland-2045-fourth-national-planning-

framework-draft/documents/, accessed 23 November 2021). Wherever possible, and proportionate to the scale and nature of the project, the Proposed Development should therefore seek to deliver benefits for biodiversity.

Local Planning Policy

11.2.2.4 Local planning policy for Aberdeenshire is set out in the Aberdeenshire Local Development Plan (LDP) 2017. Policy E1 Natural Heritage addresses protected species, including so-called 'European Protected Species' which are species protected under the Habitats Regulations, and states that: "*Development should seek to avoid any detrimental impact on protected species through the carrying out of surveys and submission of protection plans describing appropriate mitigation where necessary. Development likely to have a detrimental impact on protected species will not be approved unless: for European Protected Species, a thorough assessment of the site has demonstrated that the development is required for imperative reasons of overriding public interest and that the population will be maintained at a favourable conservation status in its natural range; or, for non-bird species protected under the Wildlife and Countryside Act 1981 (as amended) or the Protection of Badgers Act 1992, there will be significant social, economic or environmental benefits. In either case there must be no other satisfactory solution*".

11.2.2.5 Aberdeenshire Council is currently progressing its Local Development Plan 2022, and as part of this process the Proposed LDP 2020 was submitted for examination in July 2021. The proposed updated planning policy on protected species is broadly comparable to adopted Policy E1 but strengthens requirements by stating that '*Development must* [emphasis added] *seek to avoid any detrimental impact on protected species*…".

11.2.2.6 Policy P1 Layout, Siting and Design states that "*measures require to be identified to enhance biodiversity in proportion to the opportunities available and the scale of the development opportunity*". Enhancement measures should ideally be provided on the site of the development. Where it is not possible to deliver biodiversity enhancements on-site, Aberdeenshire Council may require off-site contributions to biodiversity enhancement.

11.2.2.7 Full details of the aforementioned policy can be found in the source document at: https://www.aberdeenshire.gov.uk/planning/plans-and-policies/pldp-2020/proposed-local-development-plan-2020/.

11.2.3 OTHER GUIDANCE

11.2.3.1 Additional guidance relevant to the Proposed Development and/or for interpretation of the above planning policy includes the following:

- North East Scotland Biodiversity Partnership (NESBiP) (https://www.nesbiodiversity.org.uk/);
- *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2019);
- *Advisory Note: Ecological Assessment of Air Quality Impacts* (CIEEM, 2021); and
- *A guide to the assessment of air quality impacts on designated nature conservation sites* (Holman *et al*, 2019).

11.3. ASSESSMENT METHODOLOGY

11.3.1 CONSULTATION

11.3.1.1 The assessment of impacts on ecological features has been informed and influenced by consultation held with several statutory and non-statutory stakeholders. A summary of the consultation held, the information / recommendations provided by consultees, and details of how this EcIA has responded to consultee feedback is provided in Table 11.1. Of particular relevance to the assessment is consultation held between SEPA and AECOM air quality specialists. While this is summarised in relation to biodiversity and nature conservation below, further details of that consultation and the responses made in this EIA can be found in **Chapter 8: Air Quality** (EIA Report Volume 2).

Table 11-1: Summary of consultation

Consultee	Date and nature of consultation	Information / recommendations provided	Action taken by this EIA in response
Scottish Environment Protection Agency (SEPA)	Meeting held 28 May 2021	SEPA advised that a screening distance of 15km for air quality impacts on habitats and species within sites designated for nature conservation is indicative. The distance at which such impacts may need to be assessed could be greater than this depending on, for example, topography, pollutant rates, and the distribution of relevant ecological features within a given site.	The modelling study area for ecological features was: • up to 50m from the Proposed Development Site boundary and access routes (up to 500m from Proposed Development Site entrance) for construction dust from non-road mobile machinery (NRMM); • up to 200m from the Proposed Development for traffic-related air quality changes; and • up to 15km from the 'main site' of the Proposed Development, within which the Combined Cycle Gas Turbine (CCGT) and Carbon Capture Plant (CCP) will be located. The modelling predicted impacts that are insignificant within the distances assessed. Modelling of more distant sites was therefore not required.
	Scoping Opinion dated 29 July 2021 (**Appendix 1B** EIA Report Volume 4)	SEPA noted the presence of one watercourse, the Den of Boddam Burn, which is culverted through the existing power station site and that realignment of the burn is required to enable the Proposed Development. SEPA suggested that the possibility of opening up of this watercourse as part of any realignment, part or whole, be investigated, including redirecting the burn to its historical course.	Further details are provided in **Chapter 12: Water Environment** (EIA Report Volume 2). However, it has been assessed that the opening up of the Den of Boddam Burn is not technically feasible as part of the Proposed Development.

Consultee	Date and nature of consultation	Information / recommendations provided	Action taken by this EIA in response
	Gatecheck Response 17 November 2021	It should be noted the habitats screening distance will need to be revised taking account of the air quality impact assessment (AQIA) methodology review.	The modelling study area for human health and ecological receptors are defined in Section 8.3.2 of **Chapter 8: Air Quality** (EIA Report Volume 2). The modelling predicts impacts that are insignificant within the distances assessed. Modelling of more distant sites was therefore not required.
NatureScot	Meeting held 26 May 2021	A meeting was held between AECOM and NatureScot to discuss the proposed scope of ecological field survey and assessment for the EIA. NatureScot advised that the assessment of air quality impacts should include Sites of Special Scientific Interest (SSSI), including Rora Moss SSSI. AECOM requested any information held by NatureScot on the Buchan Ness to Collieston SAC (for example Site Condition Monitoring documents).	The study areas for air quality modelling are set out above. Construction phase emissions were not modelled in relation to Rora Moss SSSI, which is located more than 10km from the Proposed Development Site. However, operational phase emissions from the Proposed Development were modelled in relation to this and all other biological SSSIs within 15km. NatureScot did not provide any information on designated sites not otherwise available online.
	Scoping Opinion dated 29 July 2021 (**Appendix 1B** EIA Report Volume 4)	NatureScot stated that there are natural heritage interests of national and international importance that may be affected by the Proposed Development, but that these were all adequately identified by the EIA Scoping Report (**Appendix 1A** EIA Report Volume 4).	No action required. The scope of survey and assessment set out in the EIA Scoping Report was completed in full.
	Response to Gatecheck Report dated 25 November 2021	NatureScot noted that a precautionary approach was to be taken which assumed that suitable habitat within and surrounding the Proposed Development Site could be	The results of field survey and desk study indicate that geese rarely use the habitat surrounding the Proposed Development Site for foraging. However, the potential for

Consultee	Date and nature of consultation	Information / recommendations provided	Action taken by this EIA in response
		used by foraging geese associated with the Loch of Strathbeg Special Protection Area. NatureScot also advised that SEPA should be engaged with regards scope of air quality assessment and potential effects on ecological features.	the occurrence of birds from the Loch of Strathbeg SPA has been considered in this assessment and in the HRA. As set out previously in this table, SEPA were consulted on the scope of air quality assessment.
Royal Society for the Protection of Birds (RSPB)	Scoping Opinion dated 29 July 2021 (**Appendix 1B** EIA Report Volume 4)	Recommended that if there are significant changes to abstraction / discharge of seawater, this impact should be considered in assessment of possible effects on the Buchan Ness to Collieston Coast SPA. Also advised that consideration should be given to potential impacts on the Southern Trench Marine Protected Area (MPA).	The Proposed Development will operate within the current limits set by the existing Pollution Prevention and Control (PPC) Permit and CAR Licence, meaning there will be no change to abstraction or discharge rates, or other parameters that could impact on ecological features in the marine environment. There will be no construction works within the marine environment. It was therefore unnecessary to consider the Southern Trench Marine Protected Area which is designated for deep sea habitats and minke whale *Balaenoptera acutorostrata*.
Aberdeenshire Council	Scoping Opinion dated 29 July 2021 (**Appendix 1B** EIA Report Volume 4)	Advised that the field surveys proposed to establish baseline conditions with respect to ecological features set out in the **Appendix 1A** (EIA Report Volume 4) were appropriate to assess in detail the potential effects of the Proposed Development. No additional surveys were recommended.	A CEMP will be produced prior to commencement of any construction activities, setting out best practice techniques and all mitigation commitments made within this EIA Report.

Consultee	Date and nature of consultation	Information / recommendations provided	Action taken by this EIA in response
		Advised that a Construction Environmental Management Plan (CEMP) should be produced, setting out best practice techniques to reduce and minimise the risks to species and habitats during the construction phase. The CEMP should also incorporate any mitigation measures identified as being required by this EIA.	
Member of the public	Email correspondence received 20 May 2021 and 22 June 2021	Provided information on the location of the NESBiP locally important species oysterplant *Mertensia maritima* in the vicinity of the Proposed Development Site between Furrah Head and Boddam. Suggested that the total colony comprised up to approximately 5,000 individual plants. Also stated that the colony at Furrah Head is a source of new plants for colonies in the wider Peterhead area including at Craigewan, Gadle Braes, Roanheads, North Head, Sandford Bay and Boddam Harbour. Periodically these smaller colonies disappear following storms and are recolonised from plants at Furrah Head.	The Phase 1 habitat survey was carried out by an experienced botanical expert, proficient in identifying plant species including oysterplant. The key area for this species was mapped and an attempt was made to count mature plants. The potential impacts and effects of the Proposed Development on this species are considered in this EIA Report. AECOM ecologists with expertise in plants and habitats have worked collaboratively with landscape specialists to develop habitat mitigation and enhancement as set out later in this chapter and in the Outline Biodiversity Strategy. Only locally-native plant species will be adopted in all landscaping mitigation.
Botanical Society of Britain & Ireland Vice-county Recorders for North Aberdeenshire	Email correspondence dated 30 June 2021	Provided further information on the number and distribution of oysterplant in the vicinity of the Proposed Development. Suggested that there may be seasonal differences which affect counting number of plants. Survey at Furrah Head in June 2013 identified 100 mature plants and 70 seedlings, indicating a sharp decline from a much larger count in July 2000. At this earlier date, conditions for colonisation by this species were likely to have been very favourable due to recent	

Consultee	Date and nature of consultation	Information / recommendations provided	Action taken by this EIA in response
		construction activities. Advised that in past decade, numbers of oysterplant have been more stable. Aside from oysterplant, also advised that both the shore and grassland above shoreline is botanically valuable. Although these areas may not contain species of national importance, they act as local refuges for widespread species. Advised that, where landscaping work is required, only species native to the local area be used for any re-planting.	

11.3.2 STUDY AREA

11.3.2.1 The zone of influence (ZoI) of the Proposed Development is the area over which ecological features may be subject to significant effects as a result of its construction, operation and/or decommissioning (including restoration), and may extend beyond the boundary of the Proposed Development Site.

11.3.2.2 The ZoI will vary for different ecological features depending on their sensitivity to an environmental change. It is therefore appropriate to identify different ZoI for different features. As recommended by CIEEM (2019), professionally accredited or published studies and guidance, where available, were used to help determine the likely ZoI, as well as professional judgement. However, CIEEM (2019) also highlights that establishing the ZoI should be an iterative process and can be informed by further desk study and field survey. Where limited information was available, the precautionary principle was adopted an a ZoI estimated on that basis.

11.3.2.3 The study areas used for desk-based study and field survey, and which are reported in **Appendices 11B-11E** and **Confidential Appendix 11G** (EIA Report Volume 4), were designed to allow for sufficient data to be collected to establish the baseline condition of ecological features within the ZoI of the Proposed Development. The study areas were therefore generally precautionary.

11.3.3 IMPACT ASSESSMENT METHODOLOGY

Scope of Assessment

11.3.3.1 The scope of survey and assessment described in this chapter was informed by the guidance contained in published documents referenced in Section 11.2.3 and additionally within **Appendices 11B-11E** and **Confidential Appendix 11G** (EIA Report Volume 4), on the responses of consultees set out in Table 11.1, and on the results of desk study and field survey carried out to establish the baseline ecological conditions.

11.3.3.2 For the purposes of desk study, field survey and impact assessment, protected and notable habitats and species considered in this EcIA are:

- The qualifying / notified features (habitats and/or species) of SACs, SPAs, Wetlands of International Importance (Ramsar sites) and SSSIs within 15km of the Proposed Development Site, this being extended to 20km for geese species which can range up to this distance when foraging (SNH, 2016);
- Woodland included on the Ancient Woodland Inventory;
- Habitats listed on Annex I of the Habitats Directive;
- Species listed on Annex II of the Habitats Directive;
- Bird species listed on Annex I of the Birds Directive;
- Animal species listed on Schedules 2 and 4 of the Habitats Regulations;
- Species listed on Schedules 1, 5 and 8 of the WCA;
- Badger *Meles meles*, which is afforded protection under the Protection of Badgers Act;
- Species on the Scottish Biodiversity List (SBL) which are thus identified as being of principal importance for biodiversity conservation in Scotland;
- Locally important habitats and species as identified by the NESBiP;
- All bird species on the Red List of Birds of Conservation Concern (BoCC) (Stanbury *et al*, 2021); and

- Invasive non-native species listed on Schedule 9 of the WCA (although this no longer legally applies in Scotland) and those considered to be of European Union (EU) concern under the IAS Regulation.

Ecological Impact Assessment

11.3.3.3 The assessment of ecological impacts described in this chapter was conducted in accordance with the guidelines published by CIEEM (2019). The principal steps involved in the CIEEM approach can be summarised as:

- Baseline conditions are determined through targeted desk study and field survey to identify ecological features that are both present and might be affected by the Proposed Development (both those likely to be present at the time works begin, and for comparison, those predicted to be present at a set time in the future);
- The importance of identified ecological features is evaluated to place their relative biodiversity and nature conservation value into a geographic context, determining those that need to be considered further within the impact assessment;
- The potential impacts of the Proposed Development on relevant ecological features are described, considering established best practice, legislative requirements and embedded design measures;
- The likely effects (adverse or beneficial) on relevant ecological features are assessed and, where possible, quantified;
- Measures to avoid or reduce (or, if necessary, compensate for) any predicted significant effects, if possible, are developed in conjunction with other elements of the design (including mitigation for other environmental disciplines);
- Any residual effects of the Proposed Development and their significance are reported; and
- Scope for enhancement measures is considered.

11.3.3.4 However, CIEEM impact terminology and the geographical scale employed for importance and significance of effect have been translated in this EcIA into more widely used terms, in keeping with the other chapters of this EIA Report, and as set out in detail in **Chapter 2: Assessment Methodology** (EIA Report Volume 2). The definitions are given in **Appendix 11A** Table 1 (EIA Report Volume 4). In summary, the terms used are as follows:

- The importance of ecological features (which is referred to in other chapters as sensitivity), has been translated to the terms ‘High’, ‘Medium’, ‘Low’ and ‘Very Low’ for definitions);
- Magnitude of impact (accounting for parameters such as duration and frequency, as well as magnitude or extent) is described in the terms ‘High’, ‘Medium’, ‘Low’ or ‘Very Low’ (as defined in **Appendix 11A** (EIA Report Volume 4)); and
- Significance of effect has been translated to the terms ‘Major’, ‘Moderate’, ‘Minor’, ‘Negligible’ or ‘No effect’, as referenced in **Chapter 2: Assessment Methodology** (EIA Report Volume 2). Significance of effect can be either adverse or beneficial.

11.3.3.5 For the purposes of this EIA, effects predicted to be Minor or Negligible are generally considered to be ‘Not Significant’. Effects assessed as either Moderate or Major are generally considered to be ‘Significant’.

11.3.3.6 Only those ecological features that are ‘important’ and that could be significantly affected by the Proposed Development require detailed assessment as noted in the CIEEM guidance – “*it is not necessary to carry out detailed assessment of ecological features that are sufficiently widespread, unthreatened and resilient to project impacts and will remain viable and sustainable”* (CIEEM, 2019). This is consistent with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, which require investigation of likely significant

effects. However, this does not mean that efforts should not be made to safeguard wider biodiversity, and requirements for this have been considered (which is consistent with the Applicant's statutory duties Schedule 9 of the Electricity Act 1989 – see Section 1.5 of **Chapter 1: Introduction** (EIA Report Volume 2) for further details).

11.3.3.7 In line with the CIEEM guidelines, the terminology used within the EcIA draws a clear distinction between the terms 'impact' and 'effect'. For the purposes of the EcIA, these terms are defined as follows:

- Impact – actions resulting in changes to an ecological feature. For example, demolition activities leading to the removal of a building used as a bat roost; and
- Effect – the outcome resulting from an impact acting upon the conservation status or structure and/or function of an ecological feature. For example, killing / injury of bats and reducing the availability of breeding habitat because of the loss of a bat roost may lead to an adverse effect on the conservation status of the population concerned.

11.3.3.8 Potential impacts on relevant ecological features are assessed and a judgement reached on whether or not the resultant effect on the 'conservation status' or structure and function is likely to be significant. This process takes into consideration the characteristics of the impact, the sensitivity of the ecological feature concerned, and the geographic scale at which the feature is considered important.

11.3.3.9 Impacts are assessed in view of the conservation status of the habitats and species under consideration.

11.3.3.10 CIEEM (2019) states that, for habitats, "*conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area*".

11.3.3.11 NatureScot and CIEEM define the conservation status of a species as "*the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest*" (SNH, 2018). A species' conservation status is considered to be 'favourable' when:

- Population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;
- The natural range of the species is not being reduced, nor is it likely to be reduced for the foreseeable future; and
- There is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis.

11.3.3.12 NatureScot recommends that the favourable conservation status concept should be applied at a national (Scottish) level to determine the level of significance of an effect arising from the impact(s) of development (SNH, 2018). However, this EcIA has also been conducted in the regional context of the North East Coastal Plain Natural Heritage Zone (NHZ 9) (SNH, 2002) within which the Proposed Development lies, and under CIEEM (2019) guidance, where significance at lower geographic levels may still be relevant and require mitigation. Therefore, even where an impact may not affect the conservation status at a national level, the potential for effects on conservation status at lower geographic levels has also been considered.

11.3.3.13 A detailed description of the EcIA method used in preparing this chapter is provided in **Appendix 11A** (EIA Report Volume 4).

11.3.4 DESK STUDY

11.3.4.1 A desk study was carried out to identify nature conservation designations and records of protected and/or notable habitats / species potentially relevant to the Proposed Development. A stratified approach was taken when defining the desk study area, based on the likely ZoI of the Proposed Development on different ecological features. Accordingly, the desk study sought to identify:

- Any statutory designated site for nature conservation, including SACs, SPAs, Ramsar sites and SSSIs within 15km of the Proposed Development Site, extended to 20km for sites with geese species as qualifying features[2];
- Local nature conservation designations within 2km of the Proposed Development Site; and
- Records of protected and/or notable species within 1km of the Proposed Development Site.

11.3.4.2 The desk study was carried out using the data sources in Table 11.2.

Table 11-2: Desk study data sources

Data source	Date accessed	Data obtained
Ordnance Survey (OS) 1:25,000 scale maps and aerial photography (https://www.bing.com/maps)	23 February 2021	Information on habitats and connectivity relevant to interpretation of planning policy and potential suitability for protected / notable habitats and/or species.
Aberdeenshire Council website (https://www.aberdeenshire.gov.uk/planning/plans-and-policies/)	29 March 2021	Local Development Plan policies relevant to nature conservation.
NatureScot SiteLink website (https://sitelink.nature.scot)	08 November 2021	The locations of statutory designated nature conservation sites in relation to the Proposed Development.
NatureScot Natural Spaces website (https://gateway.snh.gov.uk/natural-spaces)	29 March 2021	Ancient Woodland Inventory (AWI) for Scotland and results of the Native Woodland Survey of Scotland (NWSS).
North East Scotland Biodiversity Partnership website (https://www.nesbiodiversity.org.uk/biodiversity-information-for-developers/important-local-species/)	29 March 2021	Habitat Statements and list of 'locally important species' for Aberdeenshire.

[2] An initial search distance of 15km was adopted based on guidance produced by the Department for Environment, Food and Rural Affairs (Defra) and the Environment Agency (EA) which suggests that emissions from facilities generating more than 50 megawatts (MW) can have air quality impacts up to this distance (https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#screen-out-pecs-from-detailed-modelling). The search distance was extended to 20km for geese species in line with guidance published by NatureScot (SNH, 2016) which suggests that they can travel this distance between designated sites and foraging locations.

Data source	Date accessed	Data obtained
Peterhead CCS Project Onshore Environmental Statement (Shell and SSE, 2015)	28 October 2021	The results of ecology surveys carried out at and around the Proposed Development Site (for a separate project) in 2013/14.
Air Pollution Information System (APIS) (http://www.apis.ac.uk/)	08 November 2021	Information on airborne pollution, including critical loads / levels for specific habitats relevant to the Proposed Development.
North East Scotland Biological Records Centre (NESBReC)	31 March 2021	Records of protected and notable species within 1km of the Proposed Development Site (made since 2000).
NBN Atlas Scotland (https://scotland.nbnatlas.org/)	28 October 2021	Commercially available records of protected and/or notable bird species within 1km of the Proposed Development Site, and made since 2000.
British Trust for Ornithology (BTO)	15 April 2021	The most recent five years of Wetland Bird Survey (WeBS) data for the Peterhead Bay and Sandford Bay core count sector. There is no low tide count sector in the area around the Proposed Development, so all survey data were collected at high tide.
Marine Scotland – Designated Haul-Out Sites for Seals (https://marine.gov.scot/maps/446)	19 November 2021	The location of known seal haul-out sites.

11.3.5 FIELD SURVEY

Habitat Survey

11.3.5.1 A Phase 1 habitat survey was carried out in accordance with the standard survey method published by the Joint Nature Conservation Committee (JNCC, 2010), by which areas of land are assigned standard habitat types and ecological notes are recorded. Notes were made for each habitat of dominant, typical and notable plant species, and any relevant ecological characteristics (particularly where relevant to habitat condition). These reflect conditions at the time of survey.

11.3.5.2 The survey was carried out on 26-28 May 2021, supplemented by additional notes taken on 23 September 2021, by an AECOM ecologist with extensive habitat survey experience. Habitat

types were mapped with the aid of aerial photography. The Phase 1 habitat survey extent covered the entire Proposed Development Site plus a 100m buffer.

11.3.5.3 Notes were also made on National Vegetation Classification (NVC) types for more natural vegetation along the coast within 250m of the Proposed Development Site, and occasionally elsewhere where more natural vegetation or potential groundwater-dependent habitat was found. The NVC survey was made with reference to the original NVC volumes (Rodwell 1991a, 1991b, 1992, 1995, 2000), and also to NVC reviews and guidance (Rodwell *et al*, 2000; Averis *et al*, 2004; Hall *et al,* 2004).

Protected and Notable Species Surveys

11.3.5.4 Full details of the methods used when conducting species surveys for the Proposed Development are provided in **Appendices 11B-11E** and **Confidential Appendix 11G** (EIA Report Volume 4). A summary of the scope of these surveys is provided in Table 11.3. The general survey areas are shown on **Figure 11.1** (EIA Report Volume 3).

Table 11-3: Summary of species surveys carried out for the Proposed Development

Ecological survey	Date of survey	Scope of survey	Appendix (EIA Report Volume 4)
Bat roost suitability assessment	19-22 April 2021	A ground-based, external assessment of the bat roost suitability of all trees and buildings (excluding occupied residences) within the Proposed Development Site plus a 50m buffer.	11B
Bat roost surveys	12 May 2021 to 18 August 2021	Dusk emergence and dawn re-entry surveys were carried out on a total of nine trees and six buildings which were identified by the bat roost suitability assessment (described above) as having the potential to be used by roosting bats.	
Walked bat activity transect	20 April 2021 to 22 September 2021	A walked bat activity transect route was devised to cover typical examples of all habitat suitable for bat foraging and commuting within the Proposed Development Site plus a minimum 50m buffer. The transect was surveyed monthly between April and September 2021, inclusive.	
Static bat detector survey	21 April 2021 to 29 August 2021	A static bat detector was deployed at a location within the Proposed Development Site to monitor bat activity between April and August 2021, inclusive.	
Otter *Lutra lutra* and water vole *Arvicola amphibius* survey	28 May 2021 and 17 August 2021	Walkover survey of all watercourses and other waterbodies within the Proposed	11C

Ecological survey	Date of survey	Scope of survey	Appendix (EIA Report Volume 4)
		Development Site plus a 200m buffer, as far as safe access permitted.	
Red squirrel *Sciurus vulgaris* survey	19-22 April 2021	Search for red squirrel dreys in all woodland within the Proposed Development Site plus a 100m buffer.	
Badger survey	19-22 April 2021 for walkover survey and 13 May to 23 June 2021 for trail camera monitoring	Walkover survey within the Proposed Development Site plus a 100m buffer, as far as safe access permitted. This was supplemented by monitoring of two locations using motion sensitive infrared trail cameras ('trail cameras').	11C and 11G
Common Bird Census (CBC)	22 April 2021 to 07 July 2021	A modified version of the Common Bird Census was used to survey the breeding bird assemblage within the Proposed Development Site plus a 100m buffer. Five CBC survey visits were made between April and July 2021.	
Waterbird survey	19 April 2021 to 13 December 2021	Survey of waterbirds[3] was carried out once per month from April 2021 to December 2021, inclusive, within the Proposed Development Site plus a 500m buffer. The surveys were stratified according to tide times and focussed on high and low tides, to investigate use of the area by birds under different tidal conditions.	11D
Aquatic macroinvertebrate survey	21 September 2021	Macroinvertebrate sampling in Den of Boddam Burn (culverted beneath the Proposed Development Site) and an unnamed watercourse at the northern extent of the Proposed Development Site ('North stream'). This included identification of invasive non-native species and an appraisal of fish habitat.	11E
Pond Predictive System of Multimetrics (PSYM) survey for	21 September 2021	Aquatic ecological assessment of two ponds within the Proposed Development Site boundary, based on PSYM	

[3] The BTO define 'waterbirds' as wildfowl (ducks, geese and swans), waders, rails, divers, grebes, cormorants, herons, gulls and terns. This BTO definition has been adopted in this EIA.

Ecological survey	Date of survey	Scope of survey	Appendix (EIA Report Volume 4)
macroinvertebrates and macrophytes		methodology. Also included identification of invasive non-native species.	

11.3.6 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

11.3.6.1 The aim of the desk study was to help characterise the baseline context of the Proposed Development and provide valuable background information that may not be captured by field survey alone. Information obtained during the desk study is dependent upon people and organisations having made and submitted records for the area of interest. As such, a lack of records for particular species does not necessarily mean that they do not occur in the study area. Likewise, the presence of records for particular species does not automatically mean that these still occur within the area of interest or are relevant to the Proposed Development.

11.3.6.2 Details of specific limitations associated with the surveys for protected and notable species are presented in **Appendices 11B-11E** and **Confidential Appendix 11G** (EIA Report Volume 4). All identified limitations were minor and do not substantially affect the robustness of the baseline data collected, or the assessment of ecological impacts presented in this chapter.

11.3.6.3 No targeted field surveys were carried out for water shrew *Neomys fodiens* as the habitats within the ZoI of the Proposed Development are sub-optimal for this species, as described in more detail in **Appendix 11C** (EIA Report Volume 4). It is therefore considered unlikely that water shrew would occur within the Proposed Development Site itself. However, on a precautionary basis, this EcIA assumes that water shrew may be present in habitats within the ZoI of the Proposed Development and general mitigation measures will be implemented to avoid impacts on this species should it be present.

11.3.6.4 No survey was carried out for brown hare *Lepus europaeus* or hedgehog *Erinaceus europaeus*. Both species, although of conservation concern, are fairly common and very widespread. There are habitats present both within the Proposed Development Site and the wider ZoI which could support these species, including open areas of grassland for foraging, and scrub and woodland blocks which provide sheltering and foraging opportunities. It is therefore assumed that these species are likely to be present.

11.3.6.5 Waterbird surveys were carried out between April and December 2021, inclusive. These surveys are to continue monthly between January and March 2022, inclusive. The results of those surveys will be provided as additional information following submission of this EIA. However, based on desk study information and field survey data collected to December 2021, it is considered very unlikely that the continuing surveys will identify any significant new findings.

11.3.6.6 Two observations of barn owl *Tyto alba* in the vicinity Sandford Lodge were made incidentally during bat roost surveys. It was not possible to gain access to the internal parts of Sandford Lodge, or its associated outbuildings, to search for evidence of nesting or roosting barn owl. Based on external assessment only, Sandford Lodge appears to have very little potential to support nesting barn owls, unless there are unseen chimney cavities which could provide shelter. However, several of the outbuildings are enclosed and roofed, and it is possible that they could be used by barn owls for nesting or roosting. Although no evidence of such usage was identified during bat roost surveys carried out in 2021 (e.g. there were no calling birds, no repeated departures or entries to a building by any birds, and no evidence of disturbance to the

birds which were observed in the area), on a precautionary basis this EcIA assumes that there is the possibility of nesting / roosting by barn owl in these buildings in the future.

11.3.6.7 At the time of conducting baseline ecological surveys, the SSEN Transmission Peterhead Substation, located on the immediate west side of the A90 opposite the Proposed Development Site, was under construction. Habitat loss and any disturbance of protected / notable species caused by the construction of this project will have influenced, to varying degrees, the results of the ecological surveys described in this chapter. On completion of the construction of the substation, there will be no or very limited habitat for protected / notable species within the boundary of that project. Furthermore, the species identified within the ZoI of the Proposed Development are not likely to be significantly disturbed by the construction activities taking place within a relatively discrete location. Therefore, the baseline conditions identified and reported in this chapter are unlikely to materially change following completion of the construction of Peterhead Substation.

11.3.6.8 As discussed in **Chapter 4: The Proposed Development** (EIA Report Volume 2) several technical parameters have yet to be finalised for the Proposed Development, to maintain flexibility prior to election of technology suppliers and commencement of the detailed design of the Proposed Development. Therefore, three indicative layout options have been considered in this EIA and whichever represents the worst-case option has been assessed for each environmental topic. However, in relation to ecological features, the design differences between the three options are generally negligible, largely comprising minor repositioning of key infrastructure within the same part of the Proposed Development Site referred to as the 'CCGT and CCP area' (see **Figure 3.3** (EIA Report Volume 3)). Except for air quality changes (for which, see further below), this EcIA has been carried out based on the general layout common to all three options, comprising the CCGT and CCP area north-west of the existing power station, other subsidiary infrastructure (including workshop and water treatment plant) near the existing power station entrance, and construction laydown areas in adjacent fields, as shown on **Figure 3.3** (EIA Report Volume 3). In line with the air quality assessment presented in **Chapter 8: Air Quality** (EIA Report Volume 2), which for operational stack emissions included modelling of multiple stack positions within the CCGT and CCP area, the assessment of ecological impacts and effects arising from air quality changes is based on the reported worst-case emissions from the Proposed Development.

11.4. BASELINE CONDITIONS

11.4.1 DESIGNATED SITES

Statutory Designated Sites

11.4.1.1 There are eleven statutory designated sites for nature conservation with 15km of the Proposed Development Site. Some of these designations have overlapping or entirely coincident boundaries. Of the eleven statutory designated sites, three are SPAs, one is an SAC, two are Ramsar sites and five are SSSIs. Details of these sites are given in Table 11.4 (sites are listed in order of increasing distance from the Proposed Development Site). The location of the sites in relation to the Proposed Development is shown on **Figure 11.2** (EIA Report Volume 3).

11.4.1.2 There are no other statutory designations within 20km of the Proposed Development Site for which geese species are qualifying or notified features.

11.4.1.3 Hill of Longhaven SSSI, Moss of Cruden SSSI, Belscamphie SSSI and Kirkhill SSSI are all located within 15km of the Proposed Development Site but are designated solely for geological features. They are therefore not considered in this chapter.

Table 11-4: Statutory designated sites for nature conservation

SITE NAME	QUALIFYING / NOTIFIED SPECIES	RELATIONSHIP TO THE PROPOSED DEVELOPMENT
Buchan Ness to Collieston Coast SPA	Encompassing 15km of south-east facing cliffs, this SPA is designated for breeding seabirds. The qualifying features of the SPA are: • the breeding seabird assemblage, which regularly includes in excess of 20,000 individuals; • breeding kittiwake *Rissa tridactyla*; • breeding guillemot *Uria aalge*; • breeding herring gull *Larus argentatus*; • breeding shag *Phalacrocorax aristotelis*; and • breeding fulmar *Fulmarus glacialis*.	The Proposed Development is immediately adjacent to the boundary of Buchan Ness to Collieston Coast SPA, which encompasses the southern half of Sandford Bay. A small part of the Proposed Development Site protrudes into the SPA, containing the foul water outfall pipe. The existing cooling water intake, which will be retained by the Proposed Development and is not part of the Proposed Development Site, also lies partly within the SPA. The SPA extends 20km south beyond Collieston.
Buchan Ness to Collieston SAC	The sole qualifying feature of this site is vegetated sea cliffs.	The northern boundary of the Buchan Ness to Collieston SAC is approximately 750m south-east of the boundary of the Proposed Development Site. However, the main part of the Proposed Development Site, which will be the location of the CCGT and CCP, lies approximately 1.4km from the SAC. The Proposed Development Site and the SAC are separated by the settlement of Boddam.
Bullers of Buchan Coast SSSI	This SSSI underlies both the Buchan Ness to Collieston Coast SPA and the Buchan Ness to Collieston SAC. The notified biological features are therefore a combination of the interest features of those sites, and are: • breeding seabird assemblage; • breeding kittiwake; • breeding guillemot; • breeding shag; and • maritime cliffs.	The northern boundary of the Bullers of Buchan Coast SSSI is approximately 750m south-east of the boundary of the Proposed Development Site. However, the main part of the Proposed Development Site, which will be the location of the CCGT and CCP, lies approximately 1.4km from the SSSI. The Proposed Development Site and the SSSI are separated by the settlement of Boddam. There is direct marine connectivity.

SITE NAME	QUALIFYING / NOTIFIED SPECIES	RELATIONSHIP TO THE PROPOSED DEVELOPMENT
	This SSSI also has geological interest, but this is not relevant to the assessment of ecological impacts from the Proposed Development.	
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	The boundary of the SPA encompasses the estuary of the River Ythan, the Sands of Forvie on the east bank of the estuary, the eutrophic Meikle Loch and a marine component covering the area between Aberdeen and Cruden Bay. The qualifying features of the SPA are: • breeding common tern *Sterna hirundo*; • breeding little tern *Sterna albifrons*; • breeding sandwich tern *Sterna sandvicensis*; • non-breeding waterfowl assemblage, which regularly includes in excess of 20,000 individuals; • non-breeding eider *Somateria mollissima*; • non-breeding lapwing *Vanellus vanellus*; • non-breeding redshank *Tringa totanus*; and • non-breeding pink-footed goose *Anser brachyrhynchus.*	Situated, at its closest, approximately 7.1km south-south-west of the Proposed Development Site and extending 33km south to Aberdeen. There is direct connectivity through the marine environment, with the SPA encompassing a large area of the sea from Cruden Bay southwards.
Collieston to Whinnyfold Coast SSSI	This SSSI also underlies the Buchan Ness to Collieston Coast SPA and the Buchan Ness to Collieston SAC. Similar (but not identical) to the Bullers of Buchan Coast SSSI, the notified biological features of this site are: • breeding seabird assemblage; • breeding fulmar; • breeding guillemot; • breeding kittiwake; • breeding razorbill *Alca torda*; • sea wormwood *Seriphidium maritimum*; and • maritime cliffs. This SSSI also has geological interest, but this is not relevant to this assessment of ecological impacts.	The boundary of the Collieston to Whinnyfold Coast SSSI is coincident with the boundary of the Buchan Ness to Collieston SAC between Cruden Bay and Collieston, at its southern-most extent. At its closest, it is approximately 9.6km south-west from the Proposed Development Site, extending 16km further to Collieston. There is direct marine connectivity.

SITE NAME	QUALIFYING / NOTIFIED SPECIES	RELATIONSHIP TO THE PROPOSED DEVELOPMENT
Rora Moss SSSI	The sole notified feature of this site is raised bog. Rora Moss is the second largest lowland raised bog in Aberdeenshire.	Situated approximately 10.8km north-west of the Proposed Development Site. The intervening landscape is predominantly agricultural, although the SSSI is surrounded to the south by conifer plantation woodland.
Loch of Strathbeg SSSI	Loch of Strathbeg SSSI is designated for a range of habitats and species, as well as geological interests (which are not considered here). The notified biological features of the SSSI are: • eutrophic loch; • fen meadow; • open water transition fen; • saltmarsh; • sand dunes; • breeding bird assemblage; • non-breeding goldeneye *Bucephala clangula*; • non-breeding greylag goose *Anser anser*; • non-breeding pink-footed goose; and • non-breeding whooper swan *Cygnus cygnus*.	The southern-most boundary of the SSSI is approximately 13.6km north of the Proposed Development Site. There is a direct connection between the two via the marine environment, with the boundary of the SSSI covering coastal habitats and several offshore islands.
Meikle Loch and Kippet Hills SSSI	The notified biological features of the Meikle Loch and Kippet Hills SSSI are: • non-breeding greylag goose; and • non-breeding pink-footed goose. The SSSI also has geological interest, but this is not relevant to this chapter.	Meikle Loch and Kippet Hills SSSI is situated approximately 13.9km south-west of the Proposed Development Site. The intervening land use is predominantly agricultural, with some blocks of woodland.
Loch of Strathbeg SPA	Loch of Strathbeg SPA is composed of a shallow freshwater loch with surrounding wetland, dune and grassland communities. The SPA is contained within the Loch of Strathbeg SSSI. The qualifying features of the SPA are: • breeding sandwich tern; • non-breeding waterfowl assemblage, which regularly includes in excess of 20,000 individuals; • non-breeding goldeneye; • non-breeding greylag goose;	Situated approximately 14.7km north-north-west of the Proposed Development Site. Separated by the town of Peterhead and St Fergus Gas Terminal and intervening agricultural land. There is direct marine connectivity to the coastal edge of the SPA.

SITE NAME	QUALIFYING / NOTIFIED SPECIES	RELATIONSHIP TO THE PROPOSED DEVELOPMENT
	• non-breeding pink-footed goose; • non-breeding barnacle goose *Branta leucopsis*; • non-breeding whooper swan; and • non-breeding teal *Anas crecca*.	
Loch of Strathbeg Ramsar site	The qualifying features of the Loch of Strathbeg Ramsar site are similar, but not identical, to those of the Loch of Strathbeg SPA: • eutrophic loch; • non-breeding waterfowl assemblage; • non-breeding greylag goose; • non-breeding pink-footed goose; and • non-breeding whooper swan.	Loch of Strathbeg Ramsar site is entirely coincident with the Loch of Strathbeg SPA (see above).
Ythan Estuary and Meikle Loch Ramsar site	The Ythan Estuary and Meikle Loch Ramsar site largely overlaps the Ythan Estuary, Sands of Forvie and Meikle Loch SPA, but does not include the marine component. The qualifying features of the Ramsar site are: • breeding sandwich tern; • non-breeding waterfowl assemblage; and • non-breeding pink-footed goose.	The nearest part of the Ramsar site is Meikle Loch, which is approximately 14.9km south-west of the Proposed Development Site. There is direct marine connectivity to the coastal part of the Ramsar site.

Non-statutory Designated Sites

11.4.1.4 There is one locally-designated non-statutory nature conservation site within 2km of the Proposed Development. The Skelmuir Hill, Stirling Hill and Dudwick Local Nature Conservation Site (LNCS) is directly adjacent the Proposed Development Site, on the west side of the A90 road, and south of the existing electricity substation (see **Figure 11.2** EIA Report Volume 3).

11.4.1.5 The description of this LNCS provided by NESBReC and as written in *Supplementary Guidance 5: Local Nature Conservation Sites of the Aberdeenshire Local Development Plan (LDP) 2017* (https://www.aberdeenshire.gov.uk/media/20028/5a-local-nature-conservation-sites-index.pdf), indicates that the interest features are all geological: "*preglacial Buchan Gravels formation, which is rich in flints, blankets the ridge of Stirling Hill, Hill of Dudwick and Skelmuir Hill. Den of Boddam glacial meltwater channel*". A review of aerial images suggests that much of the LNCS is covered by agricultural land, which is likely to be of low ecological importance, with smaller areas of other habitat including several waterbodies and scattered scrub / semi-improved grassland.

11.4.2 HABITATS

Ancient and Native Woodland

11.4.2.1 There is no ancient woodland listed in the Ancient Woodland Inventory within 2km of the Proposed Development Site.

11.4.2.2 The Native Woodland Survey of Scotland indicates that within 1km of the Proposed Development Site there is:

- A small patch of woodland classed as 'nearly native' 680m west of the north end of the Proposed Development Site; and
- A small patch of woodland classed as 'native' shortly north of the previously-described woodland patch, 850m from the Proposed Development Site.

11.4.2.3 These are shown on **Figure 11.3** (EIA Report Volume 3). The native woodland does not appear to be mature, and the intervening land separating both these patches of woodland from the Proposed Development Site comprises the A90, extensive agricultural or formerly-agricultural fields (now semi-improved 'rank' grassland), and an industrial area.

Phase 1 Habitats

11.4.2.4 A map showing Phase 1 habitat types is provided as **Figure 11.4** (EIA Report Volume 3). This figure also shows the key area for oysterplant along this stretch of coast. The habitat descriptions provided below begin with the coastal strip, which is the primary area of note, and then proceed to describe the rest of the habitat survey area. Species nomenclature used for plants follows that of Stace (2019).

Coastal Strip

11.4.2.5 The often steep coastal slopes from the Furrah Head area northwards are dominated by neutral grassland which appears natural, and is therefore classed as unimproved. There is a reasonable diversity of plant species, although no rare species were recorded, and the NVC type is largely MG1 as for most neutral grassland elsewhere in the survey area. Red fescue *Festuca rubra* is often dominant, with abundant Yorkshire-fog *Holcus lanatus* and frequent cock's-foot *Dactylis glomerata*, and occasional tufted hair-grass *Deschampsia cespitosa*. Ribwort plantain *Plantago lanceolata* is frequent throughout this grassland, and there is occasional and locally abundant primrose *Primula vulgaris* and lesser celandine *Ficaria verna*. Meadowsweet *Filipendula ulmaria* is locally dominant (forming stands of the NVC type M27). Other species include male-fern *Dryopteris filix-mas*, hogweed *Heracleum sphondylium*, marsh thistle *Cirsium palustre*, common sorrel *Rumex acetosa*, yarrow *Achillea millefolium*, meadow vetchling *Lathyrus pratensis*, bush vetch *Vicia sepium*, and more rarely common dog-violet *Viola riviniana*. Tormentil *Potentilla erecta* occurs very rarely, and towards the bottom of the slope there is rarely scurvy-grass *Cochlearia* sp.

11.4.2.6 The coastal edge supports coastal grassland. This is mostly dominated by red fescue, but with a clear suite of maritime species. The edge closest to the sea is the most maritime, with abundant sea plantain *Plantago maritima*, frequent to locally abundant thrift *Armeria maritima* and frequent to abundant scurvy-grass. The thrift and sea plantain decline moving away from the sea. Other species here include bird's-foot-trefoil *Lotus corniculatus*, ribwort plantain, red clover *Trifolium pratense* and, in more open patches, bucks-horn plantain *Plantago coronopus*, early hair-grass *Aira praecox* and procumbent pearlwort *Sagina procumbens*. This coastal grassland most closely aligns with the NVC type MC9.

11.4.2.7 Beyond the coastal grassland, where there is fine shingle, there is scattered sea sandwort *Honckenya peploides* and Babington's orache *Atriplex glabriuscula*, and locally abundant oysterplant. The latter is a notable species and further information is given in Section 11.4.3.2.

11.4.2.8 The coastal edge widens at Sandford Bay. Within the survey area, the coastal slope veers westward and is frequently dominated by meadowsweet (NVC type M27), mixed with unimproved but coarse neutral grassland, often with tufted hair-grass dominant (NVC type MG9), as well as false oat-grass *Arrhenatherum elatius* and cock's-foot. This zone is mapped as marshy grassland. At the coastal edge here there is a wide strip of sand dune vegetation dominated by marram *Ammophila arenaria*, with frequent red fescue, occasional sand couch *Elytrigia juncea*, false oat-grass, creeping thistle *Cirsium arvense*, common ragwort *Jacobaea vulgaris* and sowthistle *Sonchus* sp., and rarely angelica *Angelica sylvestris* (mostly NVC type SD7 semi-fixed dune; SD6 mobile dune at the seaward edge). At the southern end of this sand dune vegetation there is a small patch of more open sandy vegetation with abundant alexanders *Smyrnium olusatrum* and sea sandwort. Between the sand dune vegetation and the inland slope is a strip of flat unimproved neutral grassland, with red fescue dominant and abundant common bent *Agrostis capillaris* and cock's-foot, and frequent curled dock *Rumex crispus*, hogweed, white clover *Trifolium repens*, common ragwort, meadow vetchling and yarrow.

11.4.2.9 At the very coastal edge between the sand dune vegetation and Sandford Lodge, there are occasional small and unmappable patches of lyme grass *Leymus arenarius*, and, rarely, sea rocket *Cakile maritima*.

Woodland, Trees and Scrub

11.4.2.10 Woodland within the habitat survey area entirely comprises blocks and strips of plantation, often not mature and always including non-native tree species.

11.4.2.11 Near the access roads to the existing power station and public viewing area, there is semi-mature broadleaved and mixed plantation. The broadleaved sections are dominated by sycamore *Acer pseudoplatanus* (non-native), willow *Salix* sp. and hawthorn *Crataegus monogyna*, with occasional stands of blackthorn *Prunus spinosa*. There is often a little Sitka spruce *Picea sitchensis* (non-native), becoming more prominent in the mixed plantation areas. Along the south-east edge of the Proposed Development Site there is a strip of plantation woodland with stands of pure conifer dominated by dense Sitka spruce, and stands of broadleaved trees dominated by semi-mature whitebeam *Sorbus aria*, sycamore and willow. On the west side of the A90, there are several strips and patches of further plantation, comprising Sitka spruce, sycamore or mixtures of these. The ground flora is poor in all these plantations, comprising leaf litter, neutral grasses (such as cock's-foot) and often common nettle *Urtica dioica*; the flora is particularly sparse under the Sitka spruce, as is typical.

11.4.2.12 At Sandford Lodge there is a small block of semi-mature sycamore woodland beside the entrance track. This contains lesser celandine in the ground flora, a natural woodland element, but also large amounts of common nettle and comfrey *Symphytum* sp. which are suggestive of nutrient enrichment and/or disturbance. There are also thin strips and lines of mixed and broadleaved trees (including mature trees) in the former grounds of the lodge; these are largely non-native conifers, sycamore and horse-chestnut *Aesculus hippocastanum*, over species-poor neutral grassland.

11.4.2.13 Other than the few small stands of blackthorn scrub adjacent to plantation woodland, the only other dense scrub present comprises a few stands of gorse *Ulex europaeus*. Gorse is widely and sparsely scattered elsewhere.

Grassland

11.4.2.14 Unimproved neutral grassland in the coastal strip is described under that heading above. Semi-improved neutral grassland is common in the survey area, with lower floristic diversity and/or a higher frequency of ruderal ('weed') species than the unimproved grassland, and mostly corresponds to forms of the NVC type MG1, in which larger grasses are prominent.

11.4.2.15 Semi-improved neutral grassland within the power station security fence is typically dominated by red fescue, usually with frequent to abundant cock's-foot and frequent Yorkshire-fog. Common couch *Elytrigia repens* is locally abundant. Herb diversity is moderate, usually including frequent ribwort plantain and often hogweed and meadow vetchling, the last two common in MG1-type grassland. There is often evidence of past disturbance in the presence of locally abundant creeping thistle, field horsetail *Equisetum arvense* and/or colt's-foot *Tussilago farfara*. Other species recorded in small quantity and/or irregularly include dandelion *Taraxacum* agg., common vetch *Vicia sativa*, marsh thistle, soft rush *Juncus effusus* and, very rarely, common spotted-orchid *Dactylorhiza fuschii* (this species is not uncommon in grassland in disturbed industrial areas).

11.4.2.16 Similar semi-improved neutral grassland occurs to the south-east edge of the Proposed Development Site, and to the west of the A90, often with abundant false oat-grass and/or cock's-foot, and is often very weedy with nettle and thistles. In the south-west corner of the Proposed Development Site, the neutral grassland is frequently dominated by soft rush, but is coded as neutral rather than marshy grassland because it is grazed, not particularly wet, and species-poor with grasses co-dominant (NVC type MG10). Similar species-poor soft rush vegetation occurs in a small patch between the former Sandford Lodge grounds and the large central improved field. At Sandford Lodge there is also semi-improved neutral grassland dominated by red fescue and Yorkshire-fog which appears to be overgrown lawn. Marshy grassland proper occurs in the northern part of the coastal strip and is described under that heading above. Beside the footpath in the south-east of the survey area there is a small patch of marshy grassland in which common reed *Phragmites australis* is dominant with abundant nettle – this is steeply sloping without permanent waterlogging and is therefore not coded as swamp.

11.4.2.17 The apparently unmanaged fields to the north and north-west, on both sides of the A90, are species-poor and tend to be dominated by Yorkshire-fog, with variable and locally abundant false oat-grass, cock's-foot, common couch and soft rush, and frequent to abundant weeds in particular creeping thistle and broad-leaved dock *Rumex obtusifolius*, and also ragwort north of the Sandford Lodge track.

11.4.2.18 The managed agricultural fields in the habitat survey area are largely species-poor improved grassland of very limited botanical diversity. Part of the large central field has been classed as poor semi-improved grassland – this is on an appreciable slope and is marginally more diverse than the adjacent improved grassland, but is still heavily-grazed and species-poor overall with much perennial rye-grass *Lolium perenne*. At the eastern edge of the poor semi-improved grassland, on steeper ground adjacent to the security fence, there is a very small patch of unimproved neutral grassland. The grasses in this small patch are mainly red fescue, Yorkshire-fog and common bent, with frequent crested dog's-tail *Cynosurus cristatus*, and the herbs include frequent primrose, ribwort plantain, red clover, cat's-ear *Hypochaeris radicata* and daisy *Bellis perennis*, and occasional common sorrel *Rumex acetosa* and carnation sedge *Carex panicea*. These species, combined with frequent creeping buttercup *Ranunculus repens* and creeping thistle, indicate a poor form of the NVC type MG5 (lowland meadow).

11.4.2.19 Amenity grassland, which is species-poor and heavily mown, occurs extensively in the survey area in the outskirts of Boddam, and occasionally in small quantity elsewhere.

Freshwater Habitats

11.4.2.20 There are two ponds within the survey area. The larger (referred to as 'Pond 2' in **Appendix 11E** (EIA Report Volume 4)) occupies a shallow depression in grazed improved pasture just east of the A90. This pond is heavily affected by cattle, with severe poaching and grazing around the edge. The standing water here is evidently eutrophic with a single uncommon plant, ivy-leaved crowfoot *Ranunculus hederaceus*, abundant common duckweed *Lemna minor*, and other common aquatic and marginal plants. Floating sweet-grass *Glyceria fluitans* is abundant in the peripheral vegetation, floating outwards into the water, along with creeping bent *Agrostis stolonifera* and marsh foxtail *Alopecurus geniculatus* in the damp inundation zone. These represent the S22 and MG13 NVC types, although they are of no note given that they are species-poor and common in inundated pastures.

11.4.2.21 A smaller pond (referred to as 'Pond 1' in **Appendix 11E** (EIA Report Volume 4)) is situated just west of the A90, by the north end of a lay-by. It is roughly square and almost certainly of artificial origin. The water depth at the time of survey was very shallow. No open water was present due to the overwhelming dominance of the invasive non-native species New Zealand pigmyweed *Crassula helmsii*. The New Zealand pigmyweed mat was punctuated by abundant common spikerush *Eleocharis palustris*. Other wetland herbs are sparse but include occasional lesser spearwort *Ranunculus flammula* around the periphery.

11.4.2.22 There are two small streams within the survey area. The longest (unnamed drain, referred to as 'North stream' in **Appendix 11E** (EIA Report Volume 4)) emerges from a culvert on the east side of the A90, runs beside the Sandford Lodge track, and is then culverted under the disused farm buildings before emerging to drop down the coastal slope to the sea. This is a very small stream that contained very little water at the time of survey. Where the channel was visible, the bed was of pebble / gravel and the vertical banks earthy. There is no significant aquatic or marginal vegetation. A substantial part along the Sandford Lodge track runs in an artificially deepened and straightened channel under a hawthorn hedge canopy or, where not under the hedge, is lost amongst an over-hanging mat of soft rush, Yorkshire-fog and creeping bent. Beyond the farm buildings, the channel is deeply incised with dense ruderal vegetation either side and often overhanging, before dropping steeply a short distance to the sea through neutral grassland.

11.4.2.23 The second stream – the Den of Boddam Burn – is almost entirely culverted under the Proposed Development Site but is exposed within the survey area for a short stretch to the south of the A90. This stretch is adjacent to a building and yard with a vertical built wall on the east side, and again sits in an artificially deepened and straightened channel with a steep and partly artificial west bank. This stream is small and contained shallow water of mostly less than 10cm depth at the time of survey. The substrate is pebble / gravel and there is no aquatic vegetation in this stretch.

Other Habitats

11.4.2.24 Hedgerows are scarce in the survey area. Mature but species-poor hawthorn-dominated hedgerows run along most of the length of both sides of the track to Sandford Lodge. All other hedgerows are further beyond the Proposed Development Site, and are also species-poor.

11.4.2.25 In the south-east corner of the Proposed Development Site there is a wet slope in presumed former pasture, now unmanaged, in which glaucous sedge *Carex flacca* is abundant amongst short vegetation. Other species include abundant crested dog's-tail and locally abundant field horsetail, as well as frequent perennial rye-grass, ribwort plantain, red clover, white clover and daisy. There is also occasional lesser celandine. This vegetation has been classed as a neutral flush but does not well-fit any NVC type.

11.4.2.26 There are a few small areas of tall ruderal ('weed') vegetation. The most substantial are beside the stream north of Sandford Lodge, comprising common nettle and ground elder *Aegopodium podagraria*. In the far south-east of the survey area there is also a stand of rosebay willowherb *Chamaenerion angustifolium*.

11.4.2.27 Introduced shrub occurs at three locations as described in Section 11.4.3 below.

11.4.2.28 Ephemeral vegetation occurs on gravelly ground in the northern part of the existing power station grounds. The bare ground code has been used for the coastal footpath. The refuse tip code applies to a small area of deposited brash within the northern part of the existing power station site.

11.4.3 NOTABLE AND PROTECTED SPECIES

11.4.3.1 The following sections provide a summary of the results of the desk study and field survey carried out to establish the baseline conditions in terms of protected and notable plant and animal species. Full details can be found in **Appendices 11B-11F** (EIA Report Volume 4).

Notable Plants

Native Species

11.4.3.2 Of considerable note is the occurrence of oysterplant on shingle just beyond the coastal grassland in the Furrah Head area (see **Figure 11.4** EIA Report Volume 3). The zone in which most of the oysterplant population was found to be present is the area between the point of Furrah Head and the foul water outfall pipe from the existing power station, to the south. The substrate here has been classed as shingle but is fine and approaches sand, and there are scattered boulders / rocks. Oysterplant is classed as 'Near Threatened' and is also Nationally Scarce (occurring in 15-100 hectads in the UK) (JNCC, 2020). This population is one of the most substantial on the east coast of Scotland (see consultation responses in Table 11.1, and Welch and Innes (1999)). A count of 223 individual oysterplants was made during the Phase 1 habitat survey within the key area marked on **Figure 11.4** (EIA Report Volume 3), excluding small plants / seedlings. Accounting for other plants scattered sparsely outside this key area, an estimate of 240 mature plants (excluding small plants / seedlings) in the survey area is considered to be reasonably accurate. The number of plants present in this area is subject to inter-annual variation because of changes to the shingle environment wrought by the weather and tides; in 1988 there were reported to be about ten plants, and about 840 (including seedlings) in 1998 (Welch and Innes, 1999). In 2013, there were reported to have been 100 adult plants and 70 seedlings, and numbers are reportedly more stable at the time writing (see consultation responses in Table 11.1).

Invasive Non-native Species

11.4.3.3 Invasive non-native plant species in the survey area comprise the following, which are all within the Proposed Development Site (locations are shown on **Figure 11.4** EIA Report Volume 3):

- New Zealand pigmyweed dominating Pond 1;
- A stand of sea buckthorn *Hippophae rhamnoides* adjacent to the power station car park; and
- A small stand of Japanese rose *Rosa rugosa* just beyond the security fence near the foul water outfall pipe.

11.4.3.4 In addition, although most likely not invasive, a very small stand of unknown exotic shrubs was found within the power station grounds.

Bats

11.4.3.5 The desk study returned no records of bats within 1km of the Proposed Development Site.

11.4.3.6 Nine trees and six buildings with Moderate bat roost suitability (as defined by the Bat Conservation Trust (BCT) in Collins (2016)) were identified within the Proposed Development Site, all in the area around Sandford Lodge (and including the Lodge itself). In addition, one further tree was assessed as having Low bat roost suitability and one of the Sandford Lodge buildings was deemed to have Negligible roost suitability. The locations of all are shown on **Figure 11B.2 of Appendix 11B** (EIA Report Volume 4).

11.4.3.7 Further bat roost survey were undertaken of all the trees and buildings assessed as having Moderate roost suitability. These surveys identified five roost locations located within three of the outbuildings to the west of Sandford Lodge, referred to as buildings B2, B5 and B6, as shown on **Figure 11B.2 of Appendix 11B** (EIA Report Volume 4). Based on the characteristics of the identified roosts (small, isolated gaps under guttering and roof tiles), the species and number of bats recorded entering the roosts (approximately three individuals), and the use of five separate, distinct, roosting locations within a relatively short period of time, it is likely that these locations are transient roosts used by small numbers of (probably) male common pipistrelle *Pipistrellus pipistrellus* bats. Transient roosts of the types recorded, while legally protected, are of limited nature conservation importance.

11.4.3.8 Walked transect surveys carried out monthly between April and September 2021, inclusive, recorded low levels of bat activity, limited to one species of bat only – common pipistrelle. The locations of all recordings of bats during the walked activity transects are shown on **Figure 11B.1 of Appendix 11B** (EIA Report Volume 4). As can be seen, activity was generally restricted to the small area of woodland around Sandford Lodge, with low levels of bat activity also along the access track to the Lodge from the A90 and above areas of gorse scrub within the northern part of the Proposed Development Site (including around the CCGT and CCP area).

11.4.3.9 A static bat detector deployed for a period of 124 nights between 21 April and 29 August 2021 recorded four species of bats within the Proposed Development Site: common pipistrelle, soprano pipistrelle *Pipistrellus pygmaeus*, Nathusius' pipistrelle *Pipistrellus nathusii* and an unidentified *Myotis* bat. The vast majority (more than 97%) of bat passes recorded by the static detector related to common pipistrelle, with much smaller numbers of passes by soprano pipistrelle (169), Nathusius' pipistrelle (6), and *Myotis* sp. (1). Bats were recorded on 109 nights of the total 124 nights of monitoring.

11.4.3.10 Analysis of the data collected by the static bat detector using the Mammal Society's Ecobat tool (http://www.ecobat.org.uk/) indicates that, with limited confidence, the level of common pipistrelle activity at the Proposed Development Site is likely to be 'moderate' when compared

to the area within 100km. The confidence in the Ecobat analysis for the remaining three recorded species was also limited, but the level of activity by soprano pipistrelle, Nathusius' pipistrelle and *Myotis* bats was qualitatively very low.

Otter

11.4.3.11 The desk study returned one record of a dead otter on the A90 just outside Peterhead in 2021.

11.4.3.12 A single otter spraint was found just above the beach on the minor watercourse which flows into Sandford Bay from the direction of Sandford Lodge during targeted field survey in August 2021 (**Figure 11C.2 of Appendix 11C** EIA Report Volume 4). No otter resting sites were found during field survey for this species.

11.4.3.13 The watercourses and waterbodies within the survey area are sub-optimal for otter, being small and isolated from water features in the wider area. Sandford Bay presents much more suitable otter habitat and may be used by otters for foraging.

Water Vole

11.4.3.14 No records of water vole were identified by the desk study, and no evidence of this species was found during the water vole surveys or incidentally during other ecology surveys.

11.4.3.15 The watercourses and waterbodies are unsuitable for water vole, for reasons that vary according to location, including lack of lush herbaceous vegetation for foraging, heavy shading by scrub, very small size, a steep and rocky nature (on the coastal slope), and isolation from other suitable habitat in the wider area.

11.4.3.16 On the basis of the desk study and field survey results, water vole is considered likely to be absent from the ZoI of the Proposed Development.

Red Squirrel

11.4.3.17 No evidence of red squirrel was found during the field survey for this species. The woodland blocks within the survey area are all small, isolated and composed of semi-mature trees which would provide very little foraging resource.

11.4.3.18 Due to the lack of records of this species and the nature of the habitats present, red squirrel is likely absent from the ZoI of the Proposed Development.

Badger

11.4.3.19 Evidence of badger was found within the field survey area. Full details of the results of targeted field survey for badger are provided in **Confidential Appendix 11G** (EIA Report Volume 4).

Water Shrew, Brown Hare and Hedgehog

11.4.3.20 Two records of brown hare, one from 2017 and one from 2018, were identified by the desk study, both to the west of the A90. Two records of hedgehogs in gardens in Boddam were also identified by the desk study.

11.4.3.21 No water shrew, brown hare or hedgehog were recorded incidentally at any time during the ecological field surveys carried out for the Proposed Development.

Breeding Birds

11.4.3.22 Records of 25 protected and/or notable bird species within 1km of the Proposed Development Site were returned by NESBReC or were commercially available from NBN Atlas Scotland (see Table 6, **Appendix 11D** EIA Report Volume 4). Of those species that may breed within the ZoI of the Proposed Development, only corn bunting *Emberiza calandra*, grey partridge *Perdix perdix*, lapwing *Vanellus vanellus* and peregrine *Falco peregrinus* were not recorded during field surveys. However, the records for corn bunting, grey partridge and lapwing are all more

than ten years old, suggesting no recent observations of these species. The peregrine record is from 2019, however, no peregrines were observed during any baseline ecological field surveys carried out at the Proposed Development Site and SSE Thermal are not aware of any breeding by this species on or near the existing power station. Peregrines are therefore not believed to have bred on the power station or associated buildings in 2021.

11.4.3.23 A total of 41 species were recorded by the modified CBC survey. Of those, sixteen are considered to be notable, and therefore of conservation concern, according to the definition provide in Section 11.3.3. In addition, oystercatcher *Haematopus ostralegus*, although not notable according to the definition used in Section 11.3.3, is considered by this assessment, based on professional judgement, to also be notable. This is due to this species being identified as 'Vulnerable' by the European Red List of Birds (BirdLife International, 2015), its inclusion on the Amber List of BoCC because of breeding population declines, and due to the relative sensitivity of breeding oystercatchers to disturbance, relative to other birds such as passerines.

11.4.3.24 Nine notable bird species are considered to have held territories within the Proposed Development Site and surrounding 100m buffer during the 2021 breeding season (see Table 9, **Appendix 11D** (EIA Report Volume 4)). The estimated centres of the breeding territories of these species are shown on **Figure 11D.17 of Appendix 11D** (EIA Report Volume 4). In addition, four species that are not territorial but breed gregariously were also believed to have bred within the survey area in 2021. These are also included in Table 10 in **Appendix 11D** (EIA Report Volume 4) but are indicated by 'N/A' in the columns under 'Number of territories'. The 13 notable bird species believed to have bred within the Proposed Development Site and surrounding 100m buffer in 2021 were:

- Grey wagtail *Motacilla cinerea* – one possible territory near cooling water outfall;
- Lesser redpoll *Carduelis cabaret* – two possible territories;
- Oystercatcher – two confirmed breeding locations: one on gravel within the Proposed Development Site near existing power station entrance, and one on gravel adjacent to internal road;
- Reed bunting *Emberiza schoeniclus* – one probable territory near to the access track to Sandford Lodge, and one possible territory near to seafood factory in Boddam;
- Skylark *Alauda arvensis* – six probable territories in grazed pasture west of the existing power station, and a further two probable territories in other grassland within the survey area;
- Spotted flycatcher *Musciapa striata* – one probable territory in woodland near the power station entrance;
- Siskin *Carduelis spinus* – one probable territory and one possible territory in conifer plantations;
- Song thrush *Turdus philomelos* – three probable territories in small blocks of woodland around the survey area;
- Yellowhammer *Emberiza citrinella* – five probable territories distributed across the survey area;
- Bullfinch *Pyrrhula pyrrhula* – two pairs observed together in a small block of woodland near the entrance to the power station during first CBC survey visit, with a single bird here again during the second survey visit;
- House sparrow *Passer domesticus* – breeding likely at a private residence to the south of the entrance to the existing power station;
- Linnet *Carduelis cannabina* – birds recorded across the survey area on all survey visits. It is likely that this species bred in scrub habitat within the Proposed Development Site and

wider 100m buffer, especially in gorse inside and immediately outside of the security fence around the power station; and

- Tree sparrow *Passer montanus* – recorded across the survey area but in two primary locations where breeding is likely to have taken place: one in woodland south of the public visitor car park beside the main power station entrance, and one around the Sandford Lodge outbuildings.

11.4.3.25 The breeding bird assemblage therefore comprised species typical of agricultural landscapes containing scattered woodland blocks. Although the species listed above are all of conservation concern (as indicated by inclusion on the SBL or Red List of BoCC), all are relatively common, both nationally and regionally, and are very widespread.

Waterbirds

11.4.3.26 Of the 25 records of protected / notable bird species returned by NESBReC or identified from NBN Atlas Scotland, the only waterbird not recorded by targeted field surveys was great northern diver *Gavia immer*. This species breeds in the boreal and tundra zones of North America, Greenland and Iceland and is predominantly marine during the non-breeding season, and is very uncommon inland (Forrester *et al*, 2007). The single record of this species from NESBReC in Sandford Bay is therefore certainly of a non-breeding bird.

11.4.3.27 A total of 38 species were present in the data provided by the BTO for the Peterhead Bay and Sandford Bay WeBS core count sector. The most frequently occurring species were gulls, cormorant *Phalacrocorax carbo*, eider and oystercatcher, which was recorded on all but one of the 56 survey visits. Gulls, and in particular herring gull, were generally the most abundant species. The following 15 species identified in the WeBS data were not recorded during waterbird surveys for the Proposed Development:

- Bar-tailed godwit *Limosa lapponica* – recorded on four WeBS survey visits between 2015-2020, with a peak count during any one survey of only three birds (in October 2017);
- Common sandpiper *Actitis hypoleucos* – present on only two WeBS survey visits and with a peak count of two birds (May 2017). This species breeds beside freshwater, generally in the uplands (Forrester *et al*, 2007). There is no such suitable breeding habitat for this species within the ZoI of the Proposed Development;
- Dunlin *Calidris alpina* – present on eight WeBS surveys, but with a peak count of only six birds (February 2019);
- Glaucous gull *Larus hyperboreus* – this is a rare winter visitor to Scotland and was present on only two WeBS survey visits, with the peak count being a single bird;
- Golden plover *Pluvialis apricaria* – a single bird present on only one WeBS survey in March 2018;
- Goldeneye – recorded on eight out of 56 WeBS survey visits, with peak count of eight individuals in February 2018;
- Knot *Calidris canutus* – a single bird present on one occasion in September 2015;
- Little grebe *Tachybaptus rufficollis* – a single bird present in January 2020;
- Little gull *Hydrocoloeus minutus* – a single bird present in November 2018;
- Mallard *Anas platyrhynchos* – present on six WeBS surveys, with a peak count of 11 birds in January 2019;
- Mediterranean gull *Larus melanocephalus* – this is a uncommon bird in Scotland, and breeding has never been confirmed (Forrester *et al*, 2007). A single bird was recorded in October 2016;
- Pink-footed goose – although there are several statutory designated sites for which pink-footed goose is a qualifying / notified feature within 15km of the Proposed Development,

this species was recorded as a single bird present on only one WeBS visit between 2015-2020 (February 2016);

- Red-necked grebe *Podiceps grisegena* – this is almost entirely a non-breeding species in Scotland, with only two confirmed occasions of breeding. During the non-breeding season, it occurs mainly in the Firth of Forth (Forrester *et al*, 2007). A single bird was present on one occasion in April 2018;
- Shelduck *Tadorna tadorna* – four birds present on one occasion in April 2019; and
- Teal – four birds were present on one occasion in October 2017.

11.4.3.28 A total of 27 species were recorded during the waterbird surveys, including eleven that are qualifying or notified species of designated sites within 15km of the Proposed Development Site (common tern, eider, fulmar, guillemot, herring gull, kittiwake, lapwing, redshank, pink-footed goose, sandwich tern and shag). Herring gull was by far the most abundant species and was present on every survey visit. Eider, great black-backed gull *Larus marinus* and oystercatcher were the only other species recorded on every survey visit. Other than herring gull, the only species for which a peak count of more than 20 birds was recorded were:

- Black-headed gull Larus chroicocephalus;
- Cormorant;
- Fulmar;
- Oystercatcher;
- Purple sandpiper Calidris maritima;
- Shag; and
- Turnstone Arenaria interpres.

11.4.3.29 The results of the waterbird surveys are shown on **Figures 11D.9-11D.16** of **Appendix 11D** (EIA Report Volume 4) and indicate that the following locations were of relative importance to waterbirds:

- The rocky islands off Boddam Harbour – these are used by a number of species, in particular herring gull (which were confirmed to have bred here in 2021), shag and turnstone;
- The outflow pipe from the seafood factory at Boddam – flocks of fulmar were observed feeding in the water around this outflow pipe on several survey visits. The majority of the 44 birds present in June were at this location; and
- The rocky shore immediately north of Boddam Harbour, extending approximately as far as the power station foul water outfall pipe – this area was found to be used by several wader species throughout the waterbird survey programme, including oystercatcher, redshank and turnstone. A relatively large number of purple sandpipers were recorded in this area during the survey in October.

11.4.3.30 Other parts of the survey area were used by low numbers of birds, including Sandford Bay which supported small numbers of foraging terns, shags and other birds occasionally roosting on the beach.

11.4.3.31 Other than herring gulls using the existing power station buildings (including potentially for breeding), no part of the Proposed Development Site itself is used by aggregations of waterbirds. There is very little use of grassland fields in the wider area, with only rare records of oystercatchers and herring gulls on the playing pitches in Boddam to the south.

Freshwater Aquatic Species

11.4.3.32 The Den of Boddam Burn and North stream were both found to be of limited conservation value with no notable macroinvertebrate or macrophyte species recorded. The macroinvertebrate

communities had a moderate tolerance to pollution and indicated that both watercourses were moderately impacted by sedimentation and sporadically reduced flows. Fish were considered likely to be absent from both watercourses due to lack of connectivity and intermittent drying or low flows, although there is the potential for common species such as three-spined stickleback *Gasterosteus aculeatus* to be present. These species are not of conservation concern and are not notable in the context of this EcIA. There was no direct connectivity of aquatic habitats for migratory fish between the watercourses and Sandford Bay due to the presence of the grided outfall structure and the steep rocky shoreline.

11.4.3.33 A single uncommon plant species (according to PSYM metrics), ivy-leaved crowfoot, was recorded in Pond 2 (in the field east of the A90). No other notable plant species were recorded, however the invasive non-native plant New Zealand pigmyweed was dominant in Pond 1 (on the west side of the A90). The macrophyte community in Pond 2 was indicative of heavy eutrophication due to the impact of nutrient input from cattle grazing. Fish were considered likely to be absent from both ponds.

Grey Seal

11.4.3.34 The closest main grey seal breeding colonies to the Proposed Development, as identified in a report by the Special Committee on Seals (SCOS, 2020), are the Firth of Forth and North Mainland areas, which are both more than 100km distant. However, a small grey seal breeding colony was identified using the Defra MAGIC map application (https://magic.defra.gov.uk/home.htm) approximately 72km south of the Proposed Development off Catterline. Furthermore, there is a designated haul-out site located approximately 22km south of the Proposed Development, called Ythan River Mouth, which protects grey seals located throughout the year (Marine Scotland, 2017).

11.4.3.35 Other grey seal haul-out sites, consisting of small groups of individuals, are known to occur along the Aberdeenshire coastline (SCOS, 2020). Seals have been reported at haul-out on the rocks surrounding Boddam Harbour and are also known to occur in Sandford Bay (Fisher, 2020).

11.4.3.36 Grey seal was observed hauled out and in the water near Boddam Harbour during a waterbird survey carried out on 28 October 2021 to inform this EcIA. Approximately 60 individuals were present, 45 of which were hauled out on Meikle Mackie island and other smaller rocky islands adjacent, and around 15 were in the water.

11.4.4 FUTURE BASELINE

Baseline at Time of Construction

11.4.4.1 Construction of the Proposed Development is expected to commence in Q4 2023 and will last for approximately three and a half years. Prior to the commencement of construction, the operation of the existing power station will remain consistent with the baseline year of 2021, during which time the ecological field surveys were carried out to inform this EcIA. No meaningful changes to the environment within the Proposed Development Site are therefore likely before construction starts, either physically or in relation to the operation of the existing power station.

11.4.4.2 At the time of conducting baseline ecological surveys, the SSEN Transmission Peterhead Substation on the immediate west side of the A90, opposite the Proposed Development Site, was under construction. Habitat loss and any disturbance of protected / notable species caused by the construction of this project will have influenced, to varying degrees, the results of the ecological surveys described in this chapter. Construction of the Peterhead Substation is

expected to be largely or entirely complete by the time of construction of the Proposed Development in Q4 2023. Although all habitat loss from the substation is likely to have been captured by the baseline surveys for the Proposed Development, there may be a reduction in disturbance of species following completion of its construction. However, this is very unlikely to materially change the baseline conditions identified in 2021, with the species assemblage present almost certain to remain typical of the habitats present in the surrounding area (ubiquitous agricultural land with scattered blocks of plantation woodland) and which were subject to detailed ecological field survey for the Proposed Development.

11.4.4.3 There are no other known or likely land use changes, or changes to the coastal or marine environment within the ZoI of the Proposed Development, that have the potential to significantly change the baseline ecological conditions at the time of construction of the Proposed Development.

11.4.4.4 Minor changes in the distribution of some species (e.g., nesting birds) may occur due to small-scale changes in habitat structure as a result of ecological succession or other natural processes. Any such changes are very likely to be within the range of normal inter-annual variation in the distribution and abundance of species populations. In addition, potentially relevant protected species (e.g., badger) could establish new locations used for shelter or protection, and it will be necessary to ensure compliance with the legislation protecting these species.

11.4.4.5 It is therefore expected that the current baseline conditions will remain largely unchanged by the time of construction of the Proposed Development.

Baseline in the Absence of the Proposed Development

11.4.4.6 For the purposes of considering the baseline in the absence of the Proposed Development for this chapter, a point 20 years in the future has been adopted. It is expected that by this time the existing power station would have reached the end of its operational life and have been decommissioned and demolished. If left undeveloped, the Proposed Development Site would therefore likely be brownfield, consisting variously of the existing habitats (e.g., semi-improved grassland) and areas of hard-standing. This would potentially have some ecological value, for example to waterbirds (e.g., for nesting and/or roosting). However, the likelihood of the Proposed Development Site remaining undeveloped is low, and it can be reasonably expected that some form of infrastructure would be developed. The precise impacts on ecological features that could occur would depend on the type of development progressed. Regardless, given the habitats and species found to be present in the current baseline conditions, the ecological effects of any such development would likely be limited.

11.5. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

11.5.1 DESIGN

11.5.1.1 Embedded mitigation measures are incorporated into the design of a development and aim to avoid or reduce adverse effects, including those on ecological features. Embedded mitigation can be considered at the impact assessment stage, whereas specific mitigation measures which are not part of the design, or which are otherwise needed to meet legislative requirements, and are developed after the initial impact assessment, are assessed at a later stage when considering the residual effects.

11.5.1.2 The Proposed Development has sought to avoid impacts on ecological features through design by:

- Positioning most of the main site for the Proposed Development (containing the CCGT, CCP and associated equipment) on an existing area of bare hard-standing of very low ecological value, and other facilities (including workshops and water treatment plant) largely on existing hard-standing near the existing power station entrance. Permanent habitat loss from the construction of the Proposed Development will therefore be minimal;
- Utilising existing power station infrastructure, in particular the existing cooling water system, which has an intake at Boddam Harbour and outfall in Sandford Bay. Consequently, there is no requirement for any construction works in the marine or intertidal environments, or on the shore above the tidal limit;
- Specifying the cooling system to operate within the existing limits set by the current PPC Permit and CAR Licence, meaning there will be no change to the volumes of seawater abstracted or discharged, or the quality of the latter (see **Chapter 12: Water Environment** (EIA Report Volume 2) for further details);
- Treating foul water from welfare facilities within the Proposed Development Site using a Package Treatment Plant (PTP) and discharging to Sandford Bay via the existing foul water outfall. Given the relatively small volumes involved it is assumed that there would be adequate capacity to discharge this within current PPC Permit standards;
- Surface water drainage from the Proposed Development will be discharged to Sandford Bay via the existing outfall. It is assumed, as indicated in the conceptual drainage strategy, that pollution prevention measures will include a combination of filter drains, oil interceptors and a “QuadraCeptor” – a filtration system for removal of sediment and pollutants. Bunds will be used in areas where spillages are likely to occur; and
- Providing dry low oxides of nitrogen (NOx) (DLN) burners to the selected gas turbine to minimise the formation of NO_x. Furthermore, Selective Catalytic Reduction (SCR) equipment will be used to remove NO_x from flue gas. This will minimise the emissions of NO_x and the associated potential impacts of nitrogen deposition on habitats.

11.5.2 STANDARD GOOD PRACTICE

11.5.2.1 In addition, a range of measures that are standard good practice for development of this type, and which are required to comply with environmental protection legislation, will also be implemented. These are well-developed and have been successfully implemented on infrastructure projects across the country and there is a high degree of confidence in their success. They can therefore be treated as embedded mitigation. These will include:

- Prior to the commencement of construction, a survey for protected or notable species will be carried out to check for any changes to the baseline conditions described in this chapter, in particular with regard to the locations of resting sites used by protected species such as badger. This will be completed not more than six months prior to the commencement of construction. The results will be reported and communicated to the appointed construction Principal Contractor and appropriate avoidance / mitigation measures implemented, as required;
- All personnel involved in the construction, operation and decommissioning of the Proposed Development will be made aware of the ecological features within the ZoI of the Proposed Development and the mitigation measures and working procedures that must be adopted. This will be achieved as part of the induction process and through the delivery of Toolbox Talks, where required.;
- An Ecological / Environmental Clerk of Works (ECoW) will be employed for the duration of the construction of the Proposed Development. The ECoW will advise on and monitor implementation of ecological mitigation measures and compliance with legislative

requirements in relation to ecological features. The ECoW will also carry out pre-works checks for protected and/or notable species and provide other ecological advice as necessary;

- A CEMP will be prepared and submitted for approval by Aberdeenshire Council, in consultation with NatureScot and SEPA, where necessary, prior to commencement of construction. The CEMP will set out all environmental management measures and the roles and responsibilities of construction personnel;
- During all phases of the Proposed Development (construction, operation and decommissioning), pollution prevention measures will be adopted, following SEPA Pollution Prevention Guidelines (PPG) and Guidance on Pollution Prevention (GPP), including the following:
  - controls and contingency measures will be provided to manage run-off from construction areas and to manage sediment;
  - all oils, lubricants or other chemicals will be stored in an appropriate secure container in a suitable storage area, with spill kits provided at the storage location and at places across the Proposed Development Site;
  - to avoid pollution impacts to soils, vegetation and watercourses / waterbodies during construction, all refuelling and servicing of vehicles and plant will be carried out in a designated area which is bunded and has an impermeable base. This will be situated at least 50m from any watercourse;
- Works near or at any retained trees or woodland will follow guidance in British Standard 5837:2012 *Trees in relation to design, demolition and construction – Recommendations* (British Standards Institution, 2012);
- As far as possible, works that will directly impact upon areas of vegetation that could be used by nesting birds will be undertaken outside of the breeding season, this being taken to be between March and August, inclusive. Should vegetation clearance works be required during the breeding season, a pre-works check for active nests will be carried out by the ECoW or other suitably experienced ornithologist. Such checks will be completed no more than 72 hours in advance of clearance works taking place as nests can be quickly established. Where any active nests are identified, suitable species-specific exclusion zones will be implemented and maintained until the breeding attempt has concluded;
- Sightings of protected or notable species within the Proposed Development Site during the construction phase will be recorded. If any evidence or sightings of protected species is found within 30m of works, then works in that area will stop immediately and the ECoW will be contacted for further advice;
- Any excavations will be left with a method of escape for any animals that may enter overnight, and will be checked at the start of each working day to ensure no animals are trapped within them;
- Any pipes will be capped or otherwise blocked at the end of each working day, or if left for extended periods of time, to ensure no animals become trapped;
- As far as possible, works will be carried out in daylight to minimise the risk of disturbing protected species such as foraging / commuting bats and badger; and
- Any artificial lighting required for construction works will be directional to avoid or minimise light spill.

11.6. LIKELY IMPACTS AND EFFECTS

11.6.1 FEATURES SCOPED OUT OF FURTHER ASSESSMENT

11.6.1.1 Relevant ecological features are those that are 'important' and have the potential to be affected by the Proposed Development (CIEEM, 2019). In view of the baseline data obtained through desk study and field survey, the features in Table 11.5 have been excluded from further assessment because: a) available data indicates that they are likely to be absent from the ZoI of the Proposed Development; b) it is clear that no impact from the Proposed Development is possible; and/or, c) they are habitats or species that are common and widespread and therefore not of conservation importance.

Table 11-5: Ecological features scopes out of further assessment

Ecological feature	Rationale for exclusion from further assessment in this chapter
Skelmuir Hill, Stirling Hill and Dudwick LNCS	This local non-statutory site is understood to be designated for its geological interest. A review of aerial imagery suggests that the habitats present within the site are of low ecological value, and any impacts on them would not have significant effects for biodiversity or nature conservation.
Ancient woodland	Air quality emissions are expected to have negligible impact on ancient woodland as the nearest such woodland is more than 6km from the Proposed Development Site, and air quality modelling and ecological assessment concludes that there will be no significant effects from air quality changes on much nearer habitats and protected sites to the Proposed Development Site. Guidance published by Defra and the Environment Agency suggests that assessment of air quality impacts on ancient woodland is only required up to 2km from an emissions source.
Native woodland	The nearest predominantly native woodland is more than 650m from the Proposed Development Site, while the nearest native woodland is approximately 850m distant. There is therefore no potential for direct impacts from the Proposed Development on these habitats. Moreover, between the Proposed Development Site and these woodlands land uses include the A90, extensive agricultural land and an industrial area. These are likely to influence air quality (e.g. through vehicle emissions) far more than any additional contribution which could arise from the Proposed Development. Furthermore, no significant effects from operational emissions are predicted by modelling and assessment carried out for nature conservation sites located more closely than these areas of native woodland.
Other woodland, trees and scrub	Woodland and scrub within the ZoI of the Proposed Development is of very low ecological value, comprising blocks and strips of plantation typically dominated by non-native trees, and very small areas of dense gorse (rarely blackthorn), scattered scrub (mainly hawthorn), and very localised hawthorn hedgerows. There will be no loss of any trees or woodland from the Proposed Development, except for one or two immature pine trees near the power station entrance. Scrub removal will also be minimal, restricted to the possible loss of a small area of gorse on the slopes south-east of Sandford Lodge. Part

Ecological feature	Rationale for exclusion from further assessment in this chapter
	or all of the species-poor hawthorn hedgerow along the access to Sandford Lodge may also be lost.
Grassland	Grassland within the ZoI of the Proposed Development is of low to very low floristic diversity. Much is subject to high levels of grazing, is actively managed by cutting for amenity purposes or shows evidence of disturbance. These habitats are common and widespread locally and nationally.
Freshwater habitats	There are two ponds within the Development Site, both of which are ecologically-poor, with one being infested by the invasive non-native species New Zealand pigmyweed and the other being subject to significant poaching and nutrient enrichment from cattle. Neither pond will be directly impacted by the Proposed Development. There are also two watercourses within the Proposed Development Site. One (Den of Boddam Burn) is currently culverted beneath the entire Proposed Development Site (see **Chapter 12: Water Environment** (EIA Report Volume 2) where it is of almost no ecological value. The other is ecologically poor owing primarily to very small size and heavy shading, and, subject to implementation of standard pollution prevention techniques, will not be impacted by the Proposed Development.
Other habitats	The area identified as 'flush' in the south-east corner of the Proposed Development Site is not typical of such habitat, may have been formed by past disturbance, and is relatively species-poor. It will not be directly impacted by the Proposed Development. Moreover, the temporary construction laydown area to the west is on flat pasture which is not considered to be an important source of surface water or groundwater to the flush. The primary source of water to the habitat was observed instead to be surface water flowing down slope from the south. There is consequently not expected to be any hydrological impact on this habitat. All other habitats are of low floral diversity and are common and widespread both locally and nationally. None are significantly important for biodiversity or nature conservation.
Otter	Evidence of otter activity was limited to a single spraint, to the north of the Proposed Development Site. No otter resting sites were identified within 200m of the Proposed Development Site. The freshwater habitats within the ZoI are sub-optimal for otter and their loss would be of no consequence to the conservation status of this species locally.
Water vole	Based on desk study and field survey evidence, this species is considered likely to be absent from the ZoI of the Proposed Development.
Red squirrel	Based on desk study and field survey evidence, this species is considered likely to be absent from the ZoI of the Proposed Development.
Freshwater aquatic species	A single uncommon plant (according to PSYM metrics) was recorded in Pond 2, ivy-leaved crowfoot. However, neither pond will be directly or indirectly

Ecological feature	Rationale for exclusion from further assessment in this chapter
(macroinvertebrates and macrophytes)	impacted by the Proposed Development, so there will be no effects on this or other freshwater aquatic species.

11.6.2 IMPORTANCE OF ECOLOGICAL FEATURES

11.6.2.1 The assessed importance of those ecological features identified in the baseline conditions, and which have not been screened out above, is set out in Table 11.6, together with a rationale. Ecological importance has been assessed considering geographic scale, in accordance with CIEEM (2019) guidelines. However, the geographic scale of importance has been translated to the 'sensitivity'[4] categories used throughout this EIA. The corresponding sensitivity to the importance assigned to each ecological feature is given in Table 11.6. The approach to valuing ecological features is described in detail in **Appendix 11A** (EIA Report Volume 4).

11.6.2.2 When considering geographic scale, for the purposes of this assessment, the geographical level of 'Regional' is defined as the area encompassed by the North East Coastal Plain NHZ (NHZ 9) and 'Local' as the area within 10km of the Proposed Development.

Table 11-6: Importance of ecological features

Ecological feature	Importance (sensitivity)	Rationale
All SPAs, SACs and Ramsar sites within 15km of the Proposed Development: • Buchan Ness to Collieston Coast SPA • Buchan Ness to Collieston SAC • Ythan Estuary, Sands of Forvie and Meikle Loch SPA • Loch of Strathbeg SPA • Loch of Strathbeg Ramsar site • Ythan Estuary and Meikle Loch Ramsar site	International (High)	These designated sites were selected, and are legally protected, for their international importance for the protection of threatened habitats and species.
All SSSIs within 15km of the Proposed Development: • Bullers of Buchan Coast SSSI • Collieston to Whinnyfold Coast SSSI	National (Medium)	These are sites that form part of a nationally designated network of habitats intended collectively to represent the full range of natural features that exist across the country. Therefore, they are integral to the integrity of the national SSSI network, and this is reflected in the level of protection afforded to these sites under national legislation.

[4] Although the assigned importance of ecological features has been compared to the corresponding 'sensitivity' value used elsewhere in this EIA, this is not a reflection of the sensitivity of a particular ecological feature to the Proposed Development. The 'sensitivity' value has been provided to allow direct comparison with the rest of this EIA only.

Ecological feature	Importance (sensitivity)	Rationale
• Rora Moss SSSI • Loch of Strathbeg SSSI • Meikle Loch and Kippet Hills SSSI		
Coastal habitat	Regional (Low)	The coastal strip is dominated by sloping unimproved neutral grassland with very narrow localised coastal grassland, and (to the north) areas of marshy grassland and sand dune. The neutral grassland is coarse and is not particularly species-rich nor does it contain notable species and is of local importance. However, sand dune habitat is localised at the scale of the NHZ therefore Regional importance has been assigned to coastal habitat.
Oysterplant	National (Medium)	This species is classed as Near Threatened in the Great Britain and is also Nationally Scarce (occurring in less than 100 hectads). Therefore, National importance is considered appropriate.
Invasive non-native plant species (New Zealand pigmyweed, sea buckthorn and Japanese rose)	Regional (Low)	These species are not important through ecological value but for their negative effects on biodiversity. The main risk is the potential for the spread of non-native species during construction. None of the species recorded are of EU concern, however New Zealand pigmyweed and Japanese rose are of higher UK concern as indicated through their presence on Schedule 9 of the WCA (though this does not legally apply in Scotland). Inadvertent spread of buckthorn and Japanese rose (by distribution of berries) can only reasonably be foreseen near the Proposed Development, but New Zealand pigmyweed can spread from extremely small vegetative fragments that could be carried some distance, therefore Regional 'importance' has been assigned.
Bats	Local (Very Low)	All species of bat in Scotland are protected by the Habitats Regulations. However, only four species of bat were identified within the ZoI of the Proposed Development, with activity levels for three of these being very low. Five common pipistrelle roosts were identified inside three buildings near Sandford Lodge, and activity levels of this common species were assessed as being, at most, moderate relative to the area within 100km of the Proposed Development Site. The national population of

Ecological feature	Importance (sensitivity)	Rationale
		common pipistrelle is considered to be stable and conservation status is favourable.
Badger	Local (Very Low)	Although legally protected, badger is a common and widespread species, both nationally and in Aberdeenshire; local importance is therefore assigned.
Water shrew	Local (Very Low)	Water shrew is found throughout the UK but is probably locally distributed in northern Scotland (Mammal Society, undated). It is identified as a locally important species in Aberdeenshire by NESBiP. The habitats within the ZoI of the Proposed Development are sub-optimal for this species and any population present is likely to be small and not important in a Regional context.
Brown hare	Local (Very Low)	This species is of conservation concern but is common and has a widespread distribution in Scotland and Aberdeenshire; local importance is therefore assigned.
Hedgehog	Local (Very Low)	This species is of conservation concern but is common and has a widespread distribution in Scotland and Aberdeenshire; local importance is therefore assigned.
Barn owl	Regional (Low)	Barn owl distribution in the north of Scotland is largely confined to the eastern coastal plain. The Scottish breeding population is believed to be between 500-1,000 pairs, with an estimated ten pairs in north-east Scotland in 2004 (although this is acknowledged as likely being an underestimate) (Forrester *et al*, 2007). Regardless, barn owl is a relatively uncommon species in north-east Scotland and the presence of at least one bird, which may belong to an established pair, could represent a significant portion of the NHZ 9 population. Regional importance is therefore considered to be appropriate.
Breeding bird assemblage	Local (Very Low)	The breeding bird assemblage was found to be typical of agricultural habitats which predominate much of Aberdeenshire and large parts of eastern Scotland. No rare species or species with a restricted distribution were identified as breeding within the ZoI of the Proposed Development. Therefore, the breeding bird assemblage is

Ecological feature	Importance (sensitivity)	Rationale
		representative of the wider region, and only Local importance is deemed appropriate.
Waterbird assemblage (not including qualifying species of SPAs, which are addressed as part of the assessment of impacts and effects on such sites)	Regional (Low)	The waterbird assemblage within the potential ZoI of the Proposed Development comprised species that occur commonly in NHZ 9 and elsewhere in Scotland. Whilst in most cases the recorded numbers would therefore represent a small proportion of the NHZ population, some were sufficiently abundant that they may be regionally significant. For example, a peak count of 31 purple sandpipers in October 2021 represents approximately 6.1% of the north-east Scotland population according to Forrester et al (2007). Accounting for that, and the actual assemblage of waterbird species present, which included several of conservation concern, Regional importance has been assigned.
Grey seal	National (Medium)	This species is located within the potential ZoI of the Proposed Development and it cannot be ruled out that pupping may occur in Boddam Harbour. However, there are no European sites for the protection of this species within 100km of the Proposed Development. There is a designated haul-out site located 22km south at the mouth of the River Ythan. Accounting for this nationally protected site and the international protection afforded to this species (although these individuals are not considered outstanding examples in a European context), a National importance has been assigned.

11.6.3 THE POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

11.6.3.1 The following broad categories of impact could arise during the construction, operation and/or decommissioning of the Proposed Development and are considered, where potentially relevant, in relation to each of the ecological features scoped in to detailed assessment in Table 11.6, above:

- Permanent and/or temporary loss or degradation of habitats during construction, and potentially decommissioning also;
- Airborne pollution as a result of emissions during construction, operation and/or decommissioning of the Proposed Development;
- Disturbance of animal species during the construction, operation and/or decommissioning due to increased noise, vibration, lighting, or the presence of personnel, plant and/or machinery;

- Damage or destruction of the resting places of protected or notable animal species (e.g. bat roosts);
- Displacement of animal species during all phases of the Proposed Development, including the prevention of normal movements by animal species either locally or while on longer distance migration;
- Injury or mortality of plant or animal species during construction; and
- The spread of invasive non-native plant species during construction and decommissioning.

11.6.3.2 In accordance with guidance published by the Institute of Air Quality Management (IAQM) (Holman *et al*, 2014), the air quality study area for construction dust caused by plant and machinery was adopted as being the Proposed Development Site plus a 50m buffer, in addition to a 50m buffer around the construction traffic route, extended to 500m from the Proposed Development Site entrance (see **Chapter 8: Air Quality** EIA Report Volume 2). The study area for the assessment of construction air quality impacts from road traffic was based on the screening criterion set out in Volume 11, LA 105 of the Design Manual for Roads and Bridges (DMRB) (https://www.standardsforhighways.co.uk/dmrb/search/10191621-07df-44a3-892e-c1d5c7a28d90) and the Environmental Protection UK / IAQM guidance (Moorcroft *et al*, 2017), which require that only sensitive habitats within 200m of affected roads (i.e. roads that experience a change in traffic flow above a certain level) need to be considered in road traffic emissions assessments. The only sensitive ecological features (i.e. nature conservation designations or plant species) within the 50-200m screening distances for assessment of air quality impacts are Buchan Ness to Collieston SAC, Buchan Ness to Collieston Coast SPA, Bullers of Buchan Coast SSSI and the oysterplant colony. Therefore, further consideration of construction-phase air quality changes within this EcIA is restricted to these features.

11.6.3.3 The are no likely pathways for waterborne pollution of habitats or species given industry-standard good practice mitigation measures will be implemented at all stages of the Proposed Development to meet legal and regulatory requirements, as described in Section 11.5. These measures are considered as embedded and this impact is therefore not considered for any ecological feature.

11.6.3.4 Moreover, and as described above, and in more detail in **Chapter 4: The Proposed Development** and **Chapter 12: Water Environment** (EIA Report Volume 2), there will be no construction on the shore or within the intertidal zone or marine environment. In addition, the Proposed Development will operate within the current limits set by the existing PPC Permit and CAR Licence, meaning there will be no material change to abstraction or discharge rates or other parameters that could impact on ecological features. There is therefore no possibility of impacts because of changes to coastal processes or operational discharges to the marine environment, which are therefore not considered for any ecological feature.

11.6.4 IMPACTS ON SPECIAL PROTECTION AREAS, SPECIAL AREAS OF CONSERVATION AND RAMSAR SITES

Construction Phase

11.6.4.1 A detailed assessment of the potential impacts and effects of the Proposed Development on the relevant European sites of international nature conservation importance is provided in **Appendix 11F** (EIA Report Volume 4). The Loch of Strathbeg Ramsar site and Ythan Estuary and Meikle Loch Ramsar site, while not considered in the Statement to Inform Habitats Regulations Appraisal, have overlapping boundaries with the Loch of Strathbeg SPA and the Ythan Estuary, Sands of Forvie and Meikle Loch SPA, respectively. Moreover, the features for

which they are designated are also qualifying features of the aforementioned SPAs. Therefore, impacts and effects on these Ramsar sites will be comparable to those reported for the SPAs.

11.6.4.2 All the potential impacts of the Proposed Development were considered in the Statement to Inform Habitats Regulations Appraisal. It was concluded that there would be no adverse effect on the integrity of any of the relevant European sites because of the construction of the Proposed Development, so by inference there would be no adverse effect on the relevant Ramsar sites. A conclusion of no adverse effects on site integrity can be drawn even where minor negative impacts are predicted, so long as these do not prevent the relevant conservation objectives of a given site from being met. Therefore, adopting EIA terminology, while there may be slight negative impacts on European sites from the construction of the Proposed Development, these will not be significant and will result in, at worst, **Negligible effects**.

Operational Phase

11.6.4.3 As stated above, full assessment of the potential impacts and effects of the operation of the Proposed Development can be found in **Appendix 11F** (EIA Report Volume 4). The potential for significant effects to arise on any SAC or SPA (and by association with designated SPAs, the Loch of Strathbeg Ramsar site and Ythan Estuary and Meikle Loch Ramsar site) due to airborne pollution during operation was assessed in detail. This was based on air quality modelling carried out for the Proposed Development which is described in more detail in **Appendix 11F** (EIA Report Volume 4) and in **Chapter 8: Air Quality** (EIA Report Volume 2).

11.6.4.4 It was concluded that there would be no adverse effect on the integrity of any of the relevant European sites because of the operation of the Proposed Development, so by inference there would be no adverse effect on the relevant Ramsar sites. For the purposes of EIA, and as set out above, there will be, at worst, **Negligible effect** on European sites during the operational phase.

Decommissioning Phase

11.6.4.5 The impacts which could arise during the decommissioning phase are likely to be consistent with those of the construction phase. For the purposes of EIA, and as set out above, it is therefore concluded that there will be, at worst, **Negligible effect** on European sites during the decommissioning phase.

11.6.5 IMPACTS ON SITES OF SPECIAL SCIENTIFIC INTEREST

Construction Phase

11.6.5.1 The nearest SSSI is the Bullers of Buchan Coast, approximately 750m south-east of the boundary of the Proposed Development Site, so there would be no direct impacts on SSSIs. However, several potential pathways for indirect impacts are identified and are assessed below.

Airborne Pollution

11.6.5.2 Bullers of Buchan Coast SSSI is the only SSSI within the study area for air quality impact assessment as set out in **Chapter 8: Air Quality** (EIA Report Volume 2) and is of National nature conservation importance.

11.6.5.3 The maximum predicted annual average contribution of the Proposed Development alone to NO_x concentrations because of construction activity (such as vehicular emissions) would be at

or marginally above 1% of the critical level[5] of 30µgm^{-3} given by APIS at the four nearest modelling points within the SSSI. However, the predicted maximum Predicted Environmental Concentration (PEC), accounting for both background levels and construction emissions, is at most 11.6µgm^{-3}, and thus remains far below the critical level of 30µgm^{-3} (38.7% of the critical level). Therefore, NO_X emissions from construction will not exceed the annual critical level and the only potential effect that NO_x could have on the qualifying interest features of the SSSI is through the contribution it makes to nitrogen deposition rather than through direct effects of this pollutant in the atmosphere. This is assessed below.

11.6.5.4 A critical load[6] of 20kgha^{-1}yr^{-1} for nitrogen deposition at Buchan Ness to Collieston SAC / Buchan Ness to Collieston Coast SPA was used (see **Appendix 11F** (EIA Report Volume 4) for rationale). The maximum predicted change in nitrogen deposition because of construction activity would remain below 1% of the critical load of 20kgha^{-1}yr^{-1} set for maritime cliff and slope vegetation, at all modelling points within Bullers of Buchan Coast SSSI. Therefore, nitrogen deposition from construction will not exceed the annual critical load and no adverse effects are anticipated.

11.6.5.5 For dust emissions, a screening distance of 50m is used when considering the potential for impacts and effects on ecological features. The Bullers of Buchan Coast SSSI is over 400m from the nearest construction works, so is therefore well beyond the distance within which a potential dust impact could occur.

11.6.5.6 Consequently, it is concluded that atmospheric emissions during construction of the Proposed Development will have **No effect** on the integrity of Bullers of Buchan Coast SSSI.

Disturbance

11.6.5.7 Bullers of Buchan Coast SSSI, Collieston to Whinnyfold Coast SSSI, and Loch of Strathbeg SSSI are all notified for, amongst other features, breeding and non-breeding seabirds. Except for razorbill (which was not recorded during waterbird surveys), all of the notified species of SSSIs within 15km (or 20km for non-breeding geese) are also the qualifying features of the European sites addressed above.

11.6.5.8 A detailed assessment of the potential for construction works to disturb the qualifying species of European sites is given in **Appendix 11F** (EIA Report Volume 4). This assessment identifies only limited potential for notified bird species of the SSSIs to be adversely affected by construction disturbance. This is because:

- The notified bird species of SSSIs within 15km (or 20km for geese) were either absent from the baseline environment (as identified by desk study or field survey) or occurred infrequently and/or in low numbers which do not represent a significant proportion of relevant SSSI populations;
- Some birds that are designated as breeding species (e.g. kittiwake) were not recorded by waterbird surveys in the area within 500m of the Proposed Development during the breeding season;
- Except for Bullers of Buchan Coast SSSI, all other SSSIs are more than 9km distant from the Proposed Development Site, meaning there is abundant alternative habitat for foraging and resting by notified bird species. Even for those notified species of Bullers of Buchan Coast SSSI, there is abundant alternative habitat in the area beyond the distance at which

[5] Critical level is defined as "*concentrations of pollutants in the atmosphere above which adverse effects on receptors, such as… plants* [and] *ecosystems… may occur according to present knowledge*" (see same reference as for critical load).
[6] Critical load is defined as "*a quantitative assessment of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*" (http://www.apis.ac.uk/critical-loads-and-critical-levels-guide-data-provided-apis#_Toc279788050).

any construction-related disturbance is possible (taken to be around 300m based on evidence presented in Cutts *et al* (2013);

- The areas used most by notified bird species were found to be around Boddam Harbour and the seafood facility in Boddam. The area in the vicinity of the cooling water outfall, which is the only place where construction works will take place near the shore, was found to support relatively low numbers of birds; and
- Most of the shore and sea is screened from the main CCGT and CCP area by an existing high embankment, walls and/or buildings.

11.6.5.9 The notified species of Meikle Loch and Kippet Hills SSSI are non-breeding greylag goose and non-breeding pink-footed goose. A single flock of approximately 200 pink-footed geese was recorded on one occasion in December 2021 during a waterbird survey. The flock was in a field on the opposite side of the A90 from the Proposed Development, approximately 900m from the CCGT and CCP area. At this distance, and given the intervening disturbance source presented by traffic on the A90, it is extremely unlikely that any disturbance of these birds would occur as a result of construction activity.

11.6.5.10 In accordance with the conclusion of the Statement to Inform Habitats Regulations Appraisal, but using EIA terminology, it is therefore predicted that there will be, at worst, a Very Low magnitude impact from disturbance of the notified mobile species of SSSIs, resulting in **Negligible effect**.

Displacement / Prevention of Movement

11.6.5.11 As described above, construction-related disturbance of notified bird species is considered very unlikely. However, even if this were to occur, evidence presented by Cutts *et al* (2013) suggests that such impacts are likely to extend no further than 300m for the most sensitive species. There is abundant alternative habitat beyond 300m of construction works areas, including rocky coast, islands, and sea, which will remain available for use by foraging / loafing notified bird species.

11.6.5.12 There will be no physical barriers to the movement of notified bird species.

11.6.5.13 It is therefore concluded that there will be a Very Low magnitude impact from potential minor displacement during the construction phase, resulting in a **Negligible effect**.

Operational Phase

Airborne Pollution

11.6.5.14 The closest SSSI to the Proposed Development is the Bullers of Buchan SSSI, located approximately 750m to the south-east of the Proposed Development Site, but approximately 1.4km from the CCGT and CCP area, within which the absorber and bypass stacks will be located. The next nearest site, Collieston to Whinnyfold Coast SSSI, is more than 9km distant.

11.6.5.15 Bullers of Buchan Coast SSSI lies within the boundaries of the Buchan Ness to Collieston Coast SPA and the Buchan Ness to Collieston SAC. The notified features of the SSSI are a combination of the qualifying features of the SPA / SAC. Air quality modelling and assessment carried out for those European sites is therefore directly relevant to the Bullers of Buchan Coast SSSI. Further details of the air quality modelling and assessment of effects on European sites can be found in **Chapter 8: Air Quality** (EIA Report Volume 2) and **Appendix 11F** (EIA Report Volume 4).

11.6.5.16 The nesting habitat of the notified nesting seabirds of Bullers of Buchan Coast SSSI, of which the closest are small islands and promontories adjacent to Boddam (at closest 350m from the Proposed Development Site, but 1km or more, depending on the layout option, from the proposed absorber stack), is heavily influenced by nutrient enrichment from the birds, and

largely comprises bare rock, and is therefore not sensitive to airborne pollution. The notified birds themselves are highly unlikely to be affected by airborne pollution, given that bird physiology is not radically different to that of mammals and that air pollution levels are predicted to be below human health risk levels even in proximity to the Proposed Development.

11.6.5.17 In relation to the maritime cliffs notified habitat, APIS states that maritime cliff and slope habitat is not vulnerable to acid deposition, and sulphur dioxide (SO_2) is not a component of the stack emissions from the Proposed Development and is therefore not relevant. However, NOx and NH_3 levels are relevant. The process contribution (worst-case annual mean) from the Proposed Development at the nearest part of Bullers of Buchan Coast SSSI is 4.2% and 3.7% of the critical level for NOx and ammonia, respectively. Although this is above the 1% screening threshold, the PEC (worst-case annual mean) at the closest part of the SSSI, accounting for both background levels and emissions from the Proposed Development, remains below the critical levels at 22% for NOx and 45% for NH_3. Therefore, no impact on the vegetation within Bullers of Buchan Coast SSSI is likely from operational NOx and ammonia emissions.

11.6.5.18 Air quality modelling at all other SSSIs within 15km, including Rora Moss SSSI, shows that there will be no impacts on these sites from operational air quality changes, with process contribution less than 1% of the relevant critical load / level.

11.6.5.19 It is concluded that there will be **Negligible effect** on SSSIs from the operation of the Proposed Development.

Displacement / Prevention of Movement

11.6.5.20 There will be no material change to the operation of the existing cooling water intake / discharge system used by the existing power station. Consequently, there is expected to be no change to the occurrence / distribution of fish in the sea off the Proposed Development which are prey for the notified seabird species of Bullers of Buchan Coast SSSI, Collieston to Whinnyfold Coast SSSI or Loch of Strathbeg SSSI.

11.6.5.21 The routine operation and maintenance of the Proposed Development will not require access for personnel or machinery beyond the boundary of the power station, including to the shore. The Proposed Development Site is almost entirely screened from the shore and the sea by embankment and/or walls. It is therefore highly unlikely that any operation of the Proposed Development could displace birds from this area.

11.6.5.22 A single flock of pink-footed geese was recorded, on the opposite side of the A90 from the Proposed Development, and approximately 900m from the CCGT and CCP area. Although disturbance at this distance is highly unlikely, should this or another non-breeding goose species occur in the vicinity of the Proposed Development, there are abundant other suitable fields for foraging in the surrounding area which could be used should there be any minor displacement.

11.6.5.23 It is therefore concluded there will be **No effect** from displacement / prevention of movement of the notified species of any SSSI.

Decommissioning Phase

11.6.5.24 There are no impacts greater than those already assessed above which could occur during the decommissioning phase of the Proposed Development. Therefore, the conclusions reached for construction and operation also represent the worst case at decommissioning, and **Negligible effect** is predicted.

11.6.6 IMPACTS ON COASTAL HABITAT

Construction Phase

Loss of Habitat

11.6.6.1 There will be no works within the coastal strip except for works to tie-in cooling water pipework to the existing cooling water outfall. This work will be at the inland end of the cooling water outfall and will therefore result in the loss of a maximum of 0.04ha of unimproved neutral grassland in this area. However, as indicated in **Figure 11.3** (EIA Report Volume 3), there is approximately 1.6ha of such grassland within the Proposed Development Site and another 1.4ha within the wider survey area. Any loss caused would therefore be minimal, at approximately 1.3% of the existing resource. Consequently, there is expected be a **Negligible effect** through loss of coastal habitat.

Operational Phase

Airborne Pollution

11.6.6.2 The sloping coastal strip from approximately Furrah Head north-westwards to the limit of the habitat survey at Sandford Bay appears to be more-or-less natural. It largely comprises unimproved (though not especially species-rich) neutral grassland near the Proposed Development, and to the north there is sand dune habitat dominated by marram and sloping marshy grassland with meadowsweet as well as species typical of the neutral grassland. The sloping grassland generally lacks indicators of agricultural improvement or disturbance, and although it does not contain rare species it does contain species that are quite localised in the vicinity owing to the preponderance of intensive agricultural land. The sand dune habitat, although relatively small in extent, is a priority habitat type (listed on the SBL) in Scotland.

11.6.6.3 The dominant grassland corresponds in APIS most closely to low to moderate altitude hay meadows. The sand dune habitat contains grasses other than the dominant marram, especially red fescue, and aligns best to coastal stable dune. The nitrogen deposition critical loads for these habitats are 20-30kgha^{-1}yr^{-1} for low to moderate altitude hay meadows and 8-15kgha^{-1}yr^{-1} for coastal stable dune. NOx and ammonia (NH3) critical levels are 30µgm^{-3} and 3µgm^{-3} respectively. The EIA air quality team carried out additional calculations to determine the predicted environmental concentrations (PEC) of these pollutants at three locations in the coastal strip: at the landward end of the cooling water outflow (E1), at the nearest sand dune vegetation (E3) and approximately halfway along the coastal slope between these points (E2). The results of this analysis are shown in Table 11.7, which gives the percentage of the critical load / level produced by the Proposed Development (using the worst-case annual mean), the PEC (accounting for both background levels and worst-case emission from the Proposed Development, in kgha^{-1}yr^{-1} for nitrogen deposition and µgm^{-3} for NOx and NH_3), and finally the percentage of the critical load / level that the PEC represents. These calculations used the lower end of the critical load range for nitrogen deposition.

Table 11-7: Nitrogen deposition, NO_X and NH_3 along the coastal strip

Location	N dep % CL	N dep PEC	N dep PEC/CL %	NO_X % CL	NO_X PEC (μgm^{-3})	NO_X PEC/CL %	NH_3 % CL	NH_3 PEC (μgm^{-3})	NH_3 PEC/CL %
E1 (outfall)	5.8%	13.20	66.0%	6.9%	11.83	39.4%	6.1%	1.41	47.0%
E2 (slope between E1 and E3)	1.3%	12.29	61.5%	1.5%	10.21	34.0%	1.3%	1.27	42.3%
E3 (sand dune)	2.9%	12.27	153%	1.4%	10.17	33.9%	1.2%	1.27	42.3%

CL = Critical Load / Level; N dep = Nitrogen deposition ($kgha^{-1}yr^{-1}$); PEC = Predicted Environmental Concentration

11.6.6.4 For NO_x and NH_3, although emissions from the Proposed Development are over 1% of the critical level, the PEC does not exceed the critical load for the relevant grassland and sand dune habitats. Therefore, no adverse effects are anticipated in relation to these pollutants.

11.6.6.5 Nitrogen deposition also does not exceed the critical load for grassland at E1 and E2 since the PEC is below 70% of the critical load. Therefore, an adverse effect from nitrogen deposition is not anticipated in relation to the dominant grassland habitat.

11.6.6.6 However, there is a potential impact on the nearest sand dune habitat at E3, as the process contribution of nitrogen exceeds 1% of the critical load and the PEC is also well above the critical load for this habitat at 153%. It is important to note that the existing background level of nitrogen deposition is itself well above the lower end of the critical load range at $12.04kgha^{-1}yr^{-1}$, equating to 150.5% of the critical load. The further 2.9% added by the Proposed Development is therefore not likely to contribute significantly. Additionally, the sand dune habitat beyond this nearest point would experience a reduced contribution from the Proposed Development bringing the PEC still closer to the existing background level. For these reasons, it is considered likely that the Proposed Development would have a Very Low impact on the sand dune vegetation.

11.6.6.7 Consequently, there is expected to be **Negligible effect** caused by operational emissions from the Proposed Development on habitats in the coastal strip.

Decommissioning Phase

11.6.6.8 Assuming that decommissioning works take place in the same areas as for the construction phase, there is expected to be **No effect** on coastal habitat at this stage of the Proposed Development.

11.6.7 IMPACTS ON OYSTERPLANT

Construction Phase

Injury or Mortality

11.6.7.1 There will be no works on the shore, which is the only area in which oysterplant occurs in the ZoI of the Proposed Development. There is therefore no possibility of direct physical injury or killing of any oysterplant specimens, and therefore **No effect** on this species.

Airborne Pollution

11.6.7.2 As set out above in relation to coastal habitats, gaseous airborne pollution (nitrogen deposition, NOx and NH_3) are predicted to have a Very Low impact on vegetation, and this is expected to be the case for oysterplant.

11.6.7.3 Guidance published by the IAQM suggests that the effects of construction-related dust on ecological features needs to extend to a distance 50m from the source (Holman *et al*, 2014). The majority of construction works associated with the Proposed Development will take place within the CCGT and CCP area, approximately 170m from the nearest oysterplants. Other construction areas to the north-west of here, including the northern access into the site, are even more distant from the species. The only construction works within 50m of oysterplant is likely to be minor works to the existing cooling water pipe through the Proposed Development Site and potentially some other minor activities. These are highly unlikely to generate significant quantities of dust, especially considering that dust suppression will be implemented as standard good practice during construction.

11.6.7.4 It is therefore expected that there would be Very Low magnitude impact on oysterplant from construction phase air quality impacts, and **Negligible effect** overall.

Operational Phase

Airborne Pollution

11.6.7.5 Since oysterplant is classed as Near Threatened and Nationally Scarce, and the colony on the coast beside the Proposed Development Site is a critical one serving to reinforce scattered smaller and sometimes intermittent colonies elsewhere along the wider east coast, an assessment of air quality effects on this species was considered appropriate. This has focussed on operational stack emissions from the Proposed Development, which are the only emissions of possible significance (operational emissions from other sources such as vehicle attendance, and construction emissions, have been determined to be insignificant – see **Chapter 8: Air Quality** (EIA Report Volume 2 EIA)).

11.6.7.6 The habitat in which the oysterplant grows at this location is very fine shingle, bordering on sand. This habitat comprises more shingle than vegetation, and the vegetation in the core oysterplant zone mostly comprises the scattered oysterplants, with sparse occurrences of other plants (such as sea sandwort and Babington's orache). This habitat fits within the 'dune, shingle and machair' habitat type in the air quality data given at APIS. However, although several coastal vegetation types have been studied for which APIS provides critical loads for nitrogen deposition, this is not the case for vegetated shingle. However, rather than carry out no assessment, use of critical loads for other similar habitats was considered. Of the coastal vegetation types that have critical loads, mobile dune has the closest resemblance to vegetated shingle in that the habitat is not fixed but is also unlike vegetated shingle (particularly of the type supporting oysterplant at this site) in that mobile dune is overwhelmingly dominated by vegetation (marram), whereas the shingle is sparsely vegetated. The critical load range for mobile dune for nitrogen deposition is 10-20kgha^{-1}yr^{-1}.

11.6.7.7 The environmental conditions experienced by the oysterplant include regular subjection to salt spray and periodic disruption of the shingle by weather and wave action. Oysterplant individuals are occasionally lost with seedlings from remaining plants recolonising disturbed shingle, and the exact location of oysterplants changes over time to a lesser or greater degree depending on the severity of weather and wave action. The oysterplant habitat is therefore only semi-stable, such that other plant species are particularly sparse and struggle to survive, and the oysterplant does not suffer significant competition from other species. The harsh environment resulting from the shingle substrate and strong maritime influences are the likely

limiting factors for oysterplant, and the availability of nitrogen of less importance than in more densely vegetated habitats where competition from more productive species that thrive on increased nitrogen could be an issue. For these reasons, the upper end of the critical load range for nitrogen deposition for mobile dune (20kgha^{-1}yr^{-1}) has been used to assess possible effects of nitrogen deposition on oysterplant. This was an additional analysis carried out by the EIA air quality team.

11.6.7.8 The results of this analysis indicate that the worst case annual mean process contribution of the Proposed Development in the vicinity of the core oysterplant zone is a maximum of 1.03kgNha^{-1}y^{-1}, which represents 5.2% of the critical load and therefore cannot be immediately discounted as insignificant (i.e. it is more than 1% of the critical load). However, accounting also for background deposition rates, the worst-case annual mean predicted environmental concentration is 13.1kgNha^{-1}yr^{-1}, which remains below the critical load at 65%. Therefore, it is unlikely that operational nitrogen deposition would have a significant effect on oysterplant.

11.6.7.9 Regarding NOx and NH_3, the critical levels for this habitat in this location are given at APIS as 30µgm^{-1} and 1-3µgm^{-3} respectively. For NH_3, the lower end of the critical level range is appropriate for sensitive lower plants such as lichens, whilst the upper end is appropriate for vascular plants, therefore 3µgm^{-3} has been used as the critical level for ammonia. Further analysis carried out by the EIA air quality team indicates that the worst case mean annual process contribution from the Proposed Development at the core oysterplant zone is a maximum of 1.7µgm^{-3} NOx and 0.15µgm^{-3} NH_3, which represent 6% and 5% of the critical levels respectively. However, accounting also for background deposition rates, the worst-case annual mean predicted environmental concentration is 16.3µgm^{-3} NOx and 1.4µgm^{-3} NH_3, still below the critical levels at 54% and 46%, respectively. Therefore, it is also not likely that operational NOx and NH_3 emissions would have any significant effect on oysterplant.

11.6.7.10 Consequently, and in view also of the dominant maritime limiting factors on oysterplant, there is predicted to be **Negligible effect** on oysterplant as a result of airborne emissions by the Proposed Development.

Mortality or Injury of Species

11.6.7.11 The routine operation and/or maintenance of the Proposed Development will not require any access to the shore where oysterplant occurs. There will therefore be **No effect** of injury or mortality of this species during the operational phase of the Proposed Development.

Decommissioning Phase

11.6.7.12 The impacts which could arise during the decommissioning phase of the Proposed Development are likely to be consistent with those described for the construction phase. As such, **Negligible effect** on oysterplant is expected during the decommissioning on the Proposed Development.

11.6.8 IMPACTS FROM INVASIVE NON-NATIVE PLANT SPECIES

Construction Phase

Spread of Invasive Non-native Species

11.6.8.1 Three species of invasive non-native plant were identified within the Proposed Development Site, in addition to a very small area of unidentified exotic shrubs adjacent an existing power station building.

11.6.8.2 New Zealand pigmyweed was restricted to a small waterbody situated on the west side of the A90 road, which is within the edge of the Proposed Development Site. However, there are no proposed works on the west side of the A90 (all works are to the east of the A90), and the

nearest proposed construction area is more than 100m from this location. Therefore, there is no possibility that works activities will impact on the pond or risk the spread of this species.

11.6.8.3 Sea buckthorn was recorded in one location as ornamental planting near the existing power station security building. Japanese rose was recorded outside the security fence, near to the foul water outfall. If construction works are required at or adjacent to the locations of these species then there would be potential for seeds / propagules of these species to be disturbed and transferred to new sites because of construction activities. For example, seeds / propagules could be moved with soils or carried on vehicles and machinery to new locations where the plant species concerned could then grow and establish.

11.6.8.4 Where established, both species can spread vegetatively by suckering. However, to colonise new locations these species spread by seed contained in berries. If construction works require the excavation of these species, or the unidentified exotic shrubs, it is highly likely that they would be retained within the Proposed Development Site. In a worst-case scenario in which sufficient root material remains viable, these could re-grow where they are placed. However, the potential for further spread of berries by construction plant outside of the Proposed Development Site, with standard measures for construction sites such as wheel-washes in place, is very low. Any impacts would therefore likely be restricted to the construction area and would be of Very Low magnitude only. As noted above, it is also improbable that construction plant would drive into designated nature conservation sites. Consequently, there is likely to be **Negligible effect** from the spread of invasive non-native species during the construction phase.

Operational Phase

Spread of Invasive Non-native Species

11.6.8.5 There is no realistic pathway by which invasive non-native species could be spread during the operational phase of the Proposed Development. There will consequently be **No effect** from invasive non-native species during the operational phase.

Decommissioning Phase

11.6.8.6 Although not considered here as mitigation, proposed planting carried out as habitat mitigation / enhancement for the Proposed Development will be strictly limited to the use of locally-native species. Therefore, no invasive non-native plants are likely to be present at the time of decommissioning.

11.6.8.7 Any invasive non-native plants which did establish naturally (i.e. not through planting) would be subject to management in accordance with legal requirements at the time of decommissioning.

11.6.8.8 There is therefore expected to be **Negligible effect** from the potential spread of invasive non-native plants at decommissioning.

11.6.9 IMPACTS ON BATS

Construction Phase

Habitat Loss

11.6.9.1 Bat activity within and surrounding the Proposed Development Site was found to be low to moderate, at most, and was overwhelmingly by common pipistrelle. Soprano pipistrelle, Nathusius' pipistrelle and a single unidentified *Myotis* bat occurred at much lower levels of activity and were never recorded during walked activity transects. The results of the latter surveys found that common pipistrelle activity was most frequent in the north and north-eastern part of the Proposed Development Site, around Sandford Lodge and outbuildings, the adjacent

small woodland block, and areas of dense gorse around the CCGT and CCP area (see **Figure 11B.4 of Appendix 11B** (EIA Report Volume 4)).

11.6.9.2 There will be no loss of the woodland or trees surrounding Sandford Lodge, and only a small area of dense gorse on the sloping embankments around the CCGT and CCP area will be removed. Sections, or potentially all, of the hawthorn hedge on both sides of the access from the A90 to Sandford Lodge may be removed if this existing track requires widening or if access points to the temporary construction laydown areas are needed. Although the hedge here is a linear feature which appears to be used for foraging purposes, it does not connect to high quality foraging habitat elsewhere in the surrounding area, so is unlikely to be an important commuting route for bats. This is supported by the results of the walked bat activity transects which did not identify any evidence of large numbers of bats, including in this location.

11.6.9.3 The temporary construction areas north and south of the Sandford Lodge access track will result in the temporary loss of open grazed pasture and semi-improved neutral grassland which may be of some limited value to bats for foraging. However, the majority of the Proposed Development is located on existing open sparsely-vegetated ground or existing built-up land within the existing power station security fence. Although bat activity was recorded in the vicinity of the proposed CCGT and CCP area by the static bat detector, the sparsely-vegetated habitat here does not represent optimal habitat for foraging, and it is likely that feeding was largely above the gorse and grassy vegetation on the embankments surrounding it (as observed during walked activity transects), most of which will remain.

11.6.9.4 The temporary loss of areas of grazed pasture and the permanent loss of small amounts of vegetated embankments, an area of sparsely-vegetated stony ground, and, potentially, part or all of the hedge along Sandford Lodge access track, could have at worst a Medium magnitude impact on foraging and/or commuting bats. However, there is abundant alternative habitat within 2km of the Proposed Development (this being the radius of the 'core sustenance zone' (CSZ) for common pipistrelle bats around a roost location (BCT, 2016)), so a higher level of impact is unlikely. Additionally, the more important habitats for bats within the Proposed Development Site, in particular the blocks of plantation woodland and larger areas of gorse scrub, the majority of vegetated embankments and the majority of open grazed pasture, will be retained.

11.6.9.5 It is therefore predicted that habitat loss will have **Negligible effect**.

Disturbance

11.6.9.6 At its closest, the roost location referred to in **Appendix 11B** (EIA Report Volume 4) as Roost 5, located in building B2 (see **Figure 11B.2 of Appendix 11B** EIA Report Volume 4) is approximately 28m from the edge of the temporary construction laydown area to the west, and approximately 20m from the access track into the main part of the Proposed Development Site. The roost in building B6, referred to as Roost 4, is the most distant from the access track and is still within approximately 35m. The temporary increase in vehicular traffic, including heavy plant and machinery, therefore has the potential to disturb common pipistrelle using all of the roosts in buildings B2, B5 and B6 through vibration and/or noise.

11.6.9.7 All of the identified roosts are screened from the access track and temporary construction areas by the buildings they are located within (i.e. all roosts face into the central courtyard of the outbuildings). This therefore reduces the likelihood that disturbance will be caused as noise levels will be reduced, and any artificial lighting will be at least partially blocked. However, should disturbance be caused it could result in the abandonment of these roosts. This would affect a small number of bats, believed to be approximately three individuals, most likely to be

males rather than breeding females. Any such impact would therefore not adversely affect the conservation status of common pipistrelle either nationally or within NHZ 9.

11.6.9.8 Consequently, although the abandonment of these roosts during the construction phase would represent a High magnitude impact, as it could represent the complete loss of roosting bats from the ZoI of the Proposed Development, this would only occur at a Local level given that this is the level of geographic importance assigned to bats in Table 11.6. In conclusion, therefore, a High magnitude impact from disturbance of roosting bats (which are considered to be of Local importance at the Proposed Development Site) could have a **temporary Minor adverse effect** on common pipistrelle. This is **Not Significant**.

11.6.9.9 All of the roost sites will be retained and will ultimately be available for use by bats following the completion of construction activities.

11.6.9.10 Notwithstanding the above assessment, all species of bats are protected from disturbance while using a roost by the Habitats Regulations. It will therefore be necessary to obtain a licence from NatureScot for any activities which could result in the disturbance of bats in the roosts in B2, B5 and B6, including the movement of heavy plant and machinery along the proposed access track, and any other construction-related works which take place within at least 30m of these buildings.

Damage or Destruction of Resting Places

11.6.9.11 Five roost locations used by a small number of common pipistrelles were identified within the outbuildings near Sandford Lodge referred to as B2, B5 and B6 (as shown on **Figure 11B.2 of Appendix 11B**). These buildings and the roosts they support will be retained and are not to be demolished as part of the Proposed Development. None of the other trees or buildings which, although not found to be used by bats, were assessed as having some suitability to support a roost, will also all be retained by the Proposed Development. There will consequently be no loss of roosting habitat and **No effect** on bats.

Displacement / Prevention of Movement

11.6.9.12 Artificial lighting used during the construction phase has the potential to prevent bats from foraging and/or commuting in areas which may otherwise remain viable for such activities. This is likely to have the greatest impact in the habitats adjacent to the temporary construction laydown areas west of Sandford Lodge, as this is where most bat activity was found to occur during baseline surveys.

11.6.9.13 However, during spring to autumn when bats are active, construction hours will largely coincide with daylight hours when bats are in their roosts. However, there may be limited periods towards the start and end of the season when bats are active during construction hours, or at other times when some construction activities that cannot be stopped are in progress and lighting is present. Given the baseline conditions, the low levels of bat activity recorded in affected areas and the limited potential for lighting to coincide with periods of bat activity, it is very unlikely that construction lighting will adversely impact bat habitat usage.

11.6.9.14 Bats may be dissuaded from using the Sandford Lodge access track for foraging or commuting if this is illuminated or regularly used by traffic during hours of darkness. However, this linear feature does not connect to high quality habitat elsewhere and is likely to be of relatively low importance to bat commuting.

11.6.9.15 Such impacts are likely to extend over a relatively small area and would occur in habitats of limited suitability for bat foraging (e.g. open grazed pasture). It is therefore likely to have a temporary Low magnitude impact, resulting in **Negligible effect** on bats.

Injury or Mortality

11.6.9.16 The identified roost locations in the outbuildings near Sandford Lodge will be retained and are not to be destroyed as part of the Proposed Development. There is consequently no realistic possibility of bats being injured or killed during the construction phase of the Proposed Development, meaning there will be **No effect** from this theoretical impact.

Operational Phase

Disturbance

11.6.9.17 The construction laydown areas west of the Sandford Lodge outbuildings are required during the construction phase only and will be removed and reinstated prior to the operational phase of the Proposed Development. All permanent infrastructure associated with the Proposed Development will be approximately 200m from the identified roost locations, well beyond the distance at which any disturbance can be expected to occur.

11.6.9.18 There will therefore be **No effect** from disturbance of bats during the operational phase of the Proposed Development.

Displacement / Prevention of Movement

11.6.9.19 During baseline surveys, there were no operational lighting columns within the CCGT and CCP area. However, this area was partly illuminated by lighting columns located elsewhere around the existing power station. Permanent lighting will be required by the Proposed Development and this may extend the area over which artificial illumination affects surrounding habitats used by bats. This could include the vegetated embankment between the CCGT and CCP area and Sandford Lodge.

11.6.9.20 However, this is not expected to have a large impact on bats as field survey showed that activity occurs in the area around the CCGT and CCP area despite existing illumination. Moreover, common pipistrelle and soprano pipistrelle, which were the predominant species recorded within the ZoI of the Proposed Development, are both relatively light-tolerant species, and will actively forage around lighting units (BCT and ILP, 2018).

11.6.9.21 Similarly, bat foraging around the existing power station was recorded (although rarely), suggesting that light and noise produced by the facility was not preventing bats from using this area.

11.6.9.22 There is consequently expected to be a Very Low impact from lighting- or noise-related displacement of bats during the operational phase of the Proposed Development, and no impact on the conservation status of any bat species. There would thus be **Negligible effect** on bats.

Decommissioning Phase

11.6.9.23 The impacts which could arise during the decommissioning phase of the Proposed Development are likely to be consistent with those described for the construction phase. At worst, therefore, and in relation to the potential disturbance of a small number of common pipistrelles roosting in the Sandford Lodge outbuildings, there could be a **temporary Minor adverse effect** on bat species during decommissioning, which is **Not Significant** in the context of this EIA.

11.6.10 IMPACTS ON BADGER

Construction Phase

Habitat Loss

11.6.10.1 There will be no loss of woodland and only a small loss of dense scrub to accommodate the construction of the Proposed Development. Temporary construction laydown areas are proposed on areas of pasture in the following locations, as shown on **Figure 5.1** (EIA Report Volume 3):

- Immediately north of the access track from the A90 to Sandford Lodge;
- Immediately south of the access track from A90 to Sandford Lodge;
- West of the existing power station security building; and
- In a field immediately south of the main part of the existing power station.

11.6.10.2 In total, these cover an area of approximately 10ha of optimal badger foraging habitat. Badger territories range from around 30ha in optimal habitat to more than 150ha where habitat is marginal (Harris and Yalden, 2008). The construction compounds could therefore result in the temporary loss of a substantial portion of the territory of a badger group (clan).

11.6.10.3 However, approximately 26ha of similar grassland will be retained across the grazed fields situated on the east side of the A90 (i.e. not accounting for further suitable habitat on the west side of this main road, which presents a major mortality hazard to badgers). These fields are located to the west and south of the existing power station, extending as far as, and including, the playing fields in Boddam. The plantation blocks near the existing power station entrance and north of Boddam, which are mainly broadleaved, and vegetation of the coastal slopes, also constitute viable badger foraging habitat. Therefore, although there may be a substantial temporary loss of badger foraging habitat, there is abundant optimal foraging habitat that will be retained.

11.6.10.4 Badger use latrines as a form of territory marking. In areas where badger density is low, the use of latrines as a form of passive territory defence is unnecessary and the behaviour can be absent (Scottish Badgers, 2018). A single latrine was identified within the survey area, in the north of the Proposed Development Site, near Sandford Lodge. The lack of abundant latrines as territory markers indicates that there may be limited competition for foraging resources from other badger clans in the wider surrounding area. Therefore, although the foraging resource available to badgers occupying the ZoI of the Proposed Development may be reduced, there is not expected to be significant competition for access to the retained grassland habitat described above.

11.6.10.5 Considering both the availability of retained foraging habitat and the likely low numbers of badgers in the wider area which could compete for this resource, the impact of habitat loss is expected to be Medium, resulting in **Negligible effect** on badger during the construction phase of the Proposed Development.

Disturbance

11.6.10.6 The potential disturbance of badgers during the construction phase cannot be discussed without referring to the location(s) of setts. To avoid public circulation of the location of these resting places, which are susceptible to illegal interference, the assessment of the impacts / effects of disturbance of badgers during the construction phase is presented in **Confidential Appendix 11G** (EIA Report Volume 4).

11.6.10.7 The assessment concludes that no impact to the nature conservation status of badgers is likely because of construction disturbance, so the effect is **Negligible**.

11.6.10.8 Notwithstanding this assessment, badgers are a legally protected species, and it will be necessary to comply with the requirements of the Protection of Badgers Act. Where disturbance is possible, a derogation licence will be required from NatureScot to permit activities which would otherwise result in an offence being caused.

Damage Destruction of Resting Places

11.6.10.9 A full assessment of the potential for construction works to damage or destroy any badger sett is given in **Confidential Appendix 11G** (EIA Report Volume 4). However, this concludes that damage or destruction of any identified setts is very unlikely and that there will be **No effect** as a result.

Displacement / Prevention of Movement

11.6.10.10 Badger will continue to be able to move across the Proposed Development Site, to the extent currently afforded by existing security fencing around the power station. There will be no physical barriers preventing access to retained foraging areas, except insofar as it may be necessary to pass around construction laydown areas. There will therefore be a Very Low impact on badgers.

11.6.10.11 It is concluded that there will be **Negligible effect** on badgers from displacement / prevention of movement.

Injury or Mortality

11.6.10.12 There will be a substantial increase in the volumes of vehicular traffic during the construction phase of the Proposed Development. There is therefore an associated increased risk of badger injury or mortality due to collision with vehicles. However, all construction vehicles within the Proposed Development Site will assumed to be limited to a maximum speed of 15 miles per hour (mph) and the risk will thus be minimal.

11.6.10.13 Other standard good practice mitigation measures will be implemented that minimise the risk of badger injury or mortality, as described in Section 11.5.

11.6.10.14 However, even in the unlikely worst-case scenario that a badger were killed, and even if this were to be a breeding female, this species is common and widespread both nationally and regionally, and such loss would be quickly replaced by other individuals in the social group (such as previously subordinate females) or immigration from the surrounding area. There would therefore likely be no overall change to the local conservation status of badgers. The potential for badger injury or mortality is therefore unlikely and the impact would be, at worst, of Medium magnitude. There will consequently be **Negligible effect** on badgers from this impact source.

Operational Phase

Disturbance of Species

11.6.10.15 Operation of the Proposed Development is anticipated to create up to approximately 50 full time operational roles. There will consequently be an increase in the number of personnel accessing the Proposed Development Site daily, and this will likely largely involve private vehicles. However, given that badgers currently identified at the Proposed Development Site are already habituated to the movement of traffic, the increase which may be expected due to the Proposed Development is unlikely to be sufficiently large to cause any disturbance to these animals. Thus, there will be either no impact or a Very Low impact, and **Negligible effect** on badgers.

Injury or Mortality

11.6.10.16 As described in relation to the construction phase above, traffic will assumed to be restricted to a maximum speed of 15mph within the Proposed Development Site. This, coupled

with the relatively small increase in the number of vehicles during the operational phase (compared to the existing baseline), means the risk of collision injury or mortality as a result of the Proposed Development is low and any such incidences would be rare. This would therefore be a Very Low magnitude impact with no long-term effect on badger numbers (as individuals would be replaced through birth and/or immigration), and there would be **Negligible effect** on badgers.

Decommissioning Phase

11.6.10.17 The impacts that could arise during the decommissioning phase of the Proposed Development are likely to be consistent with those described for the construction phase. As such, **Negligible effect** on badger is expected during the decommissioning on the Proposed Development.

11.6.11 IMPACTS ON WATER SHREW

Construction Phase

Loss of Habitat

11.6.11.1 Water shrews occupy a wide range of habitats and can be found along the banks of fast-flowing rivers and streams, by slow-flowing and static waterbodies such as ponds, and in fen, marsh and reedbeds (Carter and Churchfield, 2006). The only potentially suitable habitat for this species which may be impacted by the Proposed Development is the stream on the south side of the Sandford Lodge access track. However, this is very small and contained very little water at the time of survey, and is isolated and not connected to other water features. Although the likelihood of water shrew being present is therefore very low, on a precautionary basis it is assumed that this species may occur here.

11.6.11.2 It may be necessary to widen the existing access track. However, it would be necessary to protect and retain this water feature, in line with relevant legislative requirements and good practice construction methods. Therefore, this stream will not be lost to the construction of the Proposed Development. Should a crossing point over the stream be required, this would need to be designed, in accordance with standard good practice, to be passable to animals such as water shrew.

11.6.11.3 Due to the limited availability of suitable habitat for this species, and the fact that the only such habitat in proximity to the construction area will be retained, there will be **No effect** from habitat loss on water shrew.

Disturbance

11.6.11.4 Water shrew is not considered to be a species that would be susceptible to disturbance from passing vehicles (Mammal Society, undated). There is consequently not expected to be any effect from disturbance, except perhaps during any construction works to the track to Sandford Lodge itself. This would represent a Very Low magnitude impact and would have **Negligible effect** on water shrew.

Injury or Mortality

11.6.11.5 The likelihood of water shrew being killed or injured by passing construction vehicles is very low, given the assumed maximum construction site speed of 15mph. Any works required to the stream beside Sandford Lodge access track will only be carried out following a pre-works check by the ECoW (see Section 11.5) and the chances of injury or mortality being caused to water shrew as a result is also very low. There is thus likely to be **No effect** on water shrew from mortality or injury.

Operational Phase

11.6.11.6 There are no impacts which could arise during the operation of the Proposed Development meaning there will be **No effect** on water shrew.

Decommissioning Phase

11.6.11.7 The impacts that could arise during the decommissioning phase of the Proposed Development are likely to be consistent with those described for the construction phase. As such, **Negligible effect** on water shrew is expected during the decommissioning on the Proposed Development.

11.6.12 IMPACTS ON BROWN HARE AND HEDGEHOG

Construction Phase

Loss of Habitat

11.6.12.1 Brown hare and hedgehog may occupy habitats within the Proposed Development Site, including grassland, woodland and scrub. Neither species was observed incidentally during ecological field surveys, but records of both were reported by the desk study.

11.6.12.2 Although there will be a loss of grassland habitat, and potentially a very minor loss of some scrub, all woodland will be retained. There is abundant alternative grassland habitat both within and surrounding the Proposed Development Site, and the magnitude of impact on these species, if present, is therefore expected to be Very Low. There would consequently be **Negligible effect** on brown hare and hedgehog.

Injury or Mortality

11.6.12.3 Traffic will be restricted to an assumed maximum speed of 15 miles per hour within the Proposed Development Site. Although both species are vulnerable to collision with vehicles, in particular hedgehog, with this restriction in place (as well as, in respect of hedgehog, absence of works at night under normal circumstances) the probability of mortality or injury being caused is low. Any such incident would be rare and would not be likely to affect the conservation status of either species, locally, regionally or nationally. There is consequently expected to be Very Low magnitude of impact, resulting in **Negligible effect** on brown hare and hedgehog.

Operational Phase

Injury or Mortality

11.6.12.4 The risk of vehicular collision mortality or injury is further reduced during the operational phase, at which time there will be considerably fewer vehicles accessing the Proposed Development Site. The magnitude of impact is therefore Very Low and there will be **Negligible effect** on brown hare or hedgehog.

Decommissioning Phase

11.6.12.5 The impacts which could arise during the decommissioning phase of the Proposed Development are likely to be consistent with those described for the construction phase. As such, **Negligible effect** on brown hare or hedgehog is expected during the decommissioning on the Proposed Development.

11.6.13 IMPACTS ON BARN OWL

Construction Phase

Loss of Habitat

11.6.13.1 The construction laydown areas associated with the Proposed Development will result in the temporary loss of approximately 8ha of grassland which presents good foraging potential for barn owl (Forrester *et al*, 2007). Research reported by the Barn Owl Trust suggests that barn

owls require between 31-47ha of pastoral land within 2km of a nest site for foraging purposes (https://www.barnowltrust.org.uk/how-to-manage-land-for-barn-owls/barn-owl-habitat-requirements/). Approximately 22ha of such habitat will be retained within the Proposed Development Site alone. Within a further 1km (accounting for the unknown location of any possible barn owl nest) there are extensive areas of similar habitat that could be used along the coastal strip and in other areas of un-grazed grassland, although this may require birds to fly across the A90 road to reach such grassland to the west (which may already be the case) with associated risk of collision mortality.

11.6.13.2 Other habitats which will be permanently lost to the Proposed Development are predominantly bare ground and a very small area of scrub, neither of which are suitable for barn owl foraging.

11.6.13.3 Artificial lighting used during the construction phase has the potential to prevent barn owls from foraging and/or commuting in areas that may otherwise remain viable for such activities. This is likely to have the greatest impact in the grazed fields adjacent to the temporary construction laydown areas. However, any such impact is likely to extend over a relatively small area. As discussed above in relation to habitat loss, there is abundant alternative foraging habitat within the wider area.

11.6.13.4 Therefore, although there will be a temporary loss of grassland foraging habitat, given that this is a small proportion of the extensive alternative habitat in the surrounding area, the overall impact on foraging barn owls is expected to be of Medium magnitude. As a feature considered to be of Regional importance at the Proposed Development Site, a **temporary Minor adverse effect** on barn owl is therefore predicted due to habitat loss. This is **Not Significant** in the context of this EIA.

Disturbance

11.6.13.5 Although targeted surveys were not carried out, no incidental evidence was found of barn owls using any of the buildings or trees around and including Sandford Lodge during bat roost surveys completed in 2021. It is therefore assumed that this area was not used for breeding or roosting. If this were to be the case at the time of construction, there would be no disturbance of birds from works activities taking place in this area, including from traffic using the northern access route to the Proposed Development Site.

11.6.13.6 Barn owls can be very tolerant of human activity, to distances of 5-10m even when incubating eggs (at which times bird species are generally more sensitive to disturbance) (Ruddock and Whitfield, 2007). An expert opinion survey reported by Ruddock and Whitfield (2007) suggests an upper limit of 50-100m for disturbance, although many respondents did not consider that disturbance would occur until a human was within 10m of a nest.

11.6.13.7 Sandford Lodge, which is deemed to have low suitability for barn owls as it does not appear to provide sufficient shelter for nesting or roosting, is approximately 110m from the construction track and 120m from the nearest edge of the construction laydown area. At these distances, and based on evidence reported above, it is very unlikely that disturbance would be caused, even in the unlikely event that barn owls did occupy this building.

11.6.13.8 However, from external assessment the outbuildings west of Sandford Lodge appear to have more suitability to support nesting or roosting barn owls. The closest of these is approximately 10m from the temporary construction laydown area to the west, and immediately adjacent to the access track which enters the Proposed Development Site from the north[7].

[7] The distances stated here are slightly different to those given for the identified bat roosts. The possible location of a barn owl nest / roost in these buildings is unknown and so the measured distance to the access track and construction laydown area is from the

11.6.13.9 Should barn owls occupy any of the outbuildings near Sandford Lodge at the time of construction, there is the possibility of disturbance being caused. This could occur because of the construction of the laydown areas themselves, by activities taking place on these areas, or by the passage or vehicles, plant and/or machinery along the access track. Should the level of disturbance be sufficient that it caused birds to abandon a breeding attempt, this would be a High magnitude of impact on a Regionally important species, which could last for the duration of the construction period (3.5 years). There could consequently be, for the duration of the construction period, a **temporary Moderate adverse effect**, which would be considered **Significant** in this EIA.

Damage or Destruction of Resting Places

11.6.13.10 No trees suitable for use by barn owls for roosting or nesting will be felled for the Proposed Development. Moreover, the outbuildings near Sandford Lodge, and the lodge building itself, are all to be retained. There is therefore no potential for any feature which could be used by barn owls for nesting or roosting to be damaged or destroyed, and consequently there will be **No effect** on this species.

Injury or Mortality

11.6.13.11 Although barn owls are vulnerable to collision with vehicles, an assumed maximum speed limit of 15 miles per hour will be in place for all traffic within the Proposed Development Site. This, combined with the nocturnal activity of barn owls (works will not generally take place at night), substantially reduces the likelihood of collision mortality or injury such that the probability is considered to be almost zero. It is therefore assessed that there will be **No effect** from injury or mortality of barn owl during the construction phase of the Proposed Development.

Operational Phase

11.6.13.12 There are no impacts which could feasibly arise during the operational phase on barn owls, particularly as traffic movements will be even lower at this time when compared to the construction phase. There will therefore be **No effect** on barn owl from the operation of the Proposed Development.

Decommissioning Phase

11.6.13.13 Assuming that during decommissioning a temporary works area would be established near to the outbuildings at Sandford Lodge, and the northern access to the Proposed Development Site would be used, the impacts which could occur at this phase would be consistent with those predicted for the construction phase. Therefore, should barn owls be nesting in the outbuildings at this time, there would be the potential for a **temporary Moderate adverse effect** due to disturbance, which would be **Significant**.

11.6.14 IMPACTS ON BREEDING BIRDS

Construction Phase

Loss of Habitat

11.6.14.1 The Proposed Development will largely be constructed on existing sparsely-vegetated stony ground and built-up areas. The only notable species found to nest on such habitat was oystercatcher, and a nesting location, which is on gravel near to the power station entrance, will be permanently lost to the construction of the Proposed Development. A second nesting

closest edge of the buildings. The location of bat roosts in these buildings was identified through survey and the measurements between these and the construction areas are based on the distance from their position facing the internal courtyard (the opposite side of the buildings from the construction laydown area and access track).

location would be retained. The only other notable breeding species for which nesting habitat will be permanently removed will be yellowhammer and linnet, both of which are believed to have bred in gorse surrounding the CCGT and CCP area. This is expected to result in the loss of one yellowhammer territory. Linnets do not hold territories, but the removal of gorse may result in the loss of one or two nesting locations. However, there is an extensive area of gorse along the embankment outside of the construction footprint which will be retained, and alternative nesting locations are likely to exist.

11.6.14.2 The construction laydown areas may result in the loss of up to three skylark territories, as well as possibly two yellowhammer territories and one reed bunting territory (see **Figure 11D.17 of Appendix 11D** (EIA Report Volume 4)). However, this impact will be temporary and would be expected to last for the duration of the construction period (3.5 years), plus perhaps up to one additional year beyond this to account for the time taken for grassland habitat to re-establish.

11.6.14.3 Therefore, the Proposed Development may result in:

- The permanent loss of:
  - one oystercatcher nesting location;
  - one yellowhammer territory;
  - scrub habitat used by one or two pairs of linnet;
- The temporary loss of:
  - three skylark territories;
  - two yellowhammer territories; and
  - one reed bunting territory.

11.6.14.4 The impact of both permanent and temporary habitat loss will affect several species of conservation concern and is considered to be of High magnitude (on an assemblage of species assessed as being of Local importance). There will consequently be both **permanent** and **temporary Minor adverse effects** on breeding birds during the construction phase, which are **Not Significant**.

Disturbance

11.6.14.5 Passerine species (i.e. perching or songbirds), which comprise the majority of the breeding bird assemblage within the ZoI of the Proposed Development, are not generally susceptible to disturbance and can tolerate human activity to reasonably close distances. For example, several of the species identified within the baseline environment occupy habitats adjacent to the busy A90 road, private residences, or the active power station. Although more sensitive to disturbance, oystercatchers bred at two locations within the existing power station in 2021. These birds are generally tolerant of the movement of vehicles and plant and have been known to nest adjacent to very busy roads and construction sites. However, disturbance of oystercatchers can be caused by the presence of personnel on foot, outside of vehicles. The risk of disturbance of breeding bird passerine species is therefore considered to be low and is likely only to have a Very Low magnitude impact. The impacts of disturbance on oystercatcher could be greater and, if sufficiently intense, could result in the abandonment of one, or at worst, two pairs from the Proposed Development Site. This would represent a High magnitude impact. Accounting for this possibility, therefore, there could be at worst a **temporary Minor adverse effect** on breeding birds due to construction-related disturbance, which is **Not Significant**.

Injury or Mortality

11.6.14.6 For all species there is the risk of accidental destruction of nests during the construction phase because of vegetation stripping or clearance, or other activities which directly impact upon

suitable breeding habitat. It is an offence under the WCA to intentionally or recklessly destroy the active nest of any wild bird. However, the majority of passerine species will lay multiple clutches of eggs each year, and the loss of one brood would be of relatively limited conservation significance.

11.6.14.7 Oystercatchers bred in two locations within the Proposed Development Site, including one near to the current power station entrance, in an area where construction works are proposed. Unlike many passerine species, oystercatchers are relatively easy to detect as a nesting bird, and the risk of accidentally damaging or destroying an oystercatcher nest, following pre-works checks having been carried out as described in Section 11.5, is very low.

11.6.14.8 Therefore, although steps will be taken to minimise the chances of occurrence, the accidental damage or destruction of bird nests during the construction phase would represent, at worst, a Medium magnitude impact. As the assemblage is considered to be of only Local importance, there would be an overall **Negligible effect** on breeding birds.

Operational Phase

Disturbance

11.6.14.9 During the operational phase, the habitats that were found by baseline field surveys to support most breeding birds will be distant from the main infrastructure of the Proposed Development. Moreover, levels of disturbance during the operational phase of the Proposed Development are expected to be comparable to the existing baseline, with a predicted 50 full-time staff employed at the facility. This is unlikely to cause any material change in levels of disturbance already caused by the existing power station. This would apply both to passerine species and oystercatcher, as most activity outside of buildings will be in the form of vehicular movements.

11.6.14.10 There is therefore likely to be a Very Low magnitude of impact from disturbance during the operational phase, resulting in **Negligible effect** on breeding birds.

Injury or Mortality

11.6.14.11 Operational activities will be restricted to areas of hard-standing, or possibly gravel, which cannot support the nesting bird species identified in the baseline conditions, with the exception of oystercatcher in areas of gravel. It will be necessary to comply with legislation protecting nesting birds and given also that oystercatcher nest sites are relatively easy to detect and therefore avoid, it is unlikely that there would be intentional or reckless damage or destruction of any oystercatcher nests, and no other baseline nesting bird species are likely to be affected. There will consequently be **Negligible effect** from mortality or injury of breeding birds.

Decommissioning Phase

11.6.14.12 The impacts that could arise during the decommissioning phase of the Proposed Development are likely to be consistent with those described for the construction phase, except that the disturbance of oystercatcher may be reduced as one breeding location will have been permanently lost to the Proposed Development. As such, a **Negligible effect** on breeding birds is expected during the decommissioning on the Proposed Development.

11.6.15 IMPACTS ON WATERBIRDS

Construction Phase

Loss of Habitat

11.6.15.1 No construction works on the shore, intertidal zone or in the marine environment will be required as part of the Proposed Development. The nearest works to the shore will be to the part of the cooling water outfall which is located on the land, and will not require any access to

the shore. There will consequently be no loss of habitat used by waterbirds and **No effect** on these species.

Disturbance

11.6.15.2 As set out in Section 11.6.5, there is expected to be very low probability of disturbance of the notified bird species of any SSSI within 15km of the Proposed Development (or 20km for non-breeding geese). For the reasons set out in that section, this is likely to be the case for the more general waterbird assemblage. In particular, the main areas used by waterbirds were around Boddam and along the rocky coast between Boddam and the foul water outfall pipe. There will be no construction works in these areas, and the risk of disturbance is therefore very low. This includes to purple sandpiper, which was recorded in this area in relatively large numbers in autumn 2021.

11.6.15.3 Should disturbance of birds occur in the vicinity of works to the inland part of the cooling water outfall, this would impact on a small number of birds that would be likely to relocate to similar habitat nearby away from any disturbance.

11.6.15.4 It is therefore expected that there will be a Very Low magnitude impact from disturbance of waterbirds, resulting in a **Negligible effect**.

Displacement / Prevention of Movement

11.6.15.5 As described above, construction-related disturbance of waterbirds is considered very unlikely. However, even if this were to occur, evidence presented by Cutts *et al* (2013) suggests that such impacts are likely to extend to approximately 300m for the most sensitive species. There is abundant alternative habitat beyond 300m of construction works areas, including rocky coast, islands, and sea, which will remain available for use by foraging / loafing birds.

11.6.15.6 There will be no physical barriers to the movement of notified species of SSSIs.

11.6.15.7 It is therefore concluded that there will be a Very Low magnitude impact from potential minor displacement during the construction phase, resulting in a **Negligible effect**.

Operational Phase

Displacement / Prevention of Movement

11.6.15.8 There will be no material change to the operation of the existing cooling water intake / discharge system used by the existing power station. Consequently, there is expected to be no change to the occurrence / distribution of fish in the sea off the Proposed Development which are prey for multiple waterbird species.

11.6.15.9 The routine operation and maintenance of the Proposed Development will not require access for personnel or machinery beyond the boundary of the power station, including to the shore. The Proposed Development Site is almost entirely screened from the shore and the sea by embankment and/or walls. It is therefore highly unlikely that any operation of the Proposed Development could displace birds from this area.

11.6.15.10 Moreover, no significant aggregations of waterbirds were identified, either by desk study or field survey, in terrestrial habitat within 500m of the Proposed Development.

11.6.15.11 It is therefore concluded there will be **No effect** from displacement / prevention of movement of waterbirds during the operational phase.

Decommissioning Phase

11.6.15.12 Impacts during the decommissioning phase are likely to be as described for the construction phase. Therefore, **Negligible effect** is expect on waterbirds.

11.6.16 IMPACTS ON GREY SEAL

Construction Phase

Disturbance

11.6.16.1 Grey seals are reported to occur in Boddam Harbour, where approximately 60 individuals were recorded using or in the vicinity of a haul-out site at Meikle Mackie island. Grey seal individuals were also incidentally observed on multiple occasions surfaced in Sandford Bay, but were not found to be hauled-out. It cannot be ruled out that pupping and breeding activities do not occur in Boddam Harbour, with the season for pupping occurring in September and late-November.

11.6.16.2 However, there is limited information on whether these grey seals show any seasonality in their presence and whether these seals are breeding and pupping at this location. In November 2018, a BBC news article reported that a grey seal pup was rescued from Boddam, although it is not clear if this individual originated from this site (BBC, 2018). Grey seals at the closest designated haul-out site to the Proposed Development, the Ythan River Mouth, occur in large numbers of up to 2,000 individuals (reported in 2019), representing 26% of Scotland's east coast population of this species (SNH, 2017; and https://www.riverythan.org/river-projects/seal-population.html). Given that breeding is known to occur at this site and pups are often observed, it cannot be ruled out that these activities do not occur within the Boddam area.

11.6.16.3 No construction works on the shore, intertidal zone or in the marine environment will be required as part of the Proposed Development.

11.6.16.4 During the construction phase, the activity which is predicted to generate the highest sound impacts for seals hauled out at Boddam Harbour and surfaced in Sandford Bay is piling. Piling will be required for the main foundations for some of the larger elements of the Proposed Development. However, this would take place approximately 1km from the location where grey seals were observed hauled-out. At this distance, there is no possibility of noise disturbance being caused, especially with intervening barriers to sound including the existing power station, topography and other buildings.

11.6.16.5 There will consequently be Very Low impact on grey seals, resulting in a **Negligible effect** on this species.

Operational Phase

11.6.16.6 There are no impacts which could arise on grey seal during the operation of the Proposed Development meaning there will be **No effect** on this species.

Decommissioning Phase

11.6.16.7 Impacts at this stage are likely to be as described for the construction phase. Consequently, a **Negligible effect** on grey seal is predicted.

11.7. MITIGATION, MONITORING AND ENHANCEMENT MEASURES

11.7.1 SPECIFIC MITIGATION

11.7.1.1 Specific mitigation measures will be implemented to minimise the adverse effects on ecological features identified by this EcIA. Although mitigation is not required where effects are not considered to be significant (i.e. they have been assessed a being either Minor or Negligible), in some cases measures will be implemented where these can be readily achieved and/or where it may lead to ecological enhancement. This is in keeping with Scottish national and local planning policy, which include statements on delivery by new developments of positive effects for biodiversity (see Section 11.2.2).

11.7.1.2 The implementation of mitigation does not replace or negate the requirement to comply with relevant ecological legislation.

Barn Owl Boxes

11.7.1.3 To mitigate the risk of disturbance of barn owls breeding in the Sandford Lodge outbuildings, two nest boxes suitable for use by this species (and incidentally also by kestrel *Falco tinnunculus*) will be installed on suitable trees within the Proposed Development Site. These boxes will be installed prior to commencement of construction works (as far in advance as possible) to provide alternative nesting (and roosting) locations for barn owl. Locations will be selected which are as far from any construction works as possible, and ideally a minimum of 100m. The locations selected will be on land owned by SSE Thermal, ensuring that this mitigation measure can be delivered.

11.7.1.4 This will serve to provide alternative nesting locations which may be preferred to the Sandford Lodge outbuildings (especially as no evidence of breeding at this location was found in 2021), or which will otherwise be available to barn owl during the construction phase of the Proposed Development.

11.7.1.5 The boxes will be retained post-construction, at which time they will serve to provide an overall increase in the availability of nesting / roosting locations for barn owl (and potentially kestrel). These boxes will be monitored and maintained annually for a minimum of five years post-installation. This will be done, where possible, in collaboration with the North East Scotland Raptor Study Group.

Habitat Reinstatement

11.7.1.6 Following the completion of construction, all temporary construction laydown areas will be removed. As a minimum, these areas will be restored to the same habitat that was present during baseline surveys, namely agricultural semi-improved / improved grassland. However, to deliver ecological enhancement, as part of the reinstatement of the temporary construction laydown areas, additional habitat improvements will be provided, as described in Section 11.7.3.

11.7.1.7 The restoration / enhancement of the habitats affected by the construction laydown areas will minimise adverse effects identified on badger, barn owl and general breeding birds.

11.7.1.8 Replacement planting of any trees or hedgerow removed to enable the construction of the Proposed Development will also be undertaken. Again, however, this will be extended to include additional tree and scrub planting, which aims to deliver an overall biodiversity improvement.

11.7.1.9 No other mitigation is necessary in relation to habitat reinstatement, as all other habitats which will be lost to the Proposed Development – namely sparsely-vegetated stony ground, built-up land and small areas of gorse and neutral grassland – are of low to negligible ecological value.

Invasive Non-native Species Management

11.7.1.10 It is an offence to cause the spread of invasive non-native species outside of their native range in Scotland. Although the potential for the Proposed Development to cause the spread of such species is very low, a Biosecurity Management Plan (BMP) will be prepared, prior to the commencement of construction, setting out the works methods to be adopted to avoid or minimise this risk. This will deal with those invasive non-native plant species identified within the ZoI of the Proposed Development (sea buckthorn, Japanese rose) – in addition to other species that may be present but which were not identified by the desk study or field survey.

11.7.1.11 Specific measures to be implemented will include at minimum:

- No soil will be removed from the Proposed Development Site, unless otherwise checked for the presence of invasive non-native species and only to a facility licensed to receive such material;
- A minimum buffer of 2m, or further if best practice dictates, will be applied around all identified non-native plants and these areas will be fenced off with signage erected. No unauthorised personnel or plant will be allowed to enter and no materials will be stored within these exclusion zones; and
- Should any machinery be required to work within these exclusion zones, they will be thoroughly pressure-washed in a designated washdown area.

11.7.1.12 Although not legally required, all identified sea buckthorn and Japanese rose will be appropriately eradicated, following a method to be set out within the BMP. This is likely to involve the chipping of above-ground parts and roots of these plants and excavation of substrate within 2m. The material generated will either be stored and used on the Proposed Development Site, or (less preferably) taken to landfill with appropriate waste transfer documentation indicating the presence of invasive species. This will remove the risk of these species being spread from the Proposed Development Site through natural means (e.g. by birds eating berries), in particular removing the risk of sea buckthorn being naturally spread to the sand dunes north of the Proposed Development Site (this species is a threat to sand dunes where not native), and of Japanese rose being naturally spread elsewhere along the coast such as the coastal designated sites to the south.

Construction and Operational Phase Lighting

11.7.1.13 Most construction works will take place during daylight hours. However, especially during the winter months, it is very likely that works will be required during hours of darkness. Any lighting which may be required, either for construction or for security purposes, will be kept to a minimum and used only in locations where needed. Lighting will be directional and will use beam deflectors or similar to minimise light spill onto surrounding areas. When not in use, lighting will be switched off.

11.7.1.14 No construction lighting will be used along the northern access track past the Sandford Lodge outbuildings and surrounding woodland, or within 20m of this area. This will avoid illuminating one of the most important foraging areas within the Proposed Development Site for badger, bats and barn owl.

11.7.1.15 Permanent lighting will be designed with cognisance of best practice guidelines published by BCT and the Institution of Lighting Professionals (ILP) (BCT and ILP, 2018). In particular, the illumination of retained semi-natural habitats (e.g. scrub and woodland blocks, and areas of pasture) should, as far as possible, not exceed 1 lux. Other recommended design features include:

- Lighting units should lack ultraviolet (UV) elements;
- Where possible, LED luminaires should be used;
- Lights which emit in the red spectrum should be used in preference to those which emit white light;
- The use of low-level or bollard lighting units should be investigated, or column height minimised to reduce light spill;
- The use of motion-activated or timed lighting could be used, especially in areas where the risk of light spill onto semi-natural habitats is higher; and
- Accessories such as baffles, hoods or louvres should be used, where necessary, to reduce light spill.

11.7.1.16 The mitigation described above in relation to construction phase and permanent lighting will minimise adverse effects on nocturnal animals, in particular badger, bats and barn owl.

11.7.2 MONITORING

11.7.2.1 Habitat reinstatement / enhancement and other landscaping works will be monitored for 15 years, with three inspections per year during years 1-5, one inspection per year during years 6-10, and three inspections thereafter until year 15. This will ensure that the desired species are establish successfully and that target habitats, as described in the Outline Landscape and Biodiversity Strategy (EIA Report Volume 4), are created. Where necessary, remedial action will be taken should monitoring identify issues relating to the establishment of target vegetation / habitats (for example death or injury of planted trees, growth of invasive plants, over-grazing etc).

11.7.2.2 A pre-construction survey for the presence of barn owl in the outbuildings at Sandford Lodge will be carried out by a suitably licensed ornithologist[8]. Should barn owl nesting or roosting be confirmed, then a plan to ensure the protection of these birds will be prepared, in consultation with NatureScot, and implemented. Further monitoring of any birds present at this location will be undertaken to confirm that construction-related activities are not causing any disturbance. Should evidence of disturbance be observed or suspected, the works causing this to occur will be stopped immediately and further avoidance measures adopted to ensure that this does not continue. By avoiding disturbance of breeding or roosting barn owls, the identified adverse effect on this species will be avoided.

11.7.2.3 On-going monitoring of protected / notable species will be carried out by the ECoW, as required, for the duration of the construction phase. Where this monitoring identifies a need for additional avoidance or mitigation measures to be implemented, this will be communicated to the construction contractor to ensure the protection of relevant species.

11.7.3 ENHANCEMENT

11.7.3.1 Existing Scottish Planning Policy, draft NPF4 and the Aberdeenshire Proposed LDP 2020 all state that development should, wherever possible, deliver enhancements for biodiversity. In pursuance of this objective, an Outline Landscape and Biodiversity Strategy has been prepared in support of the Proposed Development, setting out a range of measures that will be implemented by the Proposed Development which exceed mitigation requirements and will ensure that there is an overall ecological improvement provided by the project. This document is provided in **Appendix 11H** (EIA Report Volume 4).

11.7.3.2 The Outline Landscape and Biodiversity Strategy has been informed by this EcIA and the assessment of landscape and visual impacts described in **Chapter 15: Landscape and Visual Amenity** (EIA Report Volume 2). It takes a synergistic approach to minimising the permanent effects (e.g. in terms of habitat loss) of the Proposed Development and to achieving the aim of delivering environmental gain.

11.7.3.3 The content of the document at this stage is high-level but provides a framework for the implementation of enhancement. It will be refined and further information added where necessary, for example in relation to design specifications. It will be submitted to

[8] No such inspection was carried out to inform this EcIA as access to the buildings was not possible due to the presence of permanent barriers across their entrances. As long as it is safe to do so, access to these buildings will be arranged pre-construction to check for barn owls.

Aberdeenshire Council for approval, in consultation with NatureScot, prior to the commencement of any construction activities associated with the Proposed Development.

11.7.3.4 The following enhancement measures are included:

- The habitat in the field north of the Sandford Lodge access track will be enhanced to create an area suitable for breeding wader species. This will include the creation of small 'scrapes' (shallow depressions which hold some water for much of the year), and potentially a larger pond in an area where ground conditions are damp, with scattered rushes. Other habitat enhancements to be investigated and implemented where possible will include the creation of areas of marsh / swamp. The aim will be for this area to become floristically diverse, and suitable for breeding and non-breeding waders. To increase breeding success, it will be necessary for the area to be fenced to exclude larger mammals (e.g. badger, otter and fox *Vulpes vulpes*);
- Native scrub planting will be carried out on the inner embankment slope on the west side of the CCGT and CCP area. Species to be used may include gorse, blackthorn (in small amount) and hawthorn;
- Native woodland planting will be carried out around the western edge of the CCGT and CCP area at the top of the embankment slope;
- As stated above, the invasive non-native species sea buckthorn and Japanese rose present in landscape planting will be eradicated from the Proposed Development Site;
- A total of five bat boxes will also be installed in suitable locations within the Proposed Development Site, including at least one which is suitable to support a maternity colony.

11.7.3.5 Although not required in Scotland, to attempt to quantify the potential biodiversity benefits from the above, an assessment of Biodiversity Net Gain (BNG) was carried out using the Department for Environment, Farming and Rural Affairs (Defra) Metric 3.0. Details of this exercise can be found in the Outline Landscape and Biodiversity Strategy. In summary, the calculation for area habitats gave a result of -5.58%. This constitutes a small net loss for area habitats (results above -5% and below +5% are considered no net loss, since Metric 3.0 is an estimating tool only). For linear habitats, enhancement of the hedgerows along the track to Sandford Lodge, comprising diversification of 440m of existing hedge and filling of a 63m gap, gave a result in Metric 3.0 of +253% gain.

11.7.3.6 However, the main purpose of the proposed ponds / scrapes at the northern-most laydown area is to benefit bird species such as waders. Faunal benefits such as this are not taken account of or quantified in habitat BNG calculations. Therefore, although the BNG calculation shows a small net loss for area habitats, together with the gain for linear habitats through hedgerow enhancement and unquantified gain for wetland bird species through pond / scrape creation, it is considered reasonable to conclude an overall small biodiversity gain for the Proposed Development.

11.7.3.7 Although the finalised landscape planting scheme may differ slightly from that designed at this stage, any minor changes are very unlikely to substantially alter the outcome of the BNG calculation.

11.8. CUMULATIVE EFFECTS

11.8.1 CUMULATIVE EFFECTS

11.8.1.1 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location (CIEEM, 2019).

11.8.1.2 Projects that have the potential to impact cumulatively with the Proposed Development to cause significant environmental effects are identified in **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4). Consideration has been given in this EcIA only to those identified projects that may be under construction at the same time as the Proposed Development, which involve a permanent loss of habitat which is similar to that within the Proposed Development Site (and which may therefore support the same species), and/or which are of a sufficient scale that any impacts they may generate could realistically be expected to act cumulatively with the Proposed Development.

11.8.1.3 The projects presented in Table 11.8 were therefore considered for their potential to act cumulatively with the Proposed Development.

Table 11-8: Assessment of cumulative impacts from other projects

Project reference	Potential for cumulative impacts	Significant cumulative effects predicted?
APP/2019/0982 – Peterhead Substation	Peterhead Substation is expected to be largely or entirely complete by the time of commencement of construction of the Proposed Development. Even if works to Peterhead Substation are continuing by this time, it is likely that they would be relatively minor and restricted to works such as snagging, operational commissioning etc. It is therefore very unlikely that they would be sufficient to act cumulatively with the Proposed Development to increase the effects on ecological features identified in Section 11.6 of this chapter (which are almost all negligible and not significant).	No
APP/2018/1831 – Installation of Underground Electricity Cables	Construction of this project may take place simultaneously with the Proposed Development. However, it is located approximately 2km from the Proposed Development Site, so there is no potential for disturbance impacts to occur cumulatively. Moreover, although there may be some habitat loss from this project, it is likely to be over a relatively narrow, linear corridor. These impacts will be temporary as it is expected that the land will be reinstated to pre-construction conditions following installation and commissioning of the cables.	No
APP/2015/1121 NorthConnect Converter Station	Located approximately 2km south-west of the Proposed Development. The application for this development states construction period of 2020-2023 but construction has not yet commenced. Appears to lie in improved agricultural land of the type which is ubiquitous in surrounding area. Any adverse effects from construction and/or operation are likely to be minor and would not act cumulatively with the Proposed Development to become significant.	No
APP2021/2681 – Electrical Converter Station	This project does not yet have planning consent but is expected to start construction in 2023, and may therefore overlap with the construction period of the Proposed Development. It is located on the opposite side of the A90 from the Proposed Development. It is located in what appears to be improved agricultural land, the loss of which will	No

Project reference	Potential for cumulative impacts	Significant cumulative effects predicted?
	not to act cumulatively with habitat losses from the Proposed Development to result in significant adverse effects.	
APP/2021/2392	This project does not yet have planning consent but is expected to start construction in 2023, and may therefore overlap with the construction period of the Proposed Development. It is located on the opposite side of the A90 from the Proposed Development. It is in what appears to be improved agricultural land, the loss of which will not to act cumulatively with habitat losses from the Proposed Development to result in significant adverse effects.	No
ENQ/2020/0931 – Acorn Project	The Acorn Project is located approximately 10km from the Proposed Development Site and will largely or entirely be within an existing industrial facility. There is therefore no potential for cumulative effects from disturbance, habitat loss or other possible impacts.	No
ENQ/2021/1139 – Residential Development	This is a proposal for a residential mixed-use development comprising approximately 800 new homes and other facilities to the west of Peterhead, approximately 3.5km from the Proposed Development Site. Although there is no possibility of cumulative disturbance, the size of this project means there could be cumulative effects from habitat loss, in particular affecting ecological features such as breeding birds and badgers. However, the residential development includes new landscaping and open spaces, plus a local nature reserve. It is therefore expected that such impacts generated by that project will be mitigated through the creation of these habitats.	No
APP/2021/1712 – Solar Photovoltaic (PV) Farm	This project, which involves the installation of a solar PV farm of 50MW capacity, plus battery storage facility of 20MW capacity, has yet to receive planning permission. It is located more than 6km from the Proposed Development. Given this, and the very minor effects predicted from the Proposed Development, there are not expected to be any significant cumulative effects.	No

11.9. LIMITATIONS OR DIFFICULTIES

11.9.1 OVERVIEW

11.9.1.1 General methodological assumptions and limitations are set out in Section 11.3.6; these are minor or have been accounted for and do not alter the assessment conclusions.

11.9.2 OUTLINE LANDSCAPE AND BIODIVERSITY STRATEGY

11.9.2.1 Detail will be added to the Outline Landscape and Biodiversity Strategy to ensure that it provides sufficient information to enable the successfully delivery of all ecological and landscape mitigation / enhancement measures set out above and in **Chapter 15: Landscape**

and Visual Amenity (EIA Report Volume 2). The outline document currently sets out the framework for the measures to be implemented only. Further investigation and/or design development may identify that certain measures are not feasible (e.g. if ground conditions are not suitable for creation of wetland features). However, in this case, alternative measures appropriate to the conditions would be devised. The final Landscape and Biodiversity Strategy will be submitted to Aberdeenshire Council for approval, in consultation with NatureScot, prior to the commencement of construction of the Proposed Development.

11.9.3 OTHER

11.9.3.1 There are no other limitations to this EcIA. As stated in Section 11.3.6, the assessment has been based on the 'worst-case' layout of Proposed Development infrastructure within the CCGT and CCP area. However, any movement of key infrastructure within this area (including the absorber and/or bypass stack) will not change the conclusions reached (for example by altering the outcomes of air quality modelling, which modelled multiple stack positions and reported the worst-case outcomes).

11.10. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

11.10.1 SUMMARY

11.10.1.1 For the purposes of this EIA, only effects which are judged to be Moderate or Major are considered to be Significant. On this basis, the only Significant effect which may arise, in the absence of mitigation, on any ecological feature is the **temporary Moderate adverse** effect on barn owls which could occur due to disturbance of nesting birds during the construction and/or decommissioning phases. However, this effect would only arise should this species breed within the outbuildings at Sandford Lodge, which was not believed to be the case at the time of baseline surveys in 2021.

11.10.1.2 With the implementation of the mitigation described above for this species, namely the provision of two nest boxes prior to commencement of construction, the impacts on barn owl from construction-related disturbance are expected to be reduced to no more than Low magnitude, and the residual effect will be **Negligible**.

11.10.1.3 The only other adverse effects identified prior to implementation of mitigation which were not considered to be Negligible were:

- A temporary Minor adverse effect on roosting bats in the outbuildings at Sandford Lodge as a result of disturbance during the construction and decommissioning phases;
- A temporary Minor adverse effect on barn owls due to the loss of grazed grassland foraging habitat caused by the creation of the construction laydown areas;
- Permanent and temporary Minor adverse effects on breeding birds due to the loss of nesting habitat during the construction phase; and
- A temporary Minor adverse effect on nesting oystercatcher during the construction phase because of disturbance.

11.10.1.4 None of these effects are considered to be Significant by this EIA.

11.10.1.5 In addition, ecological enhancement will be achieved through the delivery of habitat enhancement, including the creation of a wetland area north of Sandford Lodge access track and an area of native woodland to the south of the existing power station. This is set out in the Outline Landscape and Biodiversity Strategy (**Appendix 11H** EIA Report Volume 4).

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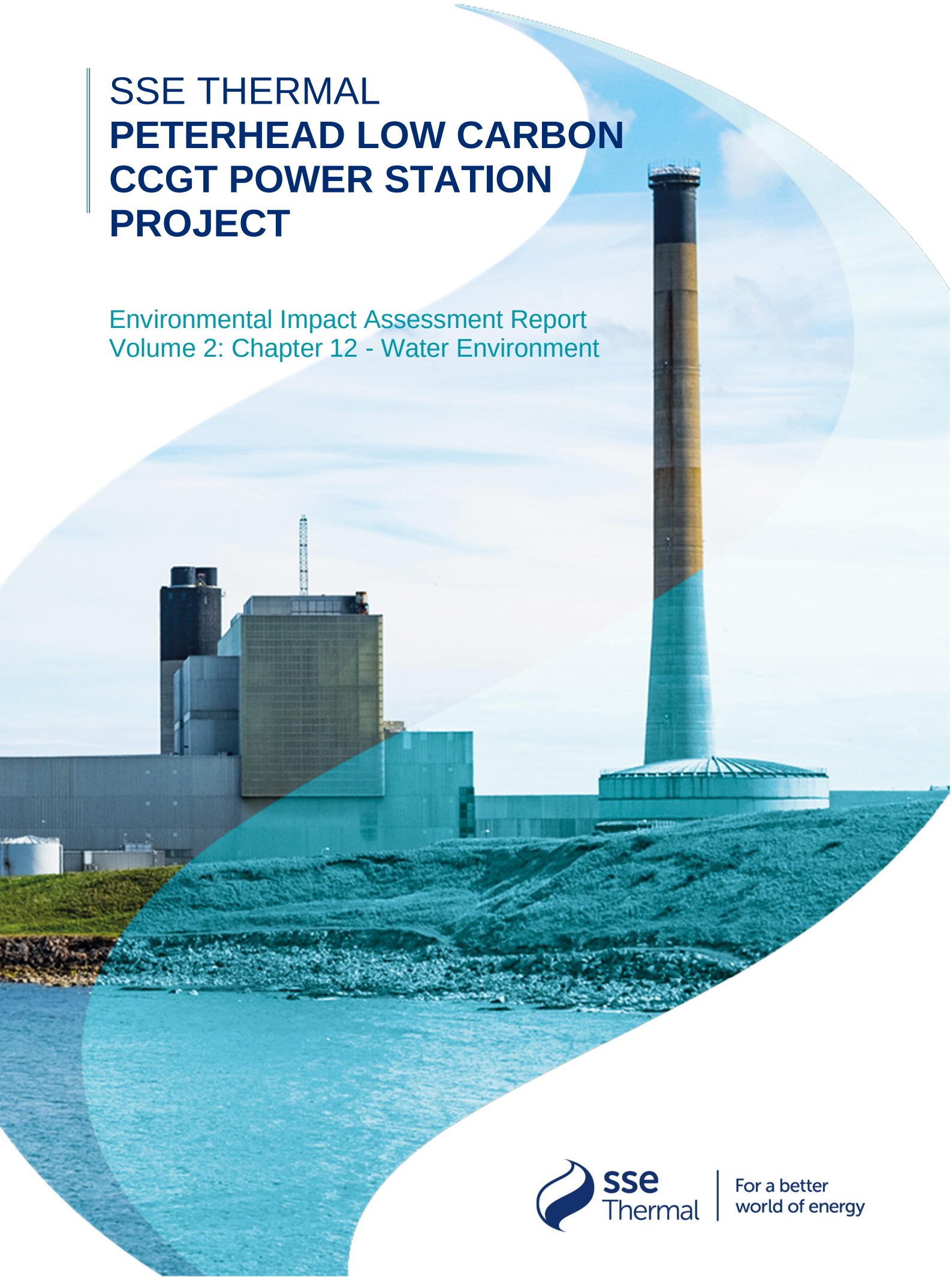
Environmental Impact Assessment Report
Volume 2: Chapter 12 - Water Environment



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CONTENTS

TABLES

12. Water Environment

12.1. INTRODUCTION

12.1.1 INTRODUCTION

12.1.1.1. This chapter of the Environmental Statement (ES) presents the findings of the assessment of likely significant effects on the water environment as a result of construction, operational and decommissioning phases of the Proposed Development, as described in **Chapter 4: The Proposed Development** (EIA Report Volume 2), hereafter referred to as 'Proposed Development'.

12.1.1.2. The water environment includes surface water quality, surface and groundwater resources, hydromorphology, and drainage. Potential impacts to groundwater quality (e.g. from any existent contaminated land or pollution risks during construction) and hydrogeology are considered in **Chapter 14: Ground Conditions** (EIA Report Volume 2) and flood risk is considered in **Chapter 13: Flood Risk** (EIA Report Volume 2).

12.1.1.3. Due to the interdisciplinary nature of effects, this chapter cross references other chapters including **Chapter 11: Biodiversity and Nature Conservation** (EIA Report Volume 2), **Chapter 13: Flood Risk** (EIA Report Volume 2) and **Chapter 14: Ground Conditions** (EIA Report Volume 2) and is supported by the following figures and appendices:

- **Appendix 12A: Water Framework Directive Assessment Report** (EIA Report Volume 4);
- **Appendix 13A: Flood Risk Assessment** (EIA Report Volume 4); and
- **Figure 12.1: Water Features and their Attributes** (EIA Report Volume 3)**.**

12.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

12.2.1 INTRODUCTION

12.2.1.1. An overview of the legislative and policy context that is relevant to the Proposed Development is provided within **Chapter 7: Legislative Context and Planning Policy** (EIA Report Volume 2).

12.2.1.2. A summary of the legislation and planning policy relevant to the assessment of potential impacts on the water environment from the Proposed Development is provided in this section. These have been taken into account in the assessment.

12.2.2 LEGISLATION

12.2.2.1. The following legislation is of relevance to the Proposed Development:

- Water Resources (Scotland) Act 2013;
- Marine (Scotland) Act 2010;
- Water Environment and Water Services (Scotland) Act 2003;
- Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003;
- Water Industry (Scotland) Act 2002;
- Water (Scotland) Act 1980;
- Control of Pollution Act 1974;

- Sewerage (Scotland) Act 1968;
- Water Environment (Miscellaneous) (Scotland) Regulations 2017;
- Conservation of Salmon (Scotland) Amendment Regulations 2016;
- Water Environment (River Basin Management Planning etc.) (Miscellaneous Amendments) (Scotland) Regulations 2015;
- Environmental Protection (Duty of Care) (Scotland) Regulation 2014;
- Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2013;
- Water Quality (Scotland) Regulations 2010;
- Environmental Liability (Scotland) Regulations 2009;
- Water Environment (Diffuse Pollution) (Scotland) Regulations 2008;
- Groundwater Regulations 1998;
- Marine Licensing (Exempted Activities (Scottish Inshore Region) Order 2011; and
- Water (Prevention of Pollution) (Code of Practice) (Scotland) Order 2005.

12.2.2.2. The Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2013, more commonly known as the Controlled Activity Regulations (CAR), apply regulatory controls over activities which may affect Scotland's water environment. This covers items such as abstraction, aquaculture, engineering, groundwater, impoundment, pollution control, discharge, culverting and watercourse diversion. Prior to operation the Proposed Development will require the appropriate CAR permits to be in place and this is expected to include new, as well as potential updates to existing permits. The Scottish Environmental Protection Agency (SEPA) has published several documents and good practice guides to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2013.

12.2.2.3. A marine licence is required for licensable activities defined in the Marine (Scotland) Act 2010 involving the deposit or removal of a substance or material below the Mean High Water Springs Mark, or in any tidal river to the extent of the tidal influence. Licensable activities include deposits, construction, alteration or improvements, removals, and navigational dredging.

12.2.3 PLANNING FRAMEWORK

Scottish Planning Policy (SPP)

12.2.3.1. The purpose of the Scottish Government's SPP (2014) is to set out national planning policies which reflect Scottish Ministers' priorities for operation of the planning system and for the development and use of land. The relevant Policy Principles to the water environment are the presumption in favour of development that contributes to sustainable development, taking account of protecting and improving the water environment and flood risk.

Scottish Energy Strategy

12.2.3.2. 'The Scottish Energy Strategy: The Future of Energy in Scotland' (2017) sets out the Scottish Government's vision for the future energy system in Scotland. The Strategy identifies a number of energy priorities, including promoting 'Renewable and local carbon solutions' as well as exploiting 'Oil and gas industry strengths', notably the potential carbon capture and storage (CCS) resource that has been created by these industries.

12.2.3.3. With regard to CCS, the strategy notes that Scotland's waters in the North Seas provide the largest carbon storage resource in Europe. Coupled with our existing oil and gas capabilities, ready supply chain, and existing pipeline and platform infrastructure, Scotland is one of the best-placed countries in Europe to realise CCS on a commercial scale.

National Planning Framework

12.2.3.4. The third National Planning Framework (2014) sets out a long-term vision for development and investment across Scotland over the next 20 to 30 years. The framework sets out the need for more proactive and innovative environmental stewardship. A planned approach to development will help deliver the right balance between safeguarding assets which are irreplaceable and facilitating change in a sustainable way. A landscape-scale approach to environmental planning and management will address the decline in some ecosystem services by prioritising action across river catchments, as well as in and around our towns and cities.

12.2.3.5. The Scottish Government has recently published a draft NPF4. The NPF4 was laid before the Scottish Parliament on 10 November 2021 and will be considered for a period of up to 120 days. Alongside Parliamentary scrutiny of the draft the Scottish Government is running a public consultation, which is open until 31 March 2022. The final adoption date will depend on the approval of NPF4 by the Scottish Parliament, but it is currently anticipated that a finalised version will be laid before Parliament for approval by Summer 2022.

12.2.3.6. The draft NPF4 is intended to provide the spatial strategy for Scotland to 2045 and takes account of the target of net zero emissions by 2045 set by the Scottish Government. Once adopted by Scottish Ministers, NPF4 will have increased status and be part of the statutory development plan. The draft also incorporates updated Scottish Planning Policy ('National Planning Policy'), which will contain detailed national policy on a number of planning topics and form part of the development plan.

12.2.3.7. The draft NPF4 contains policies relevant to the water environment including Policy 13 (Sustainable Flood Risk and Water Management), Policy 20 (Zero Waste) and Policy 32 (Natural Places).

National Marine Plan

12.2.3.8. The National Marine Plan covers both Scottish inshore waters (out to 12 nautical miles) and offshore waters (12 to 200 nautical miles). It also applies to the exercise of both reserved and devolved functions. The Plan states that developments and activities in the marine environment should be resilient to coastal change and flooding, and not have unacceptable adverse impact on coastal processes. Marine planning should consider opportunities to protect important geodiversity features and prevent deterioration or enhance where appropriate. Policy GEN 12 Water Quality and Resource states that "*Developments and activities should not result in a deterioration of the quality of waters to which the Water Framework Directive, Marine Strategy Framework Directive or other related Directives apply*. *Marine planners and decision makers should be satisfied that impacts of development and use on water have been taken into account. With regards to the WFD, reference should be made to the 'ecological status of the water environment' which includes water quality and quantity and changes to water level as well as biological aspects such as the impact of non-native species*".

Aberdeenshire Council Local Development Plan

12.2.3.9. Aberdeenshire Council Local Development Plan was adopted on 17 April 2017, and has the following policies of relevance to the water environment:

- Policy E1 Natural heritage – states that Aberdeenshire Council "*will not allow new development where it may have an adverse effect on a nature conservation site designated for its biodiversity or geodiversity importance, except where certain circumstances apply*".
- Policy P4 Hazardous and potentially polluting developments and contaminated land – states that Aberdeenshire Council "*will refuse development if there is a risk that it could*

cause significant pollution, create a significant nuisance, or present an unacceptable danger to the public or the environment."

- Policy RD1 Providing suitable services – sets out Aberdeenshire Councils requirements for the management of water supply and wastewater including that "*surface water drainage must be dealt with in a sustainable manner and in ways that avoid pollution and flooding, through the use of an integrated Sustainable Drainage System*."

Draft Aberdeenshire Council Local Development Plan 2022

12.2.3.10. Aberdeenshire Council has submitted their Proposed 2020 Local Development Plan [REF 42] for Examination. Relevant policies in this yet to be adopted but proposed local plan include:

- Policy P1 Layout, Siting and Design – required new development to use water efficiently.
- Policy P4 Hazardous and Potentially Polluting – Aberdeenshire Council "*will refuse development, even infill development, if there is a risk that it could cause significant pollution, create a significant nuisance (for example through impacts on air quality or noise), or present an unacceptable danger to the public or the environment*."
- Policy PR1 Protecting Important Resources – Aberdeenshire Council "*will not approve developments that have a negative effect on important environmental resources associated with…the water environment.*" In addition, "*new development, including aquatic engineering works, which will generate discharges or other impacts on waterbodies (including wetlands), or which could affect the water quality, quantity, flow rate, botanical richness, ecological status, riparian habitat, protected species or flood plains of waterbodies (including their catchment area) must not prejudice water quality or flow rates, or their ability to achieve or maintain good ecological status. Any such developments must contribute to the objectives set against the relevant waterbodies through the river basin management process as well as the relevant freshwater objectives and targets within the North East Scotland Biodiversity Partnership Habitat Statements. Opportunities for the improvement of water quality, physical enhancement of waterbodies and for the creation, enhancement and management of habitats shall be required where feasible to contribute to the improvement of the overall status of the waterbody. Any aquatic engineering works must be capable of being consented under Controlled Activity Regulations and construction work shall be undertaken in line with Construction Site Licensing Regulations. Adequate buffer strips will be required adjacent to waterbodies in order to protect and enhance all waterbodies within or adjacent to development sites, and these should be integrated positively into the green-blue infrastructure of the site and surrounding area*."

Aberdeen City and Shire Strategic Development Plan

12.2.3.11. The Aberdeenshire Council Local Development Plan (2020) has an objective to make sure that new development safeguards, and where appropriate, enhances historic, natural and capital assets and is within the capacity of the environment. The region will take a lead in reducing the amount of emissions and pollutants released into the environment. It would also avoid new development where it would prevent waterbodies achieving good overall status under the WFD. New development should not adversely impact on water quality either during construction or at the operational phase. Wherever possible new development should contribute to developing and enhancing blue / green networks and habitat improvement.

Aberdeenshire Council SuDS Guidance

12.2.3.12. The Aberdeenshire Council: Drainage Impact Assessment (2002) document was produced to assist developers and agents, and others involved in approving waste and surface water drainage facilities for new development. The guidance highlights general requirements for surface water runoff, as well as further technical requirements and design considerations.

12.2.3.13. Further Detailed Guidance on Good Practice in the Design and Maintenance of Soft SuDS was developed by Aberdeenshire Council in 2012. This covered aspects of the design of SuDS which may affect function, amenity and biodiversity value. It covers planting and maintenance.

River basin management plan

12.2.3.14. The River Basin Management Plan (RBMP) for the Scotland River Basin District: 2015–2027 (as amended, 2017) and additional documents establish the guidelines for compilation of WFD objectives in the Scotland River Basin District. Further details are provided in the WFD Assessment (**Appendix 12A** EIA Report Volume 4).

12.2.4 GUIDANCE

12.2.4.1. SEPA has published a number of documents and good practice guides to support the implementation of the Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2013. Notably, the License Applicant Guidance (2019) document gives guidance regarding point source discharges to surface water and groundwater, abstraction and impoundment of waters and building works within, or within the vicinity of, inland waters.

Sustainable Drainage Systems Guidance

12.2.4.2. A multi-stakeholder group known as the Sustainable Urban Drainage Scottish Working Party (SUDSWP) published 'Water Assessment and Drainage Assessment Guide' in 2016. This document includes water supply advice and is intended to help guide those involved in the installation of water and drainage infrastructure (both new and retrofitting) through the necessary stages to obtain relevant permissions and comply with standards and policies.

12.2.4.3. Further industry good practice guidance on the planning for and design of SuDS is provided by:

- CIRIA C753 - The SuDS Manual 2nd Edition (2015); and
- Transport for Scotland, SuDS for Roads (2009).

12.3. ASSESSMENT METHODOLOGY

12.3.1 CONSULTATION

12.3.1.1. Consultation has been undertaken with statutory consultees to inform this chapter. Table 12.1 provides a summary of comments raised via the formal Scoping Opinion and in response to the formal consultation.

Table 12-1: Summary of consultee responses that have informed the scope and methodology of the water environment assessment

Consultee	Date and Nature of Consultation	Comments Raised	Response Provided in this Chapter / EIA
SEPA	Scoping Opinion, June 2021	Due to the scale of the proposed plant, the applicant will be required to apply to us to make a substantial variation, or alternatively a new permit, to the existing PPC Permit due to the addition of two Schedule 1, Sections 1.1 (a) and 6.10 Part A PPC activities.	Noted. As the proposed installation has yet to under-go detailed design (or FEED), no decision has yet been made on the selection of a specific vendor for the CCGT or licensor for the CCP. The permit application is therefore at an early stage of development and is being undertaken in two stages: Stage One - to confirm that the proposed techniques are in accordance with the BAT framework and to ensure this informs the FEED process. At this pre-FEED stage, the Permit application has been progressed on the basis of a vendor/ technology-neutral process, with the assessment of worst-case emissions profile to inform a 'Permit in Principle'; Stage Two - post-FEED, site-specific BAT justifications and impact assessments for the preferred vendor technology and solvent will be carried out, following which the operator will confirm the proposals for, and undertake a trial and monitoring programme proposed as part of Permit pre-operational conditions. This approach was agreed with SEPA at a meeting held on 15th December 2021.

Consultee	Date and Nature of Consultation	Comments Raised	Response Provided in this Chapter / EIA
SEPA	Scoping Opinion, June 2021	Twin-tracking applications for consent under planning and environmental regulation regimes avoids duplication of effort, speeds the overall consenting process, and ensures that the requirements of PPC are given due consideration at an early stage when proposals are at their most fluid and appropriate modifications more easily made with less expense to the developer. We therefore encourage the developer to twin track their planning and PPC variations applications.	Noted. Stage 1 of the permitting process as described in the above response is being undertaken alongside the planning application. Stage 2 will be undertaken when a specific vendor for the CCGT and licensor for the CCP are determined. This approach was agreed with SEPA at a meeting held on 15th December 2021.
SEPA	Scoping Opinion, June 2021	Our general planning requirements for a development which is also be covered by PPC is that the planning application includes: (a) A general description of the proposed process, techniques, and technology choice. (b) EITHER – details of proposed processes, techniques and technologies, an assessment of environmental impact associated with technology choice, including the process of producing a detailed list of receptors, a description of potential impact on sensitive receptors, proposed mitigation measures and emissions standards to be achieved; OR – a demonstration that, assuming a worst-case scenario with sensitive receptors present, the development could reasonably achieve through existing technology agreed defined emissions standards; (c) A statement relating to potential for abnormal or unusual events (e.g. non-routine emissions), the frequency and expected	A general description of the proposed process and techniques are provided within this chapter (Section 12.5) and a worst-case environmental impact assessment for receptors that could reasonably be impacted has been undertaken (Section 12.6). This is based on the conceptual design and will be re-appraised at detailed design as part of the PPC Permit variation and ongoing consultation with SEPA. This will include details regarding potential for abnormal or unusual events.

Consultee	Date and Nature of Consultation	Comments Raised	Response Provided in this Chapter / EIA
		duration of the events, and the potential impact on sensitive receptors, in order to demonstrate the suitability of the location.	
SEPA	Scoping Opinion, June 2021	The discharge of effluent from the proposed facility will fall under the scope of the PPC Permit though it will consider the requirements of the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) ("CAR").	Noted. A qualitative assessment of effluent discharge to water receptors is provided within this chapter of the ES, (Section 12.6) with H1 assessment to be provided as part of the PPC Permit application as described above.
SEPA	Scoping Opinion, June 2021	A detailed Drainage Impact Assessment should form part of the planning submission. It should follow recognised best practice and guidance and set out the strategy for the management of foul drainage, any aqueous effluents and surface waters.	The drainage strategy for the Scheme is included within **Appendix 13A** (EIA Report Volume 4), and is summarised in this chapter and assessed with regard to any impacts on water quality to the identified receptors (Section 12.6).
SEPA	Scoping Opinion, June 2021	Confirmation should be provided as to whether the plant results in any other form of aqueous effluent and if so details (estimated volumes, chemical content etc) provided. Our preference is that this is also directed to the public foul drainage system. We ask that either confirmation is provided that Scottish Water have agreed the principle of accepting any such discharge or information on proposed private treatment, expected standards and discharge is required. Any direct discharges to the water environment should be subject to at least a H1 screening assessment which should ascertain the need for modelling. If detailed modelling of a discharge is required, then as outlined elsewhere we strongly	Details of aqueous effluent, to the extent they are known at the time of writing (January 2021), are provided within this chapter and impacts on their respective receptors assessed (Section 12.6). An H1 screening assessment is to be provided as part of the PPC Permit application.

Consultee	Date and Nature of Consultation	Comments Raised	Response Provided in this Chapter / EIA
		encourage the developer to provide us with a method statement outlining the proposed approach prior to the work commencing.	
SEPA	Scoping Opinion, June 2021	Information on surface water drainage should be provided. Proposals should follow recognised best practice such as The SUDS Manual, CIRIA C736 and the relevant BAT reference documents. Roof rainwater should be harvested to help reduce overall water requirements and information should be provided on the pollution hazard level for different areas of the site (for example material handing storage and handling areas, working yard areas, roads, car parking) clearly demonstrating that suitable treatment is provided. If there is the potential for oil contamination, then oil interceptors should be included as part of the design. Consideration should also be given to drainage from accidents and how that will be captured. Note that under PPC we do not control the quantity of discharge of surface water.	The conceptual surface water drainage strategy for the Scheme is included within **Appendix 13A** (EIA Report Volume 4), and is summarised in this chapter and assessed with regard to any impacts on water quality to the identified receptors (Section 12.6). The assessment considers routine runoff and risk of spillages.
SEPA	Scoping Opinion, June 2021	We note the presence of one watercourse, the Den of Boddam Burn, which is culverted through the existing power station site and that realignment of the burn is required to enable the proposed development. We would very much welcome the investigation into the possibility of opening up of this watercourse as part of any realignment, part or whole, and for an investigation into whether the burn can be redirected to its historical course as a possible environmental enhancement to the development.	The feasibility of daylighting the Den of Boddam Burn has been undertaken but has not been possible to achieve as part of the Proposed Development. An assessment of the impact of redirecting the watercourse is provided in this chapter in Section 12.6.

Consultee	Date and Nature of Consultation	Comments Raised	Response Provided in this Chapter / EIA
SEPA	Scoping Opinion, June 2021	It is noted from our initial discussion that the intent of the developer is to utilise the current cooling water intake system to serve the proposed facility which will continue to be licensed through the CAR Registration for the existing Power Station.	Noted. A permit variation is being progressed alongside development of the EIA as described above, but no changes to the water intake volumes or conditions are proposed.
SEPA	Scoping Opinion, June 2021	It is also noted and welcomed that confirmation of any Private Water Supplies (PWS) within 1km will be identified as part of the Environmental Impact Assessment. Should any PWS be found to be within 250m of the proposed site then SEPA Land Use Planning Guidance Note 31 should be referred to when assessing the impact on these.	Noted, however, there are no PWS identified within 250m of the Proposed Development Site boundary.
SEPA	Scoping Opinion, June 2021	A schedule of mitigation should be included which outlines the measures to be taken to limit the impacts on the environment during the construction period. They must include reference to best practice pollution prevention and construction techniques and regulatory requirements.	Full details of mitigation for the construction and operation phases of the development are outlined in Section 12.5 with reference to regulatory requirements.
Aberdeenshire Council	Scoping Opinion, June 2021	Aberdeenshire Council notes that there are various receptors who may be impacted by the proposed development and minor water features are scoped out of any further assessment. The use of a CEMP during construction, a DEMP during decommissioning and regulatory processes as explained within Section 14.6 is welcomed.	Comments are noted. Further details on the CEMP and DEMP with regard to the water environment are provided within this chapter (Section 12.5).
RSPB Scotland	Scoping Opinion, June 2021	It is noted that water impacts on marine ecology have been scoped out. If there are any significant changes to amount of	Impacts on the water environment (but not marine ecology) related to water discharge and

Consultee	Date and Nature of Consultation	Comments Raised	Response Provided in this Chapter / EIA
		abstractions and discharges then this should be included in the assessment of impacts in the EIA, including impacts on the Buchan Ness to Collieston Coast SPA.	abstraction are considered within this chapter, and impacts on WFD status and objectives (including ecological objectives) are considered in **Appendix 12A** (EIA Report Volume 4).
RSPB Scotland	Scoping Opinion, June 2021	The applicant should also consider the Southern Trench Marine Protected Area (as recently designated)	Noted. However, the Southern Trench MPA is outside the 1 km study area deemed appropriate for assessment within this chapter (being >5 km from the Proposed Development Site).
Scottish Water	Scoping Opinion, June 2021	Unfortunately, Scottish Water is unable to confirm water capacity or wastewater capacity currently so to allow us to fully appraise the proposals we suggest that the applicant completes a Pre-Development Enquiry (PDE) Form.	Noted. There will be a new water supply pipe for the new power station but the connection will be downstream of the existing Scottish Water interface i.e. within the Peterhead Power Station boundary, there will be no new interface with Scottish Water assets.
Scottish Water	Scoping Opinion, June 2021	According to our records, the development proposals impact on existing Scottish Water assets. The applicant must identify any potential conflicts with Scottish Water assets and contact our Asset Impact Team to apply for a diversion.	Noted. There will be a new water pipe for the Proposed Development downstream of the existing Scottish Water interface (i.e. within the existing Peterhead Power Station boundary) and there will be no new interface with Scottish Water assets
Scottish Water	Scoping Opinion, June 2021	A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under	Noted, and this is reflected in the baseline environment outlined in Section 12.4 of this chapter.

Consultee	Date and Nature of Consultation	Comments Raised	Response Provided in this Chapter / EIA
		the Water Framework Directive, in the area that may be affected by the proposed activity.	
Scottish Water	Scoping Opinion, June 2021	For reasons of sustainability and to protect our customers from potential future sewer flooding, Scottish Water will not accept any surface water connections into our combined sewer system. There may be limited exceptional circumstances where we would allow such a connection for brownfield sites only, however this will require significant justification from the customer taking account of various factors including legal, physical, and technical challenges. In order to avoid costs and delays where a surface water discharge to our combined sewer system is anticipated, the developer should contact Scottish Water at the earliest opportunity with strong evidence to support the intended drainage plan.	Noted. Foul water from the Proposed Development is to be discharged into the existing discharge pipe to Sandford Bay following treatment with a package treatment plant (described further in Section 12.5), and so there will be no requirement to connect with any combined sewer system.
Ugie Salmon	Scoping Opinion, June 2021	We would like to know if you have done any research on the effects the project might have on the salmon and sea trout whose migratory paths would come very close to the power station at Boddam.	As assessment of potential impacts on receiving waters at Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody) is undertaken in this chapter. (Section 12.6) Impacts on WFD status and objectives (including ecological objectives) are considered in **Appendix 12A** (EIA Report Volume 4).

12.3.2 STUDY AREA

12.3.2.1. For the purposes of the water quality assessment, a study area of circa 1km from the Proposed Development Site has been considered in order to identify surface waterbodies that could potentially be affected. However, since watercourses flow, quality impacts may propagate downstream, and thus where relevant the assessment also considers a wider study area based on professional judgement. In this instance, the Proposed Development lies adjacent to the North Sea, specifically the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody. It is also within 1km of the Buchan Ness to Cruden Bay Coastal WFD waterbody. It is unlikely that any further adjoining waterbodies would be affected given the size and nature of these coastal waterbodies, and so they are considered the final receiving waterbodies that could conceivably be affected.

12.3.2.2. Air quality modelling for the Proposed Development has been undertaken to determine the potential for atmospheric deposition of NOx and ammonia releases from the Proposed Development Site to impact sensitive ecosystems. The study area for this assessment covers a wider area including the Buchan Ness to Collieston Special Area of Conservation (SAC), Buchan Ness to Collieston Coast Special Protection Area (SPA) and Bullers of Buchan Coast Site of Special Scientific Interest (SSSI). Deposition is assessed against critical levels set for each particular ecosystem. The significance of effects relating to atmospheric deposition to these sites is reported in **Chapter 8: Air Quality** (EIA Report Volume 2).

12.3.3 IMPACT ASSESSMENT METHODOLOGY

12.3.3.1. This section of the chapter presents the following:

- The basis of the assessment;
- Identification of the information sources that have been used;
- Assessment methodology;
- An explanation as to how the identification and assessment of water environment effects has been achieved; and
- The significance criteria and terminology for assessment of the residual effects to the water environment.

Basis of Assessment

12.3.3.2. The following sources of information that define the Proposed Development have been reviewed and form the basis of this assessment:

- **Chapter 4: The Proposed Development** (EIA Report Volume 2);
- **Chapter 5: Construction Programme and Management** (EIA Report Volume 2);
- **Appendix 12A: WFD Assessment** (EIA Report Volume 4);
- **Appendix 13C: Den of Boddam Burn Feasibility Study** EIA Report Volume 4);
- **Figure 3.1: Proposed Development Site Boundary** (EIA Report Volume 3);
- **Figure 3.3: Proposed Development Site Indicative Layout** (EIA Report Volume 3);
- **Figure 4.1: Indicative Proposed Development Site Layout – Option 1** (EIA Report Volume 3);
- **Figure 4.6: Den of Boddam Burn Diversion** (EIA Report Volume 3); and
- **Figure 12.1: Water Features and their Attributes** (EIA Report Volume 3).

Desk Study

12.3.3.3. Desk based research has been undertaken to identify the waterbodies within and adjacent to the Proposed Development Site, and to gather and critically evaluate relevant data and information on their condition and attributes.

12.3.3.4. In summary, the key background reports, websites and data used include the following (all web sources last accessed in December 2021):

- British Geological Survey's (BGS) Geological Mapping Viewer 'Geoindex' website;
- UK Centre for Ecology and Hydrology website;
- Centre for Ecology and Hydrology (CEH)'s National River Flow Archive website;
- SEPA Environment Hub Map;
- SEPA Scotland's Environment Web Map;
- Met Office's online climate averages data;
- Defra's Multi-Agency Geographic Information for the Countryside (MAGIC) website;
- Online Ordnance Survey (OS) maps and aerial photography; and
- Information available through previous applications associated with the operation and maintenance of the Peterhead 1 Power Station intake and outfall (e.g. CAR license documents).

12.3.3.5. Data were requested from SEPA about water quality of receptors in the study area, water resources (licensed abstractions and discharge consents), pollution incidents, fisheries and aquatic ecology data and WFD information and data. No response had been received at the time of writing, and this is understood to be related to difficulties following a cyber-attack in December 2021. Data have also been requested and received with regard to Private Water Supplies from Aberdeenshire Council.

Site Surveys

12.3.3.6. A site walkover was undertaken on 17 August 2021 by a water scientist and hydromorphologist in wet and windy conditions following a week of dry weather. The walkover focused on surface waterbodies in the study area, observing their current character and condition, the presence of existing risks (including a large scale electrical sub-station development in the catchment at Millbank, see Section 12.4) and any potential pathways for construction, operational and decommissioning impacts from the Proposed Development.

Source-Pathway-Receptor Approach

12.3.3.7. The impact assessment is based on a source-pathway-receptor approach. For an impact on the water environment to occur the following is required:

- An impact source (such as the release of polluting chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or the loss or damage to all or part of a waterbody);
- A receptor that is sensitive to that impact (i.e. waterbodies and the services they support); and
- A pathway or pathways by which the two are linked.

12.3.3.8. The first stage in applying the source-pathway-receptor model is to identify the potential causes or 'sources' of impact from a development. The sources have been identified through a review of the details of the Proposed Development, including the size and nature of the development, potential construction methodologies and timescales. The next step in the model is to undertake a review of the potential receptors, that is, the water environment receptors that have the potential to be affected. Waterbodies and their attributes have been identified through

desk study and site surveys. The last stage of the model is, therefore, to determine if there is a viable exposure pathway or a 'mechanism' linking the source to the receptor. This has been undertaken in the context of local conditions relative to the water receptors within the study area, such as topography, geology, climatic conditions and the nature of the impact (e.g. the mobility of a liquid pollutant or the proximity to works that may physically impact a waterbody).

12.3.3.9. The assessment of the likely significant effects is qualitative, and considers construction, operational and decommissioning phases, as well as cumulative effects with other developments. This assessment has considered the risk of pollution to surface waterbodies directly and indirectly from construction activities, particularly in relation to those water features which are within or close to the Proposed Development Site. The risk of pollution from urban runoff and the increased demand on water resources has also been considered so that appropriate measures (e.g. SuDS, proprietary treatment devices, and water conservation measures) can be incorporated into the design of the Proposed Development.

12.3.3.10. Some specific assessments have been undertaken to support this impact assessment process. These are described in more detail in the following sections.

Assessment of Surface Water Runoff and Chemical Spillages for the Operational Phase

12.3.3.11. During operation, surface water runoff from the Proposed Development may contain pollutants derived from urban surfaces (e.g. inert particulates, hydrocarbons, metals, nutrients and de-icing salts). This mixture of pollutants is collectively known as 'urban diffuse pollutants,' and although each pollutant may itself not be present in harmful concentrations, the combined effects over the long term can cause chronic adverse impacts. Changes in impermeable surfaced area within the Proposed Development Site may lead to increases in the rate and quantities of these pollutants entering receiving watercourses. An assessment is therefore needed to determine the potential risk to the receiving watercourses and to inform the development of suitable treatment measures. Furthermore, there is potential for spillages of chemicals used on site which could have a significant adverse impact on the receiving water environment if adequate mitigation was not in place.

12.3.3.12. The appropriateness of the surface water drainage measures in terms of providing adequate treatment of diffuse pollutants has been assessed with reference to the Simple Index Assessment method described in the SuDS Manual (CIRIA, 2015a). The Simple Index Approach follows three steps:

- Step 1 – Determine suitable pollution hazard indices for the land use(s);
- Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index (for three key types of pollutants - total suspended solids, heavy metals and hydrocarbons). Only 50% efficiency should be applied to second, third etc. treatment train components; and
- Step 3 – If the discharge is to a waterbody protected for drinking water, consider a more precautionary approach.

12.3.3.13. The SuDS Manual and associated Simple Index Approach (SIA) tool only provides a limited number of land use types so these have been chosen carefully to represent the most suitable components of the Proposed Development. Where more than one pollution hazard category applies to a component of the Proposed Development, the worst pollution hazard has been selected. For areas where there is a greater risk of a chemical spillage, a process specific risk assessment may be required, for example, to inform the CAR Permit application.

Water Framework Directive Assessment

12.3.3.14. SEPA is the competent authority for implementing the WFD in Scotland, although many objectives will be delivered in partnership with other relevant public bodies and private organisations (e.g. local planning authorities, water companies, Rivers Trusts, large private landowners and developers). The Water Environment (Controlled Activities) (Scotland) Regulations as amended 2013, and more commonly known as the Controlled Activity Regulations (CAR), apply regulatory controls over activities which may affect Scotland's water environment. As part of its regulatory role and as a statutory consultee on planning applications and environmental permitting, SEPA must consider whether proposals for new developments have the potential to:

- Cause a deterioration of a waterbody from its current status or potential; and/or
- Prevent future attainment of good status or potential where not already achieved.

12.3.3.15. In determining whether or not a development is compliant or not compliant with the WFD objectives for a waterbody, the SEPA must also consider the conservation objectives of any Protected Areas (i.e. Natura 2000 sites or water dependent Sites of Special Scientific Interest) and adjacent WFD waterbodies, where relevant.

12.3.3.16. Based on these requirements a qualitative assessment of the compliance of the Proposed Development against the WFD objectives for those WFD waterbodies that could be affected has been undertaken. This includes the assessment of the potential construction/decommissioning (where they are of sufficient scale and duration that they may affect status) and operational phase impacts of the Proposed Development on hydromorphological, biological and physico-chemical parameters with respect to the WFD objectives of no deterioration and failure to prevent improvement. The assessment considers proposed mitigation measures where the waterbody is not at Good Ecological Status/Potential or better, the objectives of relevant Protected Areas designated under other EU Directives, and adjacent WFD waterbodies. Refer to **Appendix 12A** (EIA Report Volume 4).

Cooling Water System Discharge Assessment

12.3.3.17. The Proposed Development Site will require a source of cooling water for heat rejection purposes. The cooling water system (CWS) proposes to maintain the current seawater abstraction from Boddam Harbour (currently licensed up to 2,436.48 Ml/day) and discharge pipeline to Sandford Bay (currently licensed up to 2,568 Ml/day).

12.3.3.18. At this early stage in the design and development process, there are limitations to the level of detail available regarding the cooling water demand of the Proposed Development and associated return discharge. As such, only a qualitative appraisal of the CWS discharge to the coastal Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody has been undertaken in this chapter, giving consideration to both potential thermal impacts and chemical pollutants, should any be entrained in the discharge.

Classification of Effect and Significance Criteria for EIA Assessment

12.3.3.19. The classification and significance of effects has been determined using the principles of the guidance and the criteria set out in Design Manual for Roads and Bridges (DMRB) LA 113 (National Highways, 2020) adapted to take account of hydromorphology and navigation. This guidance is also applicable in Scotland, with a specific Scotland National Application Annex included within the document. Although these assessment criteria were primarily developed for road infrastructure projects, they are suitable for any development project and provide a robust and well tested method for assessing the likely significance of effects.

12.3.3.20. Approaches to mitigating potential significant effects during construction and operational phases have been described with reference to good practice guidance and design.

12.3.3.21. Following the DMRB LA 113 (National Highways, 2020) guidance, the importance of the receptor (Table 12.2) and the magnitude of impact (Table 12.3) are determined and then used to determine the overall classification of effects (see Table 12.4). Where significant adverse effects are predicted, options for mitigation have been considered and proposed where reasonably practicable. The residual effects of the Proposed Development with identified mitigation in place have then been assessed.

12.3.3.22. Whilst other disciplines may consider 'receptor sensitivity', 'receptor importance' is considered here, see Table 12.2. This is because when considering the water environment, the availability of dilution means that there can be a difference in the sensitivity and importance of a waterbody. For example, a small drainage ditch of low importance due to its low conservation value and biodiversity and limited other socio-economic attributes, may be very sensitive to smaller impacts, so just considering sensitivity would most likely overstate the potential effects. Conversely an important regional scale watercourse, that may have conservation interest of international and national significance and support a wider range of important socio-economic uses, may be less sensitive by virtue of its ability to assimilate discharges and physical effects. Irrespective of importance, all controlled waters in Scotland are protected by law from being polluted and the sensitivity of the receptor is considered when making decisions about the magnitude of the impact.

Table 12-2: Criteria to determine receptor importance

Importance	Surface Water[1]	Morphology[2]	Groundwater resources
Very High	Watercourse having a WFD classification shown in a RBMP and Q95≥1.0m^3/s. Sites protected/designated under Scottish legislation (SAC, SPA, SSSI, Ramsar, salmonid water).	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river type.	Very high productivity aquifer of WFD good groundwater quality and quantity status. Provides a regionally important resource and/or supporting a site protected under UK legislation. Water abstraction >1000m^3/day. Groundwater locally supports Groundwater Dependent Terrestrial Ecosystems (GWDTE).
High	Watercourse having a WFD classification shown in a RBMP and Q95<1.0m^3/s. Species protected under UK legislation.	Conforms closely to natural, unaltered state and would often exhibit well-developed and diverse geomorphic forms and processes characteristic of river type, with abundant bank side vegetation. Deviates from	Groundwater aquifer(s) with very high productivity or WFD good groundwater quality and quantity status. Exploitation of groundwater resource is not extensive (i.e. private

Importance	Surface Water[1]	Morphology[2]	Groundwater resources
		natural conditions due to direct and/or indirect channel, floodplain, and/or catchment development pressures.	domestic and/ or agricultural supply feeding less than ten properties). Groundwater supports a GWDTE.
Medium	Watercourses not having a WFD classification shown in a RBMP and Q95 >0.001m^3/s.	Shows signs of previous alteration and / or minor flow regulation but still retains some natural features or may be recovering towards conditions indicative of the higher category.	Groundwater aquifer(s) with low productivity or WFD variable groundwater quality and quantity status. No current known exploitation of groundwater as a resource and aquifer(s) properties make potential exploitation appear unlikely. No currently known local areas of nature conservation known to be sensitive to groundwater impacts.
Low	Watercourses not having a WFD classification shown in a RBMP and Q95 <0.001m^3/s.	Substantially modified by past land use, previous engineering works or flow regulation and likely to possess an artificial cross-section (e.g. trapezoidal) and would probably be deficient in bedforms and bankside vegetation. Could be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains	Groundwater aquifer(s) with very low productivity or WFD poor groundwater quality and quantity status. No known past or present exploitation of groundwater aquifer(s) as a resource. Limited economic or social uses. GWDTE with minimal dependency on groundwater i.e. fed by rain and natural surface drainage.

Importance	Surface Water[1]	Morphology[2]	Groundwater resources
		and ditches would fall into this category.	

[1]Professional judgement is applied when assigning an importance category to all water features. All controlled waters are protected from pollution under the Environmental Permitting (England and Wales) Regulations 2016 and the Water Resources Act 1991 (as amended), and future WFD targets also need to be considered.

[2]Based on the waterbody 'Reach Conservation Status' presently being adopted for the High Speed 2 project (developed originally by Atkins) and developed from EA conservation status guidance (Environment Agency 1998a, Environment Agency, 1998b) as DMRB guidance does not currently provide any importance criteria for morphology.

12.3.3.23. The magnitude of impact is determined based on the criteria in Table 12-3 and also considering the likelihood of the effect occurring. The likelihood of an impact occurring is based on a scale of certain, likely or unlikely.

Table 12-3: Evaluating Magnitude for Surface Water, Groundwater, and Water Resources

Impact	Criteria	Description and Examples
Major Adverse	Results in a loss of attribute and/ or quality and integrity of the attribute	*Surface Water*: Loss or extensive change to a fishery (freshwater, estuarine or salt water). Loss of regionally important public water supply. Loss or extensive change to a designated Nature Conservation Site. Reduction in waterbody WFD classification *Groundwater*: Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Loss of, or extensive change to GWDTE or baseflow contribution to protected surface waterbodies. Reduction in waterbody WFD classification. Loss or significant damage to major structures through subsidence or similar effects.
Moderate Adverse	Results in effect on integrity of attribute, or loss of part of attribute	*Surface Water*: Partial loss in productivity of a fishery. Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Contribution to reduction in waterbody WFD classification. *Groundwater:* Partial loss or change to an aquifer. Degradation or regionally important public water supply or loss of significant commercial/ industrial/ agricultural supplies.

Impact	Criteria	Description and Examples
		Partial loss of the integrity of GWDTE. Contribution to reduction in waterbody WFD classification. Damage to major structures through subsidence or similar effects or loss of minor structures.
Minor Adverse	Results in some measurable change in attribute's quality or vulnerability	*Surface Water*: Minor effects of water supplies. *Groundwater*: Minor effects on an aquifer, GWDTEs, abstractions and structures.
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	No risk identified to surface water quality, hydromorphology or groundwater
Minor Beneficial	Results in some beneficial impact on attribute or a reduced risk of negative effect occurring	*Surface Water & Groundwater*: Contribution to minor improvement in water quality, but insufficient to raise WFD classification.
Moderate beneficial	Results in moderate improvement of attribute quality	*Surface Water*: Contribution to improvement in waterbody WFD classification. *Groundwater*: Contribution in improvement in waterbody WFD classification. Improvement in waterbody catchment abstraction management strategy (CAMS) (or equivalent) classification. Support to significant improvements in damaged GWDTE.
Major beneficial	Results in major improvement of attribute quality	*Surface Water*: Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring to a watercourse. Improvement in waterbody WFD classification. *Groundwater*: Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Increased recharge to an aquifer. Improvement in waterbody WFD classification.
No change		No loss or alteration of characteristics, features, or elements; no observable impact in either direction.

12.3.3.24. Once the magnitude of impact and the receptor importance have been defined, the classification and significance of the potential effect can be derived by combining both assessments in a simple matrix as shown in Table 12-4. Effects classed as moderate or greater are considered significant in EIA terms (i.e. shaded cells). Where there is a range of effects (e.g. large/ very large) professional judgement has been used to determine the residual effect.

Table 12-4: Classification and Significance of Effect

Magnitude of Impact	Importance of Attribute			
	Very High	**High**	**Medium**	**Low**
Major	Very Large	Large / Very Large	Moderate / Large	Slight / Moderate
Moderate	Large / Very Large	Moderate / Large	Moderate	Slight
Minor	Moderate / Large	Slight / Moderate	Slight	Neutral / Slight
Negligible	Slight	Slight	Neutral / Slight	Neutral / Slight
No change	Neutral	Neutral	Neutral	Neutral

Note: adapted from DMRB LA104 (National Highways, 2020)

12.3.4 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

12.3.4.1. The following are the reasonable worst-case scenario assumptions (maximum parameters) used in the Water Environment assessment, as well as the limitations identified:

- The assessment has been undertaken using available data and Proposed Development design details at the time of writing in December 2021. It is also based on understanding of flow pathways as observed during the site walkover and based on existing site operations. Assumptions have been made regarding flow pathways for culverted sections of the Den of Boddam Burn, based on Ordnance Survey mapping. Understanding of flow pathways is described in the baseline (Section 12.4).
- The existing Peterhead Power Station abstraction intake at Boddam Harbour will be used for the Proposed Development unchanged, given that the abstraction volume will not exceed that of the existing PPC Permit (2,436.48 Ml/day). Consultation will continue with SEPA to confirm the parameters of any abstraction/ discharge.
- The assessment assumes that prior to discharge to Sandford Bay, effluent treatment facilities will be provided on site for treatment of contaminants in the direct contact cooler (DCC) blowdown, demineralisation plant and condensate polishing plant regeneration wastewater, Heat Recovery Steam Generator (HRSG) boiler blowdown and reject water (brine) from the desalination process.
- It is assumed that wastewater from the cooling process will be discharged to Sandford Bay following treatment at a rate compliant with the discharge limits set by SEPA within the existing PPC Permit. It is anticipated that the rate of discharge from the Proposed Development will be 28m^3/s at peak (including wastewater and cooling water). This rate comprises overall discharge for the Proposed Development in combination with the existing Peterhead Power Station which may continue to operate in a reduced capacity in parallel with the Proposed Development. It is expected that the peak discharge would only occur intermittently

- It is assumed that no direct works are required to the existing abstraction and discharge infrastructure within Boddam Harbour and Sandford Bay, respectively.
- Water supply for use on site for all activities with the exception of cooling water and process water (i.e. make-up to the steam/water cycle of the Proposed Development) will be supplied by Scottish Water via the existing water supply serving Peterhead Power Station.
- Foul water from welfare facilities will be treated on site using a package treatment plant (PTP) and discharged to Sandford Bay via the existing Peterhead Power Station outfall, in accordance with current site practices and conditions.
- Surface water drainage from the Proposed Development will be discharged to Sandford Bay via the existing outfall. It is assumed, as indicated in the SuDS strategy, that pollution prevention measures will include a combination of filter drains, oil interceptors and a "QuadraCeptor" – a filtration system for removal of sediment and pollutants. Bunds will be used in areas where spillages are likely to occur. Further details are provided within the SuDS Strategy (**Appendix 13B** EIA Report Volume 4).
- A fire water drainage strategy will be developed through the PPC Permit to ensure that should an incident occur, contaminated fire water would not enter the surface water drainage system or process water system, but rather be retained on-Site for a period before being disposed of safely.
- Due to the proposed volumes associated with the cooling water discharge and the minimal anticipated thermal uplift (both within the existing permit limits), a qualitative assessment of potential impacts to Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody) has been undertaken. Further assessment of effluent quality and concentrations will be considered as part of the PPC Permit application.
- As an Engineering, Procurement and Construction (EPC) contractor has not yet been appointed, construction method statements are not available at this time, and therefore reasonable assumptions have been made that all works will take place in line with best practice. Such measures are set out in the Framework CEMP (**Appendix 5A** EIA Report Volume 4).
- No water quality monitoring has been undertaken specifically to inform this assessment. Background water quality has been determined from the nearest data available from SEPA.
- The expected treatment performance of different SuDS options is based on advice reported in CIRIA C753 - The SuDS Manual (CIRIA, 2016) using the Simple Index Approach. Professional judgement has been used when deciding the example land use used, and what treatment a particular option may provide, taking into account the design of the SuDS feature and whether it is considered to be 'optimum' or 'sub-optimum' for the Proposed Development.

12.4. BASELINE CONDITIONS

12.4.1 INTRODUCTION

12.4.1.1. The relevant baseline physical characteristics of the study area and the water features present are described in this section and with reference to **Figure 12-1: Water Features and Attributes** (EIA Report Volume 3).

12.4.2 LAND USE, TOPOGRAPHY AND RAINFALL

12.4.2.1. The Proposed Development and the 1km study area surrounding this lies on the on the coast of Aberdeenshire, south of Peterhead. The topography of the area is generally characterised by

gently sloping terrain from the west towards the coast at Sandford Bay, immediately east of the Proposed Development. The maximum elevation within the study area is close to 75m above ordnance datum (AOD) at the southern extent of the study area at Stirling Hill and similarly around 75m AOD to the southwest of the study area at Sandfordhill. The elevation declines towards the sea, with a marked step comprising a raised beach at the coastline, and the Proposed Development is situated between 10 and 40m AOD. The existing site topography has seen a considerable amount of material movement associated with previous developments within the Peterhead site. These are notably two existing mounds – to the south bordering Boddam and to the north west – which has created varying elevations across the site. There is a gentle valley around the Den of Boddam Burn watercourse which flows from the southwest of the study area to the northeast, although this is largely in culvert beneath the power station.

12.4.2.2. The land use within the study area is varied. The Proposed Development Site itself generally consists of the existing Peterhead Power Station and the existing Scottish and Southern Electricity Networks (SSEN) 275kV Substation directly to the west of the A90. Beyond the current Peterhead Power Station Site, land uses are predominantly arable to the west, interspersed with small patches of woodland, with the urban fringe of the town of Peterhead to the north and the village of Boddam to the south. At the south of the study area there are several disused quarrying sites, including Boddam quarry and Stirling Hill granite quarry. The northern extent of the study area includes the Upperton Industrial Estate and Peterhead Prison. To the east is Sandford Bay and bordering beaches and coastline, including the Buchan Ness promontory and The Skerry island.

12.4.2.3. The nearest weather monitoring station on the MET Office website (MET Office, 2021) is at Fraserburgh which lies approximately 30 km to the north of the Proposed Development. Based on the available data from this weather station (1981-2010), it is estimated that the study area is likely to receive an average of 747.7 mm of rainfall per year, with it raining (greater or equal to 1 mm of rain) on approximately 146.4 days per year. This suggests that rainfall in the area is below average for the UK. Rainfall is highest from the end of Autumn to Winter (October through to February), with it generally peaking in October, and with the least rainfall falling in June, on average (see Plate 12.1).

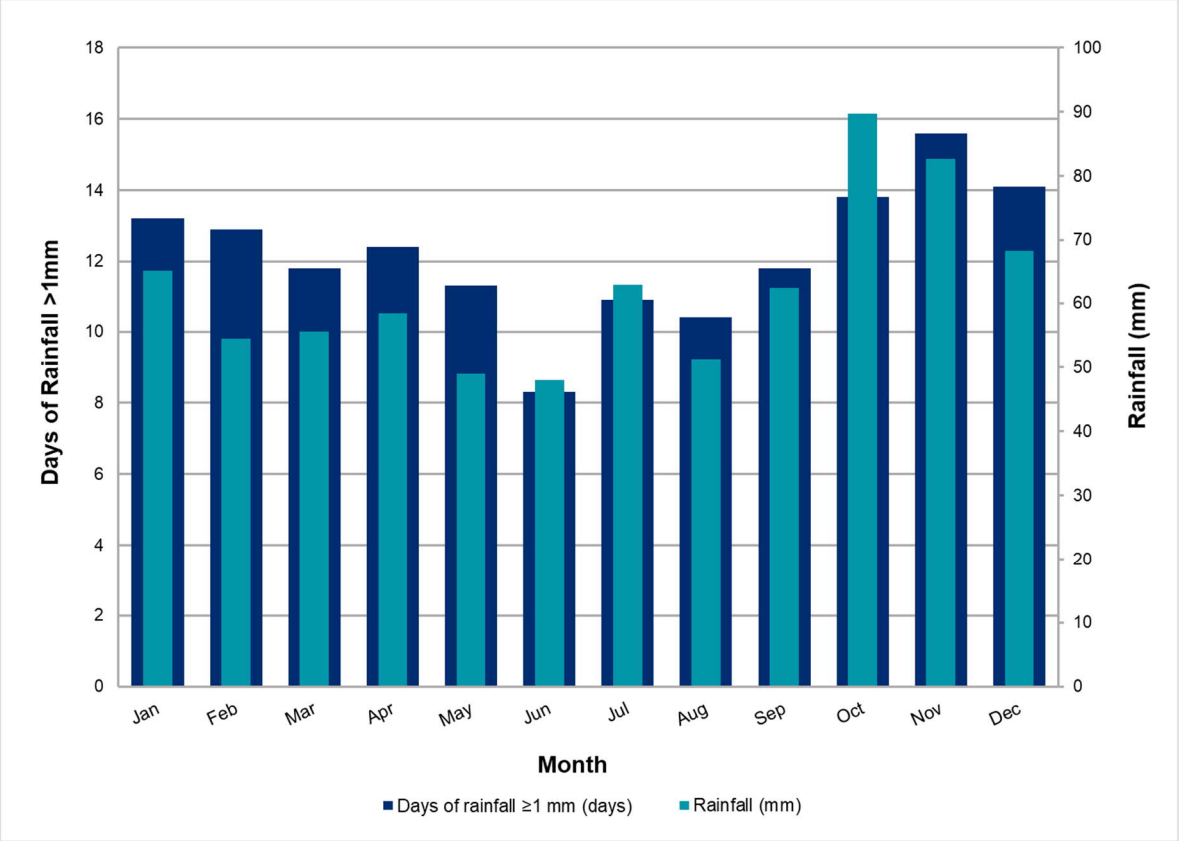

Plate 12-1: Fraserburgh weather station: monthly rainfall and days of rainfall >1mm (source: Met office website)

12.4.3 GEOLOGY, GROUNDWATER FEATURES AND SOILS

12.4.3.1. The British Geological Society (BGS) Geoindex viewer (BGS, 2021) indicates that most of the study area is underlain by bedrock of Peterhead Pluton Granite. There are very small patches of North Britain Siluro-devonian Calc-alkaline Dyke Suite – Felsite at Buchan Ness and east of Invernettie, North Britain Late Carboniferous Tholeiitic Suite - Quartz-microgabbro immediately south of Boddam, and bands of North Britain Siluro-devonian Calc-alkaline Dyke Suite – Lamprophyre at Invernettie.

12.4.3.2. The superficial deposits that overly this bedrock are primarily composed of five units. The first is the Hatton Till Formation (diamicton, clay, sand and gravel) which lies under Stirling and Boddam and stretches north through to Peterhead. The second are the coastal Marine Beach deposits (gravel, sand and silt) surrounding Sandford Bay. There is a small, isolated area of Glaciofluvial Ice Contact deposits – (gravel, sand and silt) located at the western boundary of the study area to the west of Saddle Hill and a small, isolated band of Blown Sand that lies to the east of the beach of Sandford Bay, near Newmill of Sandford. The Proposed Development is wholly underlain by the Hatton Till Formation.

12.4.3.3. SEPA's Scotland Environment Map website (SEPA, 2021) indicates that the bedrock beneath the Proposed Development Site is classified as a 2C 'low productivity aquifer'. The flow mechanism is virtually all through fractures and other discontinuities. There may be small amounts of groundwater in the near surface weathered zone and secondary fractures, and rare springs.

12.4.3.4. Publicly available borehole logs refer to investigations undertaken before the construction of Peterhead Power Station. This included major earthworks and landscaping which have altered the topography and the geological succession of the Proposed Development Site. More recent ground investigations have confirmed the following ground conditions:

- The main buildings area (north-eastern portion of the site) was confirmed to be generally underlain by Made Ground recorded up to a depth of 4m. Superficial deposits were also encountered across the area. They comprised soft to stiff, orange brown, gravelly clay with occasional cobbles and boulders of granite, and occasionally orange brown sand and gravel layers. Weathered pink granite bedrock was encountered at depths as shallow as 1.5 metres below ground level (m bgl);
- The former HFO tanks area was shown to be underlain by up to 2m Made Ground, which in turn was underlain directly by weathered granite; and
- The unused area north-west and west of the Proposed Development Site was underlain by Made Ground in the form of an earthworks stockpile (most likely deriving from the Power Station construction excavations and of a thickness reaching approximately 10m), generally overlying glacial till (up to more than 25m thickness) with occasional sand lenses. Granite was encountered below the glacial till. The extent of Made Ground/reworked material to the south of the existing Power Station is unknown as no ground investigations have targeted this area.

12.4.3.5. The British Geological Society Geoindex website (BGS, 2021) includes numerous historical borehole scans from the Proposed Development Site and indicates groundwater levels to be variable and discontinuous across the site. Groundwater was generally not encountered in boreholes to the south and east of the Proposed Development Site in boreholes of up to 16m depth, whereas in the centre of the Proposed Development Site and toward the coast there were several strikes in the range of 0.45-11 m (e.g. historic boreholes K14SW1017/LB4 and NK14SW1017/LB9 from 1972), however the majority were dry. At the coastal margin at the east of the Proposed Development Site a strike of 2.3 m in borehole NK14SW1017/A8. The borehole log suggests the latter could be of tidal origin.

12.4.3.6. The publicly available borehole logs refer to investigations undertaken before the construction of the Power Station. During the ground investigations carried out after the Power Station construction, groundwater was indicated to be discontinuous, and encountered at highly variable depths, mostly within the superficial deposits. Previous investigations also suggest the presence of an upper and lower aquifer (see **Chapter 14: Ground Conditions** (EIA Report Volume 2) for further details).

12.4.3.7. According to the SEPA (2021) Water Environment Hub Map, the Proposed Development Site and wider study area are underlain by the Peterhead WFD groundwater body (ID 150630). The groundwater body has a surface area of approximately 186 km^2 and is currently at Good Overall Status (including for qualitative and quantitative elements) and has been since 2014.

12.4.3.8. Information obtained from the SEPA (2021) Water Environment Hub Map describes the broad soil types on the Proposed Development as Mineral gleys which is a non-calcareous gley drift derived from Old Red Sandstone sediments with igneous and metamorphic rocks and conglomerate cobbles. This typically forms undulating lowlands with gentle slopes. To the south of the study area, the soil transitions to mineral podzols which are derived from granites and granitic rocks that produce undulating lowlands and hills.

12.4.3.9. Further details are available from the Soil Map of Scotland (1:25,000) which indicates that the majority of the site lies on ‘imperfectly drained brown soils’. There are also soils classified as ‘mixed bottom land’, composed of a wide range of soil types, including immature soils and

alluvial soils. These are shown around the 'Den of Boddam Burn' surface watercourse. In addition, 'poorly drained non-calcareous gleys' are mapped in the north and north-west of the site. The same units can be found in the surrounding area of the site (non-calcareous gleys to the north and west, brown soils to the south). Alluvial soils of undifferentiated texture and drainage are also mapped adjacent to the south-western boundary of the site. Refer to **Chapter 14: Ground Conditions** (EIA Report Volume 2) for further details.

12.4.3.10. The entire study area is in a Drinking Water Protected Area for groundwater. No groundwater abstraction licences have been identified within the study area. A request to SEPA has been made to confirm this in July 2021; however, no response had been received at the time of writing (December 2021).

12.4.3.11. One private water supply (PWS) abstraction has been identified from a data request to Aberdeenshire Council. This is located between Saddle Hill and the Proposed Development at National Grid Reference (NGR) NK 11562 42541. This is scoped out of further assessment because it is upslope and up catchment from the Proposed Development and so could not be impacted.

12.4.4 SURFACE WATER FEATURES

12.4.4.1. A site walkover undertaken on 17 August 2021, and observations from this visit as well as data from the SEPA Water Environment Hub (SEPA, 2021), OS Maps (Bing, 2021) and Google Earth (Google, 2021) were used to identify water features within the study area, and these are shown in Table 12.5 and in **Figure 12-1: Water Features and their Attributes** (EIA Report Volume 3).

12.4.4.2. The Proposed Development Site is located between two WFD river catchments, the 'River Ugie North/South confl to tidal limit' (ID23215) approximately 4km north and Slains Burn (ID: 23199) approximately 6km south. However, all watercourses within the study area drain directly to the coast and so discharge directly into the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody (ID: 200131) and Buchan Ness to Cruden Bay Coastal WFD waterbody (ID: 200125).

12.4.4.3. The surface watercourses that have been identified in the study area are listed in Table 12.5 and shown in Figure 12.1:

Table 12-5: Surface Waterbodies

Waterbody	Type of Waterbody	WFD Designation or Associated WFD waterbody (where applicable)
Sandford Bay	Coastal	Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody (ID: 200131) and Buchan Ness to Cruden Bay Coastal WFD waterbody (ID: 200125)
Invernettie Burn	Fluvial watercourse	Discharges to Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody (ID: 200131)
Den of Boddam Burn	Fluvial watercourse	Discharges to Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody (ID: 200131)
Drains and Ditches	Fluvial watercourses	Drains and ditches generally flow into the Den of Boddam Burn or Invernettie Burn, which

Waterbody	Type of Waterbody	WFD Designation or Associated WFD waterbody (where applicable)
		discharge to Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody (ID: 200131).
Various ponds	Stillwaters, but in some cases ponds are on-line with the Den of Boddam Burn	Ponds are within the catchments of the Den of Boddam Burn and Invernettie Burn, which discharge to Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody (ID: 200131).

12.4.4.4. There are two WFD designated waterbodies within the study area, both of which are coastal. Further details are given in Table 12.6.

Table 12-6: WFD Waterbodies

Waterbody	Ecological Status / Potential	Overall Target Objective	Hydromorphological Designation	Designated Reach
Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody (ID: 200131)	Good	Good	Heavily modified - on account of physical alterations that cannot be addressed without a significant impact on navigation	This coastal waterbody is 46.3 km^2 and is designated from Buchanhaven to the northern extent of Peterhead and continues south to Buchan Ness.
Further details: The coastline in the study area around the existing Peterhead Power Station bordering this waterbody is lined with coastal defence boulders, and there is a large concrete structure at NGR NK 12766 43349 which is the existing discharge point. There is a harbour to the south of the study area at Boddam, where the existing abstraction point for the Peterhead Power Station is located. The coastal margin of this waterbody is largely industrial in nature supporting Peterhead Port within Peterhead Bay, which is one of the busiest fishing ports in the UK. Peterhead Bay also includes a small marina, Peterhead Sailing Club and a small sandy beach. Here there are two large breakwaters extending into the bay, the northern breakwater being 822m in length and the southern breakwater 457m. They enclose an area of 1.2 km^2 in Peterhead Bay. The coast is relatively rugged north of Peterhead Bay as the coast extends to Buchanhaven. There is a wastewater treatment works (WwTW) at the northern margin of Sandford Bay which is assumed to discharge to this waterbody.				
Buchan Ness to Cruden Bay Coastal WFD waterbody (ID: 200125)	High	High	Not designated as heavily modified.	This coastal waterbody is 57.7 km^2 and is designated from Buchan Ness to the north, extending south to the northern extent of Cruden Bay.
Further details: The coastline bordering this waterbody is far less industrialised than the neighbouring Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody. This waterbody overlaps partially with the southeastern extent of the study area where the shoreline is characterised by the rocky and rugged coastal features of Inch Biggle and Thief's Loup along with several cave features. The adjacent land use is predominantly agricultural.				

12.4.4.5. Further details on the additional surface water features identified in the study area are provided below:

- **Invernettie Burn** – this watercourse is situated around 350m north of the Proposed Development Site at its closest. It has a total length of approximately 5.2 km. The watercourse appears to rise as two separate arms to the west of the Proposed Development at Redleas (NGR NK 08744 42935) and at Grange Moss close to Westerton of Auchtygall (NGR NK 09131 43790). These two streams flow in an easterly direction to combine as Invernettie Burn at Auchtygall (NK 10310 43792). The watercourse then continues to flow in an easterly direction towards south Peterhead, partially in culvert beneath several roads including the A982, and discharges to Sandford Bay to the west of the WwTW at NK 12557 44035. There is not considered to be any potential connectivity between the Proposed Development and Invernettie Burn and so it was not visited for further survey during the site walkover.
- **Den of Boddam Burn** – this watercourse flows from south west to north east for about 3km before it reaches the boundary of the existing Peterhead Power Station site, which it flows beneath largely in culvert (indicative route shown in **Figure 12.1** (EIA Report Volume 3)). The watercourse is a former glacial meltwater channel rising to the south of Wellsforest Farm (NK 10081 40979). It then flows east towards Sandfordhill passing by a series of ponds at The Den, one of which is the Den Dam (an old mill reservoir now used recreationally for toy yachts) which is immediately southwest of the study area. Here the watercourse was around 0.5 m width when visited on site. It has been extensively modified in the past but does have some gravels on the bed. The watercourse then flows in a northeastern direction towards the Proposed Development Site. At Millbank (site of a former Carding Mill) to the south of the A90 the watercourse enters a culvert and is diverted around the eastern and northern boundary of the Proposed Development Site before flowing into Sandford Bay close to the existing cooling water outfall (NGR NK 12581 43446). Immediately upstream of the culvert the channel is approximately 1.5 m wide with a flow depth during the survey of approximately 0.1 m deep with the substrate consisting of a concrete base with a gravel and cobble overlay and the right bank was formed of a large wall. Along its length, dense vegetation overhung the channel, which in addition to the wall, resulted in heavy shading. There are outfalls adjacent to the A90 which are assumed to carry road runoff into the watercourse. Fine sediment accumulations were more widespread on the bed upstream of the culvert, which has a diameter of approximately 2m. Further details of the watercourse including photographs are provided in **Appendix 13C** (EIA Report Volume 4); and
- There are numerous **ditches and drains** identified using maps/aerial photography within the study area, as outlined in **Figure 12.1** (EIA Report Volume 3). Many of the drains and ditches are agricultural or relate to historical quarrying activity. In general, they are straightened, embanked watercourses, many of which are artificial and may be nutrient enriched due to runoff of fertilisers and other farming products. They are generally expected to have minimal biodiversity value with many likely to be ephemeral (i.e. flowing for only part of the year or only after storms), with few geomorphic bedforms (e.g. riffles and pools). All of these identified features are upstream of the Proposed Development Site, and so none of them are expected to be impacted.
- There is a small agricultural **pond** within the study area at NK 12130 43255 (**Pond 2**) immediately east of the A90, and another agricultural pond located at NK 12229 42862 (**Pond 1**), immediately west of the A90 and immediately adjacent to the Proposed Development boundary. In the wider study area there are larger ponds associated with previous quarrying activity. These are mainly around the southern extent of the study area

close to Stirling Hill. There are also two ornamental ponds associated with Newmill of Sandford to the north of the study area.

Sandford Bay

12.4.4.6. The bay is approximately 1.5 km wide (headland to headland) and consists of a sandy beach with rocky shores on both sides. The bay encloses approximately 1 km^2 of seabed. It is a shallow bay exposed to the North Sea winds and swell from the north east (ASML, 2019). The tidal range along this coast south of Rattray Head is influenced by the tidal regime of the North Sea and has a range at mean spring tide of between 3.5 and 4.0 m (Barne *et al*., 1996).

12.4.4.7. The beach at Sandford Bay is around 140 m in length, with a low gradient and smooth profile. The bay has a boulder shore fronted vertical cliff to the south and a stable, gently sloping central section of fine sediment backing onto an upper foreshore of dry loose sand and flat dune. To the north the bay flattens out into a boulder shoreline known as The Skelly's (Shell and SSEl, 2015).

12.4.4.8. Intertidal surveys in Sandford Bay undertaken to inform a previous Environmental Statement for Peterhead Power Station (Shell and SSEl, 2015) indicated that common rocky shore and sediment biotopes are present. One specialised coralline crust dominated shallow eulittoral rock pool biotope was recorded to the south of the site in the lower shore close to Boddam Harbour, and this biotope has the potential to occur throughout the intertidal zone where suitable bedrock substrate allows. The nationally scarce oysterplant *Mertensia maritima* was recorded in sandy/shingle habitat found from Boddam Harbour along the coastline to Peterhead Power Station. No nationally important biotopes or BAP priority habitats were recorded during the survey.

12.4.4.9. More detailed survey was undertaken between the existing Peterhead Power Station outfall and Sandford Bay. The intertidal area is characterised by low lying rocky shore which is predominantly boulders overlying pebbles and coarse sand; however large areas of bedrock are also present, and these predominate in the southern section of the area surveyed. Three specialised biotopes were recorded during the survey. These included *Corallina officinalis* and coralline crusts in shallow eulittoral rockpools and seaweeds in sediment-floored eulittoral rockpools, which were found within other eulittoral biotopes in the upper and mid-shore throughout the survey area. The third was fucoids and kelp in deep eulittoral rockpools, recorded on lower shore bedrock.

12.4.4.10. SSE Thermal is committed to a triennial monitoring programme of marine impact assessment to Sandford Bay relating to the permitted discharge from the existing Peterhead Power Station. The latest report was published in 2019 (ASML, 2019). The report stated that previous surveys have shown that the power station outfall has had an effect on the intertidal and subtidal fauna and flora in Sandford Bay, though the effects are not large. The data suggest a greater diversity of biotopes than would normally be expected within a bay on the northeast coast of Scotland, a higher abundance and diversity of marine algae, a slight reduction in diversity of some groups of rocky shore animals and the presence of several biotopes that are typical of current swept and scoured conditions. There was no detectable impact from the outfall on *Laminaria* (seaweed) holdfast communities.

12.4.4.11. The SEPA Bathing Waters website (SEPA, 2021) indicates that Sandford Bay itself is not a designated Bathing Water but there is one designation within the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody, which is Peterhead Lido, within Peterhead Bay (NGR NK 12484517). In 2021 this was classified as being at Excellent status. This was maintained from Excellent Status when last recorded in 2018/2019. The closest Bathing Water to the south of

the Proposed Development is at Cruden Bay, over 8km to the south. This Bathing Water was at Good status in in 2018/19, but more recent classifications are not available.

12.4.4.12. There are no designated shellfish waters within Sandford Bay or the wider study area. However, the waterbody is of high importance for navigation with Peterhead Port being the UK's largest white and pelagic fish port. It is also a key base for servicing the offshore oil and gas industry. Peterhead Bay includes a tanker jetty that was designed to deliver fuel to the existing Peterhead Power Station and is also used for the repair of vessels.

12.4.5 SURFACE WATER QUALITY

12.4.5.1. The SEPA data publication website (SEPA, 2021) shows that there is no water quality or sediment data available for Sandford Bay, and none has been provided in response to a freedom of information request (July 2021). There are two data monitoring points north of the study area in Peterhead Bay, but these are not considered representative of the study area given the heavily industrialised and enclosed nature of Peterhead Bay and the port contained within it. However, some monitoring of Sandford Bay has been undertaken by SSE Thermal as part of the PPC authorisation. 2018 data indicated that maximum recorded temperature in Sandford Bay was 12.9ºC, compared to 21.53ºC in 2013. The cooling water outfall was not operational in 2018 which accounts for this difference. Salinities were comparable to previous surveys, in the range 33.6-34.7‰ (AMSL, 2018)

12.4.5.2. Analysis of nine water samples indicated that ammoniacal nitrogen was in the range 0.011-0.03 mg/l, pH varied from 7.72 to 7.89 (circum-neutral) and total suspended solids were in the range 3.6-5.6 mg/l. The report concluded that as with previous surveys, there was no detection of chemical contamination for the parameters analysed (AMSL, 2018).

12.4.5.3. The Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody had a Water Quality condition of Good in 2018 according to the SEPA Scotland's Environment website (SEPA, 2021). The SEPA Water Classification Hub gives more detailed breakdown of water quality and ecological status for certain elements:

- Overall ecology: Moderate status (2019 data);
- Physico-chemical elements: High status (2012 data);
- Dissolved oxygen: High status (2012 data);
- Dissolved inorganic oxygen: High status (2012 data);
- Biological elements: Good status (2019 data);
- Invertebrate animals: Good status (2019 data);
- Imposex assessment: Good status (2019 data);
- Benthic invertebrates: High status (2019 data);
- Macroalgae: High status (2019 data);
- Phytoplankton: High status (2019 data);
- Specific pollutants: Pass (2012 data); and
- Unionised ammonia: Pass (2012 data).

12.4.5.4. The Buchan Ness to Cruden Bay Coastal WFD waterbody had a Water Quality condition of High in 2018 (SEPA, 2021). The SEPA Water Classification Hub gives more detailed breakdown of water quality and ecological status for certain elements:

- Overall ecology: High status (2019 data);
- Physico-chemical elements: High status (2019 data);
- Dissolved oxygen: High status (2012 data);

- Dissolved inorganic oxygen: High status (2012 data);
- Biological elements: Good status (2019 data);
- Invertebrate animals: Good status (2019 data);
- Benthic invertebrates: High status (2019 data);
- Macroalgae: High status (2019 data);
- Phytoplankton: High status (2019 data);
- Specific pollutants: Pass (2012 data); and
- Unionised ammonia: Pass (2012 data).

12.4.5.5. The Den of Boddam Burn is not monitored for water quality by SEPA. There appear to be water monitoring points along Invernettie Burn according to SEPA Scotland's Environment Map website (SEPA, 2021), but the data are not accessible to view. Water quality data was requested from SEPA, but none had been provided at the time of writing (December 2021). The nearest fluvial watercourses are the River Ugie North/South confl to tidal limit watercourse and Slains Burn.

12.4.5.6. The River Ugie - North/South confl to tidal limit waterbody has an overall Ecological Status of Poor due to a failing fish status and fish barrier status. However, all physico-chemical and chemical parameters (including priority substances and specific pollutants) are at Good status or higher as assessed in 2019 (SEPA, 2021).

12.4.5.7. Slains Burn waterbody has an overall Ecological Status of Moderate due to its Bad morphological status. However, all physico-chemical parameters (last assessed in 2019) and chemical parameters (specific pollutants last assessed in 2011) are at Pass status (SEPA, 2021).

12.4.5.8. In the absence of available long term monitoring data for the Den of Boddam Burn and Invernettie Burn, it is considered likely that the water quality characteristics of these watercourses may be relatively similar to the River Ugie and Slains Burn given its close proximity and similar catchment characteristics, although there may a greater influence of urban pollution pressures on Invernettie Burn due to it passing through the southern fringes of Peterhead.

12.4.5.9. The Proposed Development Site and the study area are located within the Nitrate Vulnerable Zone: 'Aberdeenshire, Banff, Buchan and Moray'. Nitrate Vulnerable Zones are areas designated as being at risk from agricultural nitrate pollution.

12.4.5.10. The Proposed Development Site is not located in a Drinking Water Protected Area for surface water and there are none within 1km of the Proposed Development Site.

12.4.6 AQUATIC ECOLOGY

12.4.6.1. Details regarding aquatic ecology within the study area are provided in **Chapter 11: Biodiversity and Nature Conservation** (EIA Report Volume 2). This includes details on freshwater aquatic ecology surveys. This is also supported by **Appendix 11E: Aquatic Ecology Report** (EIA Report Volume 4)**.** Marine habitats and species have previously been scoped out of scheme specific ecological survey.

12.4.6.2. The Den of Boddam Burn and a small ditch northeast of Sandford Lodge (NGR NK 12371 43512) were surveyed for macroinvertebrates in September 2021. These watercourses both supported a range of common aquatic macroinvertebrates found within minor stream habitats. The biological indices demonstrated that both supported a community of low conservation value with the biological quality considered to be low/moderate. Furthermore, both are mildly

tolerant of suspended sediments but have some sensitivity to reduced flows. A single non-native species was recorded from both sites, the New Zealand pond snail *Potamopyrgus antipodarus*.

12.4.6.3. Macrophytes were absent from both watercourses, and this is likely to be due to heavy shading across both sites. The habitats present were also considered unsuitable to permit spawning migratory fish.

12.4.6.4. Two ponds in the study area were also surveyed. Pond 1 is immediately west of the A90, to the north of the substation within the Proposed Development Site boundary (NK 12229 42862), and Pond 2 (NK 12130 43255) also to the west of the A90 southwest of Sandford Lodge (NK 12130 43255). Pond 1 was dry at the time of the survey and as such will require further survey to assess the value of this habitat. However, it was noted that it was dominated with the non-native New Zealand pigmyweed *Crassula helmsii*. Pond 2 supported a low number of aquatic macroinvertebrate taxa and the community is considered fairly typical for a pond habitat. A single macrophyte was recorded, common duckweed (*Lemna minor*). No non-native species were present.

12.4.6.5. The assessment concluded that the aquatic macroinvertebrate and macrophyte communities are local (site level) nature conservation value. Refer to **Appendix 11E: Aquatic Ecology Report** (EIA Report Volume 4) for full details.

12.4.7 DESIGNATED SITES FOR NATURE CONSERVATION

12.4.7.1. Details regarding sites designated for their nature conservation interest within the study area are provided in **Chapter 11: Biodiversity and Nature Conservation** (EIA Report Volume 2).

12.4.7.2. From approximately the mid-latitude point in Sandford Bay south for approximately 15 km beyond the study area the cliffs and coastal waters are designated as part of the Buchan Ness to Collieston Coast Special Protection Area (SPA). Similarly, to the far south of the study area and south of Boddam, the cliffs are designated as the Buchan Ness to Collieston Special Conservation Area (SAC) and the Bullers of Buchan Coast Site of Special Scientific Interest (SSSI). All three of these sites are in the study area for the Proposed Development, as shown in **Figure 12.1** (EIA Report Volume 3).

12.4.7.3. The **Buchan Ness to Collieston Coast SPA** is a 15 km stretch of south-east facing cliff, formed of granite, quartzite and other rocks. The varied coastal vegetation on the ledges and the cliff tops includes maritime heath, grassland and brackish flushes. The boundary of the SPA follows the boundaries of Bullers of Buchan Coast SSSI and Collieston to Whinnyfold Coast SSSI, and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface. The total area of the designated site is 5,400 ha. The site qualifies as an SPA by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 95,000 seabirds including nationally important populations.

12.4.7.4. The **Buchan Ness to Collieston Buchan Ness to Collieston SAC** is 206ha in area and is designated because its vegetated cliff slopes support a wide range of coastal vegetation types, including an abundance of such local species as Scots lovage *Ligusticum scoticum* and roseroot *Sedum rosea*. In some areas the cliff edge retains semi-natural plant communities such as maritime heath, acid peatland and brackish flushes. All these are now rare on the coast of north-east Scotland and this section of coastline contains some of the best remaining examples. Possibly due to the local microclimate and the presence of lime-rich soils, these communities contain several plants which are associated with dry, calcareous grassland,

including carline thistle *Carlina vulgaris* and cowslip *Primula veris*. Sea wormwood *Seriphidium maritimum* also occurs. These species are rare in north-east Scotland. The cliffs and offshore stacks support a scattered but considerable colony of cliff-nesting seabirds with bird-influenced vegetation (JNCC, 2021). The latest assessed condition was Favourable Declining in 2016 (Nature Scot, 2021).

12.4.7.5. The **Bullers of Buchan Coast SSSI** is a 108ha area comprising the sea cliffs and coastal strip from Buchan Ness southwards to just beyond Slains Castle, near Cruden Bay, including the Bullers of Buchan. The cliffs, slopes and inshore stacks are of special geological and biological interest. It is an important site for rock coast geomorphology, demonstrating a range of forms developed in a relatively uniform, massive granite. Several distinctive landforms occur within a relatively small area – complex inlets, caves, arches, stacks, skerries and linear reefs. The sea-cliffs and slopes support a wide range of maritime habitats including grassland, crevice and ledge communities. The sea-cliffs and inshore stacks support a colony of breeding seabirds which is of international importance. There are six elements of the SSSI that are assessed with four being at Favourable Maintained status when last assessed in 2016, with one being at Favourable Recovered (breeding Guillemot) and one being Unfavourable No Change (breeding Kittiwake) (Nature Scot, 2021).

12.4.8 WATER RESOURCES

Discharge Consents

12.4.8.1. Details regarding discharge consents were requested from SEPA but had not been returned at the time of writing in December 2021. However, locations of discharge consents within 250m of the Proposed Development have been derived from Envirocheck GIS data (Landmark, 2021) and are shown in **Figure 12.1** (EIA Report Volume 3) and presented in Table 12.7.

Table 12-7: Summary of consented discharges

Consent	No. present in relation to Proposed Development Site		Details			
	On-site	0-250m				
Discharge Consents	10	9	**Location**	**Operator**	**Discharge Type**	**Receiving water**
			On-site			
			2 no. entries in proximity of the pier	N O S Hydro Board	Sewerage and trade	Sandford Bay
			5 no. entries in proximity of the cooling water outfall point	N O S Hydro Board or Scottish Hydro-Electric Plc	Sewerage, water works effluent or unknown	Sandford Bay or unknown (assumed to be Sandford Bay)

Consent	No. present in relation to Proposed Development Site		Details			
	On-site	0-250m				
			2 no. entries in proximity of the electrical substation	N O S Hydro Board	Sewage effluent	Den of Boddam Burn
			Off-site			
			1 no. entry in proximity of Sandford Lodge	Mr G Keith	Sewage effluent	Unnamed stream to Sandford Bay
			1 no. entry adjacent west, in proximity of the electrical substation	Mr Richard W G Fyfe	Septic tank	Tributary of Den of Boddam Burn
			2 no. entries adjacent and 25m west, near Millbank	Mr H S Norrie and J M Mcdonald Esq	Septic tanks	Den of Boddam Burn
			1 no. entry approximately 75 m southwest	North of Scotland Hydro Board	Sewerage and trade discharge	Freshwater stream/river
			5 no. entries up to 130m south-east	Seafood factory	Trade effluent/septic tank	Tidal waters/ Sandford Bay

12.4.8.2. Nine out of the nineteen identified discharges are within the Proposed Development site and discharge to Sandford Bay and the Den of Boddam Burn, which itself discharges to Sandford Bay. Those off site are related to sewerage and trade effluent and also discharge into the Den of Boddam Burn catchment or Sandford Bay.

12.4.8.3. There are six water releases listed on the Scottish Pollutant Release Inventory (SPRI) within the study area as shown on SEPA's Scotland Environment Map website (SEPA, 2021), as follows:

- D1 - Peterhead Power Station (SSE Generation Ltd) – Pollution Prevention and Control discharge;

- D2 - Peterhead Power Station (BP Exploration Alpha Ltd) - Pollution Prevention and Control discharge;
- D3 - Glenugie Engineering Works, Peterhead (Score (Europe) Ltd) – Radioactive Substances;
- D4 - Peterhead Sewage Treatment Works (Grampian Waste Water Services Ltd) – Sewage Treatment Works.
- D5 - Peterhead Sewage Treatment Works (Kelda Water Services Ltd) – Pollution Prevention and Control discharge; and
- D6 - Peterhead Sewage Treatment Works (Scottish Water Services Ltd) – Pollution Prevention and Control discharge.

12.4.8.4. Further details regarding these SPRI water releases are not available on the Scotland Environment Map website (SEPA, 2021), but all appear to discharge to Sandford Bay except for D2 which, based on mapping, is expected to discharge to the Den of Boddam Burn.

Licensed Abstractions

12.4.8.5. Records held by Aberdeenshire Council for private abstractions report the presence of a single private groundwater abstraction well for domestic use located approximately 470m west of the site (see **Figure 12.1** (EIA Report Volume 3)) and associated with the property known as “Denend Croft” (potentially residential). The depth of the groundwater intake is unknown.

12.4.8.6. Except for the Coastal Abstraction licence from Boddam Harbour for the existing Peterhead Power Station (for a daily volume not exceeding 2,436.48 Ml/day) there are no further surface water abstraction licences identified within 1km of the site. A request was made to SEPA to confirm if any additional abstractions are present, but no response had been received at the time of writing (February 2022).

Water Pollution Incidents

12.4.8.7. According to the Envirocheck GIS data (Landmark, 2021), there are no recorded pollution incidents to controlled waters listed for the Proposed Development Site and the study area. However, a prosecution relating to controlled waters entry is present, associated with the seafood factory located immediately south-east of the Proposed Development Site, dated to 2000.

12.4.9 FUTURE BASELINE

Construction

12.4.9.1. The future baseline has been determined qualitatively by considering the possibility of changes in the attributes that are considered when deciding the importance of waterbodies in the study area.

12.4.9.2. Generally, there is an improving trend in water quality and the environmental health of waterways in the UK since the commencement of significant investment in sewage treatment in the 1990s, the adoption of the WFD from 2003, and the application of ever more stringent planning policies. However, recently there has been growing attention of the need to address the operation of combined sewer overflows and spills of untreated sewerage from works during periods of heavy rain, which is made worst by increases in the volume of foul water to treat and climate change (i.e. increased storminess and periods of heavy rain). In addition, pollution of waterways from micro-plastics and novel chemical compounds are emerging issues.

12.4.9.3. Overall, adopting a precautionary perspective, in terms of water quality impacts, the future baseline assumes that all WFD waterbodies achieve their planned target status by 2027. It is

likely that through the action of new legislative requirements and ever more stringent planning policy and regulation, that the health of the water environment will continue to improve post-2027, although there are significant challenges, such as adapting to a changing climate and pressures of population growth, which could have a retarding impact. It is difficult to forecast these changes with any certainty.

12.4.9.4. Under the WFD, the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody has an objective of Good Ecological Potential by 2027, and Buchan Ness to Cruden Bay Coastal WFD waterbody of High Ecological Status by 2027. Both waterbodies are already at this status and so there must be no deterioration from this, and there are also objectives for individual elements of the WFD classification that are to be achieved (e.g. biological quality elements, physico-chemical parameters etc). It is assumed that these objectives will be achieved or on their way to being achieved as part of the Future Baseline.

12.4.9.5. The assessment of the importance of waterbodies considers a large range of attributes and does not focus solely on water quality. It also considers other attributes such as scale, nature conservation designations, habitat type, the presence of protected species, social and economic uses. For some of these attributes, it is unlikely that they will change in the future (e.g. waterbody size, whether a river is likely to support cyprinid or salmonid fish populations, the presence of a designated nature conservation site or bathing water).

Operation

12.4.9.6. The same future baseline conditions expected during construction will apply to the operation phase (i.e. all WFD targets are met, improving water quality, no change in the presence and status of designated sites).

Decommissioning

12.4.9.7. The same future baseline conditions expected during construction will apply to the decommissioning phase (i.e. all WFD targets are met, improving water quality, no change in the presence and status of designated sites).

12.4.10 IMPORTANCE OF RECEPTORS

12.4.10.1. The importance of the local water resource receptors within the study area is described in Table 12.8. Importance is based on the criteria outlined above in Table 12.2.

Table 12-8: Importance of Receptors

Waterbody	Importance	Importance Descriptions
Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody and Buchan Ness to Cruden Bay Coastal WFD waterbody).	Water Quality: Very High Importance Morphology: Low Importance	Sandford Bay and surrounding coastal waters are considered as a Very High importance receptor on the basis of being WFD designated as the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody and Buchan Ness to Cruden Bay Coastal WFD waterbody. It is also a waterbody of international and national importance, being designated as a SPA, with Buchan Ness to Cruden Bay Coastal WFD waterbody in the study area also containing a SSSI and SAC. The waterbody is of importance for the dilution and dispersion of treated/untreated sewerage/trade/process waste water, which at the same time influence water quality and present a risk of chemical spillages. Water is also abstracted from the

Waterbody	Importance	Importance Descriptions
		waterbody for industrial use. However, the morphology is considered Low importance due to significant modifications, including large breakwaters at Peterhead Bay. The waterbody is also important for navigation, fishing, commercial and recreation activities.
Invernettie Burn	Water Quality: Medium Importance Morphology: Low Importance	Invernettie Burn is considered a Medium importance receptor for water quality on the basis of not having a WFD classification but is estimated to have a Q95 >0.001m^3/s. It may potentially be suffering from nutrient enrichment given the predominantly agricultural land use of the catchment, and there may be urban pollutant pressures in the downstream extent of the burn as it passes through south Peterhead in the study area. It is considered a Low importance receptor for morphology on the basis of being straightened for much of its length around field boundaries and culverted and channelised in sections through south Peterhead.
Den of Boddam Burn	Water Quality: Medium Importance Morphology: Low Importance	Den of Boddam Burn is considered a Medium importance receptor for water quality on the basis of not having a WFD classification but is estimated to have a Q95 >0.001m^3/s. It is wholly in culvert beneath the existing power station site and received discharges from roads (including the A90) and from the power station. It may also receive agricultural pollutants given the largely agricultural upstream land use It is considered a Low importance receptor for morphology having been straightened for much of its length around field boundaries and culverted and channelised in sections through south Peterhead.
Drains and Ditches	Water Quality: Low Importance Morphology: Low Importance	Unnamed drains and ditches are small in scale and artificially straight and incised (e.g. along field boundaries). They are not WFD designated and considered likely to be ephemeral, and so are considered Low importance receptors for water quality, and Low importance receptors for morphology.
Various ponds	Water Quality: Low Importance Morphology: Low Importance	Low importance for water quality and morphology as they are not designated and have minimal apparent social or economic use.
Groundwater resources	High importance	Groundwater body considered of high importance as the Peterhead WFD groundwater body is at Good quantitative and qualitative status. The entire study area is in a Drinking Water Protected Area for groundwater. This is despite being designated a low productivity aquifer. There is only one known abstraction for a private water supply, located up catchment from the Proposed Development.

12.5. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

12.5.1 INTRODUCTION

12.5.1.1. The following impact avoidance measures have either been incorporated into the design (i.e. embedded mitigation) or are standard construction or operational practices. These measures have, therefore, been accounted for during the impact assessment.

12.5.2 CONSTRUCTION

12.5.2.1. For the purposes of this assessment, it is assumed that the measures set out below would be required of any contractors undertaking construction work in relation to the Proposed Development.

12.5.2.2. During construction, accidental water pollution may occur directly from spillages of polluting substances into waterbodies, or indirectly by being conveyed in runoff from hard standing, other sealed surfaces or from construction machinery. Fine sediment may also be disturbed in waterbodies directly or also wash off working areas and hard standing (including approach roads) into waterbodies indirectly via existing drainage systems or overland. This sediment may potentially contain contaminants that could be harmful to the aquatic environment. Plans to avoid, prevent and reduce adverse effects on the water environment and deal with any accidental pollution would be included within the CEMP prepared by the Contractor, prior to commencement of construction. A Framework CEMP accompanies the EIA Report (**Appendix 5A** EIA Report Volume 4).

12.5.2.3. The CEMP will be reviewed and updated to ensure all relevant potential impacts and effects are considered and addressed as far as reasonably practicable, considering available good practice. The principles of the mitigation measures set out below are the minimum standards that the Contractor will implement, acknowledging that for some issues, there are multiple ways to address. Methods to deal with pollutant risk will be reviewed and adapted as construction works progress in response to different activities, weather conditions, and work locations.

12.5.2.4. It is envisaged that the final CEMP will contain a Water Management Plan (WMP) as a technical appendix which would provide relevant details regarding standard mitigation to be implemented to protect the water environment from adverse impacts during construction, including, but not limited to the general mitigation measures outlined below.

Good Practice Guidance

12.5.2.5. The construction of the Proposed Development would be in accordance with good practice guidance. A series of Guidance for Pollution Prevention (GPP) is in development, which provides environmental regulatory guidance to Scotland. The following relevant GPPs have been released to date on the NetRegs website (Northern Ireland Environment Agency and Scottish Environment Protection Agency, NetRegs, 2021) and are considered to be good practice:

- GPP 1: Understanding your environmental responsibilities – good environmental practices;
- GPP 2: Above ground oil storage tanks;
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer;
- GPP 5: Works and maintenance in or near water;
- GPP 8: Safe storage and disposal of used oils;
- GPP 13: Vehicle washing and cleaning;

- GPP 19: Vehicles: Service and Repair;
- GPP 20: Dewatering underground ducts and chambers;
- GPP 21: Pollution Incident Response Planning;
- GPP 22: Dealing with spills; and
- GPP 26: Safe storage – drums and intermediate bulk containers.

12.5.2.6. Where new GPP are yet to be published, previous Pollution Prevention Guidance (PPG) documents (Environment Agency, 2001) continue to provide useful advice on the management of construction to avoid, minimise and reduce environmental impacts, although they should not be relied upon to provide accurate details of the current legal and regulatory requirements and processes. Construction phase operations would be carried out in accordance with guidance contained within the PPG (also available at NetRegs), including:

- PPG 3: Use and design of oil separators in surface water drainage systems;
- PPG6: Working at construction and demolition sites;
- PPG7: Safe storage – the safe operation of refuelling facilities;
- PPG18: Managing fire water and major spillages; and
- PPG27: Installation, decommissioning and removal of underground storage tanks

12.5.2.7. Additional good practice guidance for mitigation to protect the water environment can be found in a range of CIRIA documents and British Standards Institute documents:

- British Standards Institute (2009) BS6031:2009 Code of Practice for Earth Works (British Standards Institute, 2009;
- British Standards Institute (2013) BS8582 Code of Practice for Surface Water Management of Development Sites (British Standards Institute, 2013a);
- C753 (2015) The SuDS Manual (second edition) (CIRIA, 2015a);
- C744 (2015) Coastal and marine environmental site guide (second edition) (CIRIA, 2015b);
- C741 (2015) Environmental good practice on site guide (fourth edition) (CIRIA, 2015c);
- C648 (2006) Control of water pollution from linear construction projects, technical guidance (CIRIA, 2006);
- C609 (2004) Sustainable Drainage Systems, hydraulic, structural and water quality advice (CIRIA, 2004); and
- C532 (2001) Control of water pollution from construction sites – Guidance for consultants and contractors (CIRIA, 2001).

Management of Construction Site Runoff

12.5.2.8. The measures outlined below, which will be included in the CEMP, will be required for the management of fine sediment in surface water runoff resulting from construction activities:

- Reasonably practicable measures will be taken to prevent the deposition of fine sediment or other material in, and the pollution by sediment of, any existing waterbody during construction considering relevant industry guidelines including CIRIA report 'C532: Control of water pollution from construction sites'. This may typically (CIRIA, 2001) include use and maintenance of temporary lagoons, tanks, seeding/ covering of earth stockpiles, earth bunds, straw bales and sandbag walls, other proprietary measures, fabric silt fences or silt screens and consideration of the type of plant used.
- A temporary drainage system will be developed to prevent runoff contaminated with fine particulates from entering surface water drains without treatment. This will cover all land drains and waterbodies within the Proposed Development Site that could be affected, taking measures to adequately protect them using, for example, drain covers, sandbags, earth bunds, geotextile silt fences, straw bales, or proprietary treatment. Any discharge to

waterbodies (directly or indirectly) will only be made with the consent of SEPA (or Scottish Water, if to the public foul sewer) and with any agreed treatment measures implemented.

- Where reasonably practicable, earth moving works will seek to avoid periods of very wet weather, to minimise the risk of generating runoff contaminated with fine particulates. Where this is not reasonably practicable, mitigation measures will be implemented to control fine sediment laden runoff.
- To protect waterbodies from fine sediment runoff, topsoil/ subsoil will be stored a minimum of 20m from watercourses on flat lying land (and further where any ground is sloping). Where this is not reasonably practicable and material is to be stockpiled for longer than two weeks, material will either be covered with geotextile mats or seeded to promote vegetation growth, with runoff from the stockpile prevented from draining to any watercourses, without prior treatment.
- Appropriately sized runoff storage areas for the settlement of fine particulates in runoff will be provided. It is anticipated that treated water may be pumped under a temporary CAR Permit from SEPA or agreed with Scottish Water to an existing WwTW.
- Mud deposits will be controlled, as far as reasonably practicable, at entry and exit points to the Proposed Development Site using wheel washing facilities and/ or road sweepers operating during earthworks activities or other times as considered necessary.
- Equipment and plant will be washed out and cleaned in designated areas within the Proposed Development Site compound where runoff can be isolated for treatment before discharge under appropriate consent and/ or agreement with SEPA and/ or Scottish Water, or otherwise removed from the Proposed Development Site for appropriate disposal at a licensed waste facility.
- Debris and other material will be prevented from entering surface water drainage, through maintenance of a clean and tidy site, provision of clearly labelled waste receptacles, grid covers and the presence of site security fencing.
- The CEMP will include details of necessary water quality monitoring including visual observations, in situ testing using handheld water quality probes and periodic sampling for laboratory analysis.

Management of Spillage Risk

12.5.2.9. The measures outlined below will be implemented to manage the risk of accidental spillages and potential conveyance to nearby waterbodies via surface runoff or land drains. The measures relating to the control of spillages and leaks will be included in the CEMP and adopted during the construction works:

- Any liquid fuel will be stored and used in accordance with the Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2013.
- Particular care will be taken with the delivery and use of concrete and cement as it is highly corrosive and alkaline.
- Fuel and other potentially polluting chemicals will either be in self bunded leak proof containers or stored in a secure impermeable and bunded area (minimum capacity of 110% of the capacity of the containers).
- Any plant, machinery or vehicles will be regularly inspected and maintained to ensure they are in good working order and clean for use in a sensitive environment. This maintenance is to take place off site if possible or only at designated areas within the Proposed Development Site compound. Only construction equipment and vehicles free of all oil/ fuel leaks will be permitted on site. Drip trays will be placed below static mechanical plant.
- All washing down of vehicles and equipment will take place in designated areas and wash water will be prevented from passing untreated into watercourses.

- All refuelling, oiling and greasing will take place above drip trays or on an impermeable surface which provides protection to underground strata and watercourses, and away from drains as far as reasonably practicable. Vehicles will not be left unattended during refuelling.
- As far as reasonably practicable, only biodegradable hydraulic oils will be used in equipment working in or over watercourses.
- All fixed plant used on the Proposed Development Site will be self-bunded.
- Mobile plant is to be in good working order with drip trays installed beneath oil tanks/ engines/ gearboxes and hydraulics, which would be checked and emptied regularly.
- Plans to deal with accidental pollution would be included within the CEMP prior to commencement of construction and any necessary equipment (e.g. spillage kits) would be held on site and all site personnel would be trained in their use. The Environment Agency would be informed immediately in the unlikely event of a suspected pollution incident.
- The Proposed Development Site will be secure to prevent any vandalism that could lead to a pollution incident;
- Construction waste/ debris will be prevented from entering any surface water drain or waterbody;
- Suitable facilities for concrete wash water (e.g. geotextile wrapped sealed skip, container or earth bunded area) will be adequately contained, prevented from entering any drain, and removed from the Proposed Development Site for appropriate disposal at a suitably permitted waste facility.

Cooling Water and Wastewater Connection Works

12.5.2.10. The Proposed Development Site will require a source of cooling water for heat rejection purposes. Process water will also be required to provide make-up (i.e. to replace small losses from day to day operation) to the steam-water cycle. There will also be a requirement for water for domestic and sanitary use.

12.5.2.11. The Proposed Development will utilise the existing cooling water system used by the existing Peterhead Power Station, using the intake at Boddam Harbour and the existing outfall at Sandford Bay. New pipe work will be required, and pumps would need to be replaced, but no construction work within the marine environment is required.

12.5.2.12. The Applicant is proposing to re-use existing assets and pipework associated with the existing Peterhead Power Station for the discharge of treated effluent to Sandford Bay. Interconnecting pipework would extend from the Proposed Development Site to connect to this infrastructure. Information on construction methods is provided in **Chapter 5: Construction Programme and Management** (EIA Report Volume 2).

CAR Licensing

12.5.2.13. Certain regulatory processes will apply to the Proposed Development and will influence the way pollution risks during construction are managed. A CAR Licence from SEPA under The Water Environment (Controlled Activities) (Scotland) Amendment Regulations 2013 will be required for the construction site and for temporary and permanent works to water bodies (e.g. abstractions and discharges and works to the Den of Boddam Burn). Through consultation with SEPA, appropriate treatment measures for construction-site run-off, conditions on operational discharges, limits and conditions on abstractions will be determined.

12.5.3 OPERATION

12.5.3.1. Several embedded mitigation features are being incorporated into the design of the Proposed Development design in order to avoid, minimise and reduce potential adverse impacts on water features, water resources and flood risk, and these are described in the following sections.

Surface Water Drainage

12.5.3.2. A suitable surface water drainage network and management system will be provided for the Proposed Development that will provide appropriate interception, conveyance, treatment, and attenuation of surface water runoff. Further details are provided in **Appendix 13B** (EIA Report Volume 4).

12.5.3.3. Surface water will be discharged to Sandford Bay, following treatment, via the existing outfall. This outfall would not need to be modified, and so there would be no works required in the marine environment.

12.5.3.4. The detailed drainage strategy will be developed further in continued consultation with SEPA. The proposed drainage system is to include the use of a combination of filter drains, oil interceptors and a “ACO QuadraCeptor” (i.e filtration system for removal of sediment and pollutants) to treat pollutants in surface water runoff from impermeable surfaces on the site and approaches have been selected based on the CIRIA C753 Simple Index Approach assessment (CIRIA, 2015a).

12.5.3.5. Infiltration SUDS have been discounted based on the pollutants level and potential for underlying pollutants based on the sites historic use. All proposed SuDS measures are therefore to be lined to ensure no infiltration and potential leachate of underlying pollutants.

12.5.3.6. Areas within the site that will contain chemicals are to be bunded to ensure that in an event of a chemical release the area can be isolated form the site drainage network. Appropriate storage capacity is to be provided based on the combination of the chemical volume and the direct rainfall falling on that area. The isolation tank will be drained down following any event and the contents will be taken off site and the tank will be cleaned before being re-connected to the site drainage system.

12.5.3.7. Bunding arrangements will be designed in line with the guidance set out in CIRIA C736F Containment Systems for the Prevention of Pollution (CIRIA, 2014).

12.5.3.8. The maintenance required for the water treatment systems and drainage networks will be based on standard guidance and practice. Requirements for maintenance and management of SuDS (e.g. filter drains) are described in The SuDS Manual (CIRIA, 2015a) and DMRB CG 532 (National Highways, 2020). A Surface Water Maintenance and Management Plan would detail the requirements of access and frequency for maintaining all drainage systems proposed on the Proposed Development Site. It is anticipated that this will be prepared at the detailed design stage. The maintenance regime must be properly implemented to ensure all treatment measures and processes operate as intended for the lifetime of the Proposed Development, and to avoid issues such as blockages which could lead to flooding.

12.5.3.9. Furthermore, as the Proposed Development will be an active industrial site controlled by a PPC Permit and regulated by the Environment Agency, pollution control measures will be required to demonstrate Best Available Techniques (BAT) to prevent accidental discharge of pollutants such as hydrocarbons to surface water systems. Pollution prevention measures considered would include (but would not be limited to):

- Silt / oil alarms will be fitted on all interceptors and attenuation storage facilities to alert operators when they require emptying.

- Foul flows and effluent arising from the Proposed Development operation will be kept separate from the surface drainage network;
- Areas which are expected to be sources of frequent pollutant spills to be isolated through the use of bunds as outlined above.

Process Water

12.5.3.10. At this stage in the design process, preliminary water supply and wastewater discharge assessments have been undertaken to determine what process waste waters may be generated by the Proposed Development and how these may be treated with the application of BAT.

12.5.3.11. The Proposed Development Site will require a source of cooling water for heat rejection purposes. Process water will also be required to provide make-up to the steam-water cycle. There will also be a requirement for water for domestic and sanitary use.

Cooling Water

12.5.3.12. For cooling water, the Proposed Development will utilise the existing cooling water system used by the existing Peterhead Power Station, using the existing intake at Boddam Harbour and the existing cooling water outfall at Sandford Bay. New onshore pipework would be required, and existing pumps would need to be upgraded or replaced.

12.5.3.13. The cooling water system comprises an existing seawater intake, existing intake tunnel and surge chamber, existing coarse and fine screening, new main cooling water pumps, new piping from the pumps to the power plant site, new cooling water heat exchangers (namely the Main Condenser, DCC Circulating Water Cooler and Gas Turbine Auxiliaries fed from a booster pump), and new piping to the existing outfall to return the extracted water back to the sea.

Wastewater

12.5.3.14. Wastewater contaminants will be generated from the following activities:

- DCC Blowdown - DCC blowdown wastewater will be treated within the power island and Carbon Capture and Compression Plant (CCP) area. Several treatment processes are under consideration to enable the treated water to be recovered for returning to the DCC in a closed loop cycle, treated for use as process make-up or, as a last resort, treated for discharge to the sea at Sandford Bay.
- Acid wash effluent, reclaimer sludge and effluent from the stripper column within the CCP is to be tankered off site to a licensed hazardous waste disposal facility.
- Demineralisation Plant and Condensate Polishing Plant Regeneration - The wastewater from the demineralisation plant and possible steam condensate polishing plant will be treated prior to discharge to the sea at Sandford Bay.
- HRSG Boiler Blowdown - The HRSG boiler blowdown would be treated prior to discharge to the sea at Sandford Bay.
- Water Treatment Works (WTW) Residuals - The quantity and quality of the wastewater discharge from the WTW is highly dependent upon the salinity of the source and the required level of desalination but is likely to include brine.

12.5.3.15. Wastewater treatment will be provided for process effluent prior to discharge to the environment via the existing treated sewage outfall to Sandford Bay (separate to the cooling water outfall). Furthermore, effluent discharges would be regulated by SEPA through the PPC Permit required for the operation of the Proposed Development.

12.5.3.16. It is anticipated that the wastewater environmental regulatory emission limit values (ELVs) that apply within the PPC Permit shall be in-line with the target BAT Associated Emission Levels

(AELs) from wastewater treatment plants treating effluent from chemicals sites, or processes as identified within the BAT Reference Document for Common Wastewater and Waste Gas Treatment / Management Systems in the Chemical Sector (2016) (otherwise known as the CWW BREF) and the Large Combustion Plant (LCP) BREF (2019) and its associated BAT Conclusions document. While these do not provide AELs for all the Proposed Development's processes, they enable an appropriate basis to be determined. If the project Environmental Risk Assessment (to be developed post-consent) shows that significant impact could occur with the plant discharging at the BAT-AEL concentrations, tighter emission limits would subsequently be applied.

12.5.3.17. Following treatment, process water that is to be directed to the outfall would flow via the existing pipelines and infrastructure. Water sampling facilities are to be provided for manual sampling of water prior to discharge. The frequency of testing and parameters to be tested will be agreed with the permitting authority. In situ continuous monitoring of flow, temperature, total organic carbon (TOC) conductivity and pH measurement will also be undertaken.

12.5.3.18. Routine maintenance of the Proposed Development infrastructure including those elements involving process water will be planned and scheduled via the maintenance management system with major overhauls occurring approximately once every two to five years depending on the nature of plant operations in that period.

Domestic and Sanitary Effluent

12.5.3.19. The existing foul drainage used on site will be utilised for the Proposed Development. Domestic foul water will be treated by a new on-site treatment package, and the treated water discharged through the existing foul water outfall.

Public Water Supply

12.5.3.20. The Proposed Development will add a new connection to the existing Scottish Water supply which serves the existing Peterhead Power Station.

Den of Boddam Burn Culvert

12.5.3.21. As described in Section 12.4, the Den of Boddam Burn is culverted through the Proposed Development Site and discharges into Sandford Bay near Furrah Head. To accommodate the Proposed Development infrastructure, it is necessary to divert the culvert from its existing route around the north and east of the Proposed Development site to a new route and then to tie-in with the existing discharge location into Sandford Bay. **Appendix 13C** (EIA Report Volume 4) shows the options that have been considered and the feasibility of each. The preferred Option is 2A, which is a relatively minor change to the route of the culvert in comparison to other options, to facilitate the excavations required, without significant realignment. The gradient of the culvert would also require modification to ensure it remains below ground. However, as the existing intake and outfall are retained, the hydraulic gradient is the same as the current situation overall. Drawing 0650403-SHT-30-0000-C-XXXX in **Appendix 13C** (EIA Report Volume 4) provides further details.

Management of Hazardous Substances on Site

12.5.3.22. Materials including chemicals to be stored and used within the Proposed Development Site will be subject to control via the PPC Permit, COMAH Licence (if applicable) and other necessary consents required, and are anticipated to include the following process chemicals:

- Solvent that will remove the carbon dioxide from the gas stream in the CCP. The solvent to be used is the subject of ongoing technical studies but is assumed to be an aqueous solution of amines. The CCP includes equipment for reclaiming used solvent within the process, but make-up will be required.

- Sodium hydroxide and sulphuric acid for pH control and treatment within the CCP.
- Power plant treatment chemicals (oxygen scavenger, SCR reagent (ammonia or urea) and phosphate).
- Capture plant treatment chemicals (sodium hydroxide, sulphuric acid and triethylene glycol – insulating gas for HV electrical systems).
- Water treatment plant chemicals (biocides, anti-scalants, sulphuric acid, sodium hydroxide, phosphoric acid, polyelectrolyte, molasses).
- Hydrogen for generator cooling and deoxygenation of product carbon dioxide stream.
- Cooling tower chemicals (biocides, bio dispersants, corrosion inhibitors).

12.5.3.23. Other chemicals required for routine cleaning, maintenance and emergency firefighting uses include:

- Distillate fuel;
- Nitrogen (natural gas system and other equipment purge);
- Cleaning chemicals;
- Acetylene (metal cutting);
- Inert fire-fighting gases;
- Lubricating oils; and
- Carbon dioxide for purging of electrical generators for maintenance purposes.

12.5.3.24. The inventory of materials to be stored on the Proposed Development Site will be finalised through the detailed design. However, where storage of hazardous materials, individually or in-combination exceeds the relevant thresholds, separate permissions will be sought from the HSE and local planning authority for their storage, under the COMAH and Hazardous Substance Consent regimes respectively. The project is currently working on the basis that lower tier COMAH will apply to the Site operations as a minimum, but this will only be confirmed during detailed design once all chemicals required have been identified along with the quantities which exist within the Proposed Development site.

12.5.3.25. Areas at most risk of frequent spills will be isolated using bunds (or other physical barriers) to prevent spread of spills across the Proposed Development Site and towards watercourses, and then would be disposed of appropriately. Penstocks, booms or absorbent systems will also be used to ensure accidental fuel/ chemical spills and fire control do not enter the surface water network.

12.5.3.26. Several of the impact avoidance measures employed during the construction phase would remain for the operational phases of the Proposed Development (where relevant), and would be implemented through the Proposed Development Site Environmental Management System (EMS), for example:

- An Incident and Emergency Response Plan to deal with incidents, including accidental pollution and all necessary equipment (e.g. spillage kits) would be held on-site and all relevant site personnel would be trained in their use, for example the plan would incorporate details on how to appropriately deal with accidental spillages to ensure they are not drained to any surface water system;
- Containment measures would be implemented, including bunding or double-skinned tanks for fuels and oils; all chemicals would be stored in accordance with their COSHH guidelines;
- Any relevant measures incorporated within the drainage system design to prevent material entering local waterbodies would be described. It is currently envisaged that this may include penstocks on surface and foul water drainage systems to provide final containment

of any major chemical spillage, and upstream at the Proposed Development Site outfall to Sandford Bay;

- Measures will be in place for dealing with emergency situations involving loss of containment of hazardous substances during the operation phase, in order to minimise the effects and limit danger to persons, the environment and property. As described above, it is assumed that penstocks will be included on both the surface and foul water drainage systems to provide final containment of any significant chemical spillage on the Proposed Development Site and upstream of the site outfall to Sandford Bay.

12.5.3.27. The Incident and Emergency Response Plan will set out the emergency spill control procedure that will include the following key actions adapted from the Health and Safety Executive's Emergency Response / Spill Control Technical Measures Document (HSE, 2020):

- Spills involving hazardous materials should first be contained to prevent spread of the material to other areas. This may involve the use of temporary diking, sand bags, dry sand, earth or proprietary booms / absorbent pads;

12.5.3.28. Wherever possible the material would be rendered safe by treating with appropriate chemicals;

- Hazardous materials in a fine dusty form would not be cleared up by dry brushing where possible;
- Treated material would be absorbed onto inert carrier material to allow the material to be cleared up and removed to a safe place for disposal or further treatment as appropriate;
- Waste would not be allowed to accumulate. A regular and frequent waste removal procedure should be adopted; and
- Process specific emergency spill kits (acid, alkali, solvent, toxic, etc.) would be readily available with supporting procedures, and maintained on a regular basis, and staff regularly trained in their use.

12.5.3.29. Once a hazardous spillage has been contained, to prevent spread of the material to other areas, the material would be treated to render it safe. Acids and alkalis may be treated with appropriate neutralising agents. Due to differing properties of various groups of chemical products, an appropriate strategy with suitable treatment agents should be established in each case.

12.5.3.30. Once the material has been treated the cleared-up area would be washed with large volumes of water. This would not be discharged from Proposed Development Site outfall but disposed of offsite. Should any spillage occur, then SEPA would be immediately informed.

12.5.3.31. Further guidance to be consulted upon in development of the Incident and Emergency Response Plan will include:

- HS(G)191 Emergency planning for major accidents. Control of Major Accident Hazards Regulations 1999 (HSE, 1999);
- HS(G)71 Chemical warehousing: the storage of packaged dangerous substances (HSE, 1992); and
- BS 5908: Fire and explosion precautions at premises handling flammable gases, liquids and dusts. Code of practice for precautions against fire and explosion in chemical plants, chemical storage and similar premises (BSI, 1990).

12.5.3.32. All products are to be labelled with their hazard ratings so that the user is aware of any potential risks to the environment. Provided they follow the label instructions, the risks are well controlled. Only well trained, certificated and staff experienced in the use of the various chemical products will be allowed access.

12.5.4 DECOMMISSIONING

12.5.4.1. The power generation and carbon capture elements of the Proposed Development have a design life of approximately 25 years. At the end of their design life, it is expected that these elements of the Proposed Development may have some residual life remaining and the operational life may be extended. If the operating life were to be extended, the Proposed Development would be upgraded in line with the legislative requirements at that time. On this basis, decommissioning activities are currently anticipated to commence after 2053.

12.5.4.2. At the end of its operating life, it is anticipated that all above-ground equipment associated with the parts of the Proposed Development to be decommissioned will be removed from the Proposed Development Site. Prior to removing the relevant plant and equipment, all residues and operating chemicals will be cleaned out from the plant and disposed of in an appropriate manner.

12.5.4.3. Prevention of contamination is a specific requirement of the PPC Permit for the operation of the Proposed Development and therefore it is being designed such that it will not create any new areas of ground contamination or pathways to receptors as a result of construction or operation. Once the relevant plant and equipment have been removed to ground level, it is expected that the hardstanding and sealed concrete areas will be left in place. Any areas of the Proposed Development to be decommissioned that are below ground level will be backfilled to ground level to leave a levelled area.

12.5.4.4. The Proposed Development would be subject to decommissioning under the conditions of the PPC Permit including conditions relating to chemical/ polluting material handling, storage and use and emergency procedures in line with BAT. A detailed Decommissioning Environmental Management Plan (DEMP) would be prepared to identify required measures to prevent pollution during this phase of the Proposed Development, based on the detailed decommissioning plan.

12.5.4.5. The impact avoidance measures for decommissioning would be similar to those identified above for the construction phase. As above, measures would be in place to prevent pollution in accordance with the permit.

12.6. LIKELY IMPACTS AND EFFECTS

12.6.1 INTRODUCTION

12.6.1.1. The Proposed Development has the potential to cause adverse effects to the water environment during construction, and operation and decommissioning phases. Water receptors described in Section 12.4 have therefore been assessed for the likelihood of actual effects occurring during these phases of the Proposed Development (taking into account the mitigation measures as detailed in Section 12.5).

12.6.2 CONSTRUCTION PHASE

12.6.2.1. During the construction phase the following water environment impacts may occur if appropriate mitigation is not applied:

- Temporary impacts on surface water quality due to deposition or spillage of soils, sediments, oils, fuels or other construction chemicals, or through mobilisation of contamination following disturbance of contaminants in sediments, ground or groundwater, or through uncontrolled site run off;

- Potential impacts to flow regime and hydromorphology of surface waterbodies as a result of increased run-off due to increased areas of hardstanding or new physical modifications or other works during construction; and
- Potential impacts to groundwater resources and private water supplies.

Surface Water Quality – Suspended Fine Sediments

12.6.2.2. Construction activities such as earthworks, excavations, site preparation, levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of the vegetation that binds it, compaction, and increased runoff rates. Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to waterbodies where it can result in adverse impacts on water quality, flora and fauna.

12.6.2.3. Construction works within, along the banks and across watercourses can also be a direct source of fine sediment mobilisation, and this sediment could contain contaminants given the past industrial activities within the Proposed Development Site (i.e. the existing Peterhead Power Station). Mobilisation of sediments could occur from works to redirect the Den of Boddam Burn into a new culvert, and this could be conveyed to the sea at Sandford Bay which is a short distance downstream.

12.6.2.4. Other potential sources of fine sediment during construction works include water runoff from earth stockpiles, dewatering of excavations (surface and groundwater), mud deposited on site and local access roads, and that which is generated by the construction works themselves or from vehicle washing. Sediment could also be runoff from laydown areas if not properly mitigated. **Figure 5.1** (EIA Report Volume 3) indicates proposed construction laydown areas, with proposed Areas A and B close to the drain at the northern extent of the Proposed Development (to the south of Newmill of Sandford).

12.6.2.5. Generally, excessive fine sediment in runoff is chemically inert and affects the water environment through smothering riverbeds and plants, temporarily changing water quality (e.g. increased turbidity and reduced photosynthesis) and causing physical and physiological adverse impacts on aquatic organisms (such as abrasion, irritation). However, given the past industrial activity on the Proposed Development Site, there may also be the potential for acute and chronic toxic effects to aquatic organisms.

12.6.2.6. Taking into consideration the source-pathway-receptor approach, earthworks and excavation required to construct a new culvert (the source) to re-route the Den of Boddam Burn (the receptor) could cause some mobilisation of fine sediments (the pathway) during installation, and this would pass through the existing outfall to Sandford Bay (a downstream receptor). However, the new culvert would be constructed off-line in dry conditions, and so the potential mobilisation of sediments would be restricted to the short period when the existing Den of Boddam Burn watercourse is connected to the new culvert for the first time. As such, this is expected to be a temporary impact. The impacts are expected to be mitigated through the best practice measures outlined the CEMP and WMP (see Section 12.5), including providing a means of collecting the first flush of sediment from the newly laid channel (e.g. a silt curtain, straw bales or similar). Regular observations and monitoring of the watercourse will be required post-works to ensure that no adverse impacts have occurred in terms of sediment mobilisation and that the watercourse transitions into a settled state. The frequency of observations will be described in the WMP. A temporary minor adverse impact to the medium importance (for water quality) Den of Boddam Burn is therefore anticipated, resulting in a **slight adverse effect (not significant)**. Given the large dilution and dispersal potential in the tidally influenced Sandford Bay (specifically the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody) there

would be a negligible impact, which, given the very high importance waterbody results in **a slight adverse effect (not significant)**.

12.6.2.7. The abstraction and wastewater discharge from the Proposed Development are to re-use the existing infrastructure with no works anticipated within the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody. As such, there are no effects anticipated to this waterbody during construction relating to fine sediments mobilised from works to the cooling water infrastructure.

12.6.2.8. There will be no other direct works to watercourses but there will be wider excavations and earthworks across the Proposed Development Site during construction which have potential to mobilise sediments in runoff towards existing drains and on to the Den of Boddam Burn and Sandford Bay. However, given implementation of best practice mitigation measures outlined in the CEMP and WMP (see Section 12.5), runoff of waters that potentially contains fine sediment from the wider Proposed Development Site would be mitigated, thereby resulting in negligible impacts to drains or ditches in the study area. As low importance receptors this represents a **neutral effect (not significant)**. There would be no impact anticipated to the downstream waterbodies.

Surface Water Quality – Chemical Spillages

12.6.2.9. Leaks and spillages of polluting substances during construction could potentially pollute nearby surface watercourses if their use or removal is not carefully controlled and spillages (the source in the source-pathway-receptor model) enter existing flow pathways or waterbodies directly (the pathway). Like excessive fine sediment in construction site runoff, the risk is greatest where works occur close to and within waterbodies (the receptors). However, to ensure legislative compliance, appropriate storage, handling and disposal measures for each substance will need to be in place prior to and during construction via the mitigation measures outlined in the CEMP and WMP.

12.6.2.10. As described above, works are required to construct a new culvert route for the Den of Boddam Burn. However, given that this construction would be undertaken in dry conditions (i.e. disconnected from river flow) prior to re-directing flow into the new culvert upon completion, and given implementation of mitigation measures outlined in the CEMP and WMP, a negligible impact on the medium importance Den of Boddam Burn is predicted, resulting in a **neutral effect (not significant)**.

12.6.2.11. There will be no works to the existing abstraction infrastructure from Boddam Harbour or to the discharge outfall to Sandford Bay. However, there will be new main cooling water pumps, new piping from the pumps to the power plant site, new cooling water heat exchangers, and new piping to the existing outfall to return the extracted water back to the sea. These works are likely to be in hydrological connectivity to Sandford Bay via the cooling water system, and any spillages during installation of the new infrastructure could be conveyed to the sea if not appropriately dealt with. Given measures in the CEMP and WMP, it is considered that the risk to Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody) would be negligible. For this very high importance receptor this is considered a temporary **slight adverse effect (not significant)**.

12.6.2.12. There are no other works directly to watercourses, but runoff from the construction site could wash spillages towards drains connecting with the Den of Boddam Burn and Sandford Bay, However, given the mitigation measures outlined in Section 12.5 for inclusion in the CEMP and WMP, the impact is considered negligible to the low importance drains, resulting in a **neutral effect (not significant)** with no impact to downstream receptors.

Groundwater Resources

12.6.2.13. There will be earthworks and excavation required during construction of the Proposed Development, for example for foundations, construction of the new Den of Boddam Burn culvert route and cable laying. Excavations are anticipated to variously impact made ground, superficial deposits and bedrock. Groundwater levels across the site have been shown to be variable (see Section 12.4), ranging from 2m below ground level towards the coastal margin to depths of 5-9m b.g.l. beneath the centre of the Proposed Development Site, and over 16m below ground level to the east of the Proposed Development Site. On this basis there is some limited potential to intercept groundwater in parts of the Proposed Development Site.

12.6.2.14. The Phase 1 Desk Based Assessment for the Proposed Development (**Appendix 14A** EIA Report Volume 4) has recommended a preliminary intrusive ground investigation is undertaken which will give greater clarity on groundwater levels. The site investigation will be designed with due consideration of the requirements of BS 5930:2015+A1:2020 (BSI, 2015) Code of Practice for Ground Investigation; BS10175: 2011+A2:2017 Investigation of potentially contaminated sites – Code of Practice (BSI, 2011); and the UK Specification for Ground Investigation (2nd Edition) (ICE Publishing, 2011). This will allow appropriate risk assessment to be undertaken for areas requiring excavation to ensure that appropriate mitigation is in place prior to commencing works.

12.6.2.15. The CEMP outlines best practice measures for managing groundwater that is encountered and appropriate dewatering approaches for discharge from the site, and will be further informed by the forthcoming ground investigation. A CAR permit for abstraction would be required from SEPA when abstracting more than 10 m^3/day, although this quantity is considered unlikely at this stage. The discharge of groundwater would similarly require a CAR permit from SEPA for discharge. These consents would control any collection, treatment, sampling and discharge requirements of the abstracted groundwater.

12.6.2.16. Given the potential to encounter groundwater temporarily during construction, but that it would be appropriately managed in line with any required permit conditions and best industry practice as outlined in the CEMP, there is the likelihood of a temporary minor magnitude of impact on the high importance groundwater body. This results in a **slight adverse effect (not significant)** on the groundwater body.

12.6.2.17. Given that the identified private water supply to the west of the Proposed Development Site is upslope from the catchment (being located at approximately 60m AOD), the direction of groundwater flow is anticipated to be easterly towards the sea. As such, any minor dewatering on the Proposed Development Site is expected to have a negligible magnitude of impact on the private water supply. As a high importance receptor this again results in a **slight adverse effect (not significant)**. No other groundwater abstractions have been identified in the study area.

12.6.2.18. Issues related to groundwater contamination are considered in **Chapter 14: Ground Conditions** (EIA Report Volume 2).

12.6.3 OPERATION PHASE

12.6.3.1. During the operation phase the following potential water environment impacts may occur if appropriate mitigation is not applied:

- Impacts on receiving waterbodies from diffuse pollutants in surface water runoff, or because of accidental spillages;

- Changes in water quality within the Sandford Bay from operational abstractions and discharges from the Proposed Development Site including the discharge of treated process wastewater, water from the cooling system and foul water discharge;
- Increased demand for water supply that could impact on water resources;
- Potential morphological impacts to waterbodies; and
- Potential impacts to groundwater resources and private water supplies.

12.6.3.2. Impacts relating to atmospheric deposition from the Proposed Development to waterbodies are assessed in **Chapter 11: Biodiversity and Nature Conservation** (EIA Report Volume 2).

Potential Pollution of Surface Watercourses: Surface Water Routine Runoff and Accidental Spillages

12.6.3.3. Throughout its lifetime, the Proposed Development would be regulated by SEPA through a PPC Permit, which would include conditions relating to handling, storage and use of materials, including emergency procedures in line with the use of BAT. These measures would be in place to prevent pollution during plant operation in accordance with the permit.

12.6.3.4. The SuDS Strategy (contained within **Appendix 13B** EIA Report Volume 4) proposes to use SuDS (i.e. filter drains) and proprietary solutions to attenuate and treat surface water runoff prior to its discharge to Sandford Bay. This would avoid potential adverse effects on water quality. While SuDS are the preferred approach, space is a constraint on the existing power station site, and so proprietary systems are also required to achieve the necessary treatment in some areas.

12.6.3.5. Using the source-pathway-receptor approach, the source of pollution would be potential contaminants on impermeable surfaces (e.g. chemical spillages or hydrocarbons from vehicles deposited on roads) which are transferred through the pathway of surface water runoff to Sandford Bay (the receptor) via the existing surface water outfall, subject to consent from SEPA.

12.6.3.6. The SuDS Strategy (contained within **Appendix 13B** EIA Report Volume 4) indicates that filter drains are to be used to treat roof runoff from the Proposed Development, an ACO QuadraCeptor will be used for road runoff within the Proposed Development and a ACO QuadraCeptor and oil interceptor used for runoff from chemical storage and industrial areas. Locations of these features is to be determined during detailed design. All surface water discharge leaving the site is to be treated (with collected oil intermittently removed and disposed of off-site).

12.6.3.7. The SuDS Manual's Simple Index Approach (CIRIA, 2016) has been applied to assess the suitability of the indicative treatment trains for surface water runoff and spillages. CIRIA have developed a Simple Index Approach (SIA) Tool to apply this assessment, and land use categories and hazard indices used in the assessment are derived from this tool.

12.6.3.8. The Very Low Pollution Hazard level associated with the "*Commercial/Industrial roofing: inert materials*" category in the SIA tool has been applied to assess runoff from roofs. The Low Pollution Hazard level associated with "*Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)*" has been applied for assessing runoff from roads. For chemical storage areas the High Pollution Hazard level associated with "*Sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured*" is used, and for other industrial areas the High Pollution Hazard level associated with the "*Site where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured*" category in the SIA tool has been used.

12.6.3.9. Table 12.9a to Table 12.9c show the pollutant hazard index score for different pollutants for each category of land use. These tables also show the treatment potential of an ACO QuadraCeptor (treatment values derived from manufacturer's product details), oil interceptor and filter drains when compared against the pollution hazard index for each land use. To achieve a pass, the total (or aggregate) mitigation index of the treatment train must meet or surpass the pollution hazard index. Under the Simple Index Approach the effectivity of the second treatment component (i.e. the oil interceptor in the case of the chemical storage and industrial areas) is considered to be 50% compared to the first treatment component (i.e. the QuadraCeptor).

Table 12-9a: Pollution Hazard Indices and Total Pollution Index for each pollutant (Simple Index Approach) associated with runoff from chemical storage and industrial areas within the Proposed Development

Proposed Development Land Use (derived from CIRIA SIA tool)	Treatment	Mitigation		
		Total Suspended Solids	Metals	Hydrocarbons
Chemical Storage & other Industrial Areas				
Site where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; Other Industrial Site Areas	ACO QuadraCeptor	0.8	0.8	0.8
	Oil Interceptor (at 50% efficiency)	0.4	0.4	0.8
	Pollution Hazard Index	**0.8**	**0.8**	**0.9**
	Aggregate Mitigation Index	**1.0**	**1.0**	**1.2**
	Summary	With integration of a QuadraCeptor and appropriate oil interceptor runoff from chemical storage and other industrial areas would pass the water quality assessment (i.e. aggregate mitigation index > pollution hazard index)		

Table 12-10b: Pollution Hazard Indices and Total Pollution Index for each pollutant (Simple Index Approach) associated with runoff from roads within the Proposed Development

Proposed Development Land Use (derived from CIRIA SIA tool)	Treatment	Mitigation		
		Total Suspended Solids	Metals	Hydrocarbons
Roads				
Low traffic roads (e.g. residential roads and general access roads,	ACO QuadraCeptor	0.8	0.8	0.8
	Pollution Hazard Index	**0.5**	**0.4**	**0.4**

Proposed Development Land Use (derived from CIRIA SIA tool)	Treatment	Mitigation		
		Total Suspended Solids	Metals	Hydrocarbons
< 300 traffic movements/day)	**Aggregate Mitigation Index**	**0.8**	**0.8**	**0.8**
	Summary	With integration of a QuadraCeptor runoff from roads would pass the water quality assessment (i.e. aggregate mitigation index > pollution hazard index)		

Table 12-11c: Pollution Hazard Indices and Total Pollution Index for each pollutant (Simple Index Approach) associated with roofs within the Proposed Development

Proposed Development Land Use (derived from CIRIA SIA tool)	Treatment	Mitigation		
		Total Suspended Solids	Metals	Hydrocarbons
		Roofs		
Commercial/Industrial roofing: Inert materials	Filter Drains	0.4	0.4	0.4
	Pollution Hazard Index	**0.3**	**0.2**	**0.05**
	Aggregate Mitigation Index	**0.4**	**0.4**	**0.4**
	Summary	With integration of filter drains runoff from roofs would pass the water quality assessment (i.e. aggregate mitigation index > pollution hazard index)		

12.6.3.10. For all land use types, sufficient mitigation has been included for the water quality assessment to pass. It is recognised that treatment potential of oil interceptors will differ depending on the chosen product, however, most products would provide sufficient treatment for hydrocarbons to be confident that the treatment train passes the assessment. The appropriateness of the chosen product for providing the additional treatment required for runoff will be confirmed through consultation with SEPA.

12.6.3.11. Amines which are soluble are not included in the Simple Index Approach but would be captured in a closed loop system as per best practice and so would not impact the water environment.

12.6.3.12. The Drainage Strategy developed at the detailed design stage will ensure that suitable treatment is provided prior to discharge to Sandford Bay in order to not adversely impact water quality of receiving waterbodies.

12.6.3.13. Hazardous substances will be used on site. In each case the product will have a Material Safety Data Sheet providing guidance on safe disposal of waste chemicals. It is assumed that

during operation of the facility, the disposal of product containers and chemical waste will adhere to this guidance, and the impact avoidance measures above.

12.6.3.14. Spillages on the Proposed Development Site will be treated as per the pollution prevention measures described within Section 12.5, and spilt substances collected and disposed of as per their individual requirements. Areas where chemicals and liquid/powdered substances that could be harmful or toxic in the water environment (including where they exert a Biochemical Oxygen Demand) are stored, and thus spillages are possible, will be bunded, and oil interceptors will be fitted with alarms. Delivery areas would be kerbed and sloped to runoff into a catchment sump. Penstocks will be provided to isolate any spills or firewater in the surface water drainage system and prevent its discharge to the environment. Should any spillage occur then SEPA would immediately be informed.

12.6.3.15. A Surface Water Maintenance and Management Plan will be prepared during the detailed design phase to describe the requirements for access and frequency for maintaining drainage infrastructure proposed on the Site. The maintenance regime must be fully implemented throughout the lifetime of the Proposed Development to avoid issues such as blockages which could lead to flooding, or failure of the spillage containment and pollution prevention systems.

12.6.3.16. Given that the Drainage Strategy will have to meet standards required by the PPC Permit and the expected local policy requirements, and that measures will be in place for dealing with spillages and firewater then a negligible magnitude of impact is predicted to the large, tidal Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody) which has a large capacity to disperse and dilute pollutants. As a very high importance receptor, this would result in a **slight adverse effect (not significant)**.

Potential Impacts on water quality of Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody) from operational discharges

12.6.3.17. Treated process wastewater from the Proposed Development (the source in the source-pathway-receptor approach) will discharge (the pathway) to Sandford Bay (the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody) (the receptor) under a PPC Permit. This wastewater will be derived from DCC blowdown, HRSG blowdown, the demineralisation plant and WTW residuals. It is anticipated that the volume of discharge from the Proposed Development (i.e. cooling water and wastewater) will be 28 m^3/s at peak. This rate comprises overall discharge for the Proposed Development in combination with the existing Peterhead Power Station which may continue to operate in a limited capacity in parallel with the Proposed Development. It is expected that the peak discharge would occur intermittently. As such it is considered that the Proposed Development will be operating within the parameters of what was determined to be not significant for the existing Peterhead Power Station, where the existing permit (PPC/A/1008802) allows a maximum daily discharge of 107,000 m^3/hr (equivalent to 29.7 m^3/s).

12.6.3.18. Discharge of cooling water will require a permit from SEPA, which will specify the effluent quality required to maintain the status of the receiving waters. Treated process wastewater will be monitored prior to discharge in compliance with the conditions of this permit (as with the existing Peterhead Power Station).

12.6.3.19. Based on available data at the time of writing (February 2022), it is considered that there will be a negligible magnitude of impact on temperature status of Sandford Bay given that discharge temperature will be lower than that currently permitted (32ºC), and so the discharge would not worsen any existing impact of the power plant and will not present a barrier to fish movement. For the very high importance Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody), this negligible impact would give a **slight adverse effect (not significant)**.

Engagement with the relevant stakeholders – principally SEPA – will be undertaken to confirm the approach to assessment within the PPC Permit application.

12.6.3.20. There is further potential for physico-chemical water quality impacts at the Sandford Bay outfall, as discharged treated wastewater is likely to include that from:

- DCC Blowdown – effluent from which may include high concentrations of ammonia, dissolved carbon dioxide and other trace chemicals. Treatment options are being developed to be installed on Site which may include air, biological and/or thermal stripping of wastewater to achieve a preliminary 5 mg/L ammonia content;
- Demineralisation Plant and Condensate Polishing Plant Regeneration - effluent will be high in salt content, with a total dissolved solids (TDS) concentration typically in the region of 30,000 ppm. It is assumed that these wastewaters will be of low volume and will be neutralised and discharged to Sandford Bay as part of the cooling water discharge.
- HRSG Blowdown - effluent is likely to be low in TDS but contaminated with a range of trace chemical additives. Limited treatment of this wastewater will be required before discharge to Sandford Bay via the existing outfall. Options also being considered include recovery of this wastewater for process water make-up.
- Water Treatment Works (WTW) Residuals - effluent quantity and quality of the wastewater discharge from the WTW is highly dependent upon the salinity of the source and the required level of desalination. It is proposed to recover the wash water from the media filtration processes, along with sludge processing return liquors, to minimise waste discharge from the Proposed Development Site and to minimise water abstraction rates. The required WTW will vary depending on the type of water treatment option that is finally selected.

12.6.3.21. The total discharge rate of wastewater from the Proposed Development is expected to remain below 0.1m³/s and is expected to be discharged intermittently. Final rates will be confirmed during the detailed design of the Proposed Development.

12.6.3.22. The discharge from the Proposed Development has not yet been fully characterised and information relating to which chemicals will be used and their concentrations in the discharge will be determined at the detailed design phase. The Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody had a High status for physico-chemical elements when last classified in 2012, and a Pass status for specific pollutants. The Proposed Development must not lead to deterioration of this status or prevent future improvement. It will need to be demonstrated that the discharged effluent from the Proposed Development meets the required standards for a range of water quality indicators in order to obtain a permit for a consented discharge.

12.6.3.23. An on-site effluent treatment plant would be provided following BAT for treatment of effluent derived from the above processes. Water sampling facilities are to be provided for manual sampling of water prior to discharge. The frequency of testing and parameters will be agreed with the permitting authority. In situ continuous monitoring of parameters including flow, temperature, conductivity and pH shall also be undertaken, where appropriate. The exact nature of monitoring will be informed by ongoing consultation with SEPA as part of the permitting process.

12.6.3.24. Given the requirements for the effluent from the Proposed Development to meet conditions of a PPC Permit, it is considered that there is limited potential for pollution from the outfall, especially given the large capacity for dilution and dispersal offered by Sandford Bay (the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody). As such, a negligible impact is predicted at this stage, with no changes likely to impact on WFD classifications for the larger

waterbody. Given that the outfall is to a very high importance receptor, this results in a **slight adverse effect (not significant).**

Demand for Water

12.6.3.25. The existing Peterhead Power Station abstraction intake at Boddam Harbour will be used for the Proposed Development unchanged, and the abstraction volume will not exceed that of the existing licence (2,436.48 Ml/day). Given that the abstraction would be licensed by SEPA, a negligible magnitude of impact is predicted on water availability within Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody). This gives a **slight adverse effect (not significant)** as a very high importance receptor.

Foul Water Discharge

12.6.3.26. Foul water from welfare facilities will be treated on site using a package treatment plant (PTP) and discharged to Sandford Bay via the existing Peterhead Power Station outfall. Given the relatively small volumes involved it is assumed that there would be adequate capacity to discharge this within current PPC Permit standards. This will be confirmed through further design work at the detailed design stage and consultation with SEPA. On the basis that foul water will be treated on site prior to being discharged, the impact on Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody) is considered to be a negligible magnitude impact, resulting in a **slight adverse effect (not significant)**, as a very high importance receptor.

Watercourse Morphology: Re-routing of the Den of Boddam Burn culvert

12.6.3.27. The Den of Boddam Burn is culverted through the Proposed Development Site and discharges into Sandford Bay near Furrah Head (indicative existing route shown in **Figure 12.1** (EIA Report Volume 3)). To accommodate the Proposed Development infrastructure the culvert will be diverted and regraded from its existing route before returning to the existing discharge location at Sandford Bay.

12.6.3.28. The potential to daylight the watercourse has been explored but is not feasible on the basis of it passing through the operational power station site and vehicle movements and material deliveries will be required to cross the watercourse during routine operation of the plant (see **Appendix 13C** EIA Report Volume 4). As a result, there will essentially be a direct culvert replacement but along a new route. No currently open section of the channel will be culverted (i.e. there will be no extension of the culvert upstream to encompass any length of existing open watercourse). The culvert will maintain the existing hydraulic gradient overall. It will be appropriately sized to enable the hydrological and sediment regimes to be maintained and to ensure no increase in flood risk.

12.6.3.29. The Den of Boddam Burn is a low importance receptor for morphology because of its already heavily modified nature, including the culvert beneath the existing power station and the straightened nature of the channel upstream of the Proposed Development Site. The loss of the existing channel will lead to minor alternations to the existing hydrological and sediment regime that has developed within the culvert, and any habitat developed within it, albeit this would be extremely limited by the lack of light. Given the like-for-like nature of this change, along with potential for design improvements for the new culvert, any adverse impact is considered of minor magnitude, resulting in a **neutral effect (not significant)**. No other morphological impacts to watercourses are predicted.

Groundwater Resources

12.6.3.30. While there would be potential for groundwater flows to be intercepted during construction of excavations for the Proposed Development (for example for the new culvert of the Den of

Boddam Burn and building foundations) as discussed above, once the Proposed Development is operational and the ground reprofiled, it is considered there would be negligible magnitude of impacts to groundwater which would continue to flow towards the sea as is currently the case. As a high importance receptor this negligible impact would result in a **slight adverse effect (not significant**) in EIA terms. There would be no impact anticipated to the private water supply to the west of the Proposed Development.

12.6.3.31. Issues related to groundwater contamination are considered in **Chapter 14: Ground Conditions** (EIA Report Volume 2).

12.6.4 DECOMMISSIONING PHASE

12.6.4.1. At the end of its operating life, all above-ground equipment associated with the Proposed Development will be decommissioned and removed from the Proposed Development Site. There is therefore opportunity to restore the banks of waterbodies where infrastructure is removed (e.g. abstraction and discharge infrastructure). It is assumed that all underground infrastructure will remain in-situ, however, all connection and access points will be sealed or grouted to ensure disconnection.

12.6.4.2. On this basis, decommissioning impacts are expected to be limited to waterbodies in close proximity to the Proposed Development Site (i.e. the Den of Boddam Burn and Sandford Bay), and will be similar to the impacts reported for the construction phase, but with fewer earthworks, excavations and pipework arisings to manage.

12.6.4.3. A detailed Decommissioning Environmental Management Plan (DEMP) will be prepared to identify required measures to prevent pollution during this phase of the development, based on the detailed decommissioning plan.

12.6.4.4. There may be marginal improvements to the water quality of the Den of Boddam Burn and Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody) waterbodies following decommissioning of the Proposed Development given that the proposed abstraction/ discharges will be ceasing. However, any such change will be negligible given that no significant adverse effects have been identified. For the very high importance Sandford Bay (Ugie Estuary to Buchan Ness (Peterhead)) Coastal WFD waterbody this negligible magnitude impact is a **slight beneficial effect (not significant)**. For the medium importance (for water quality) Den of Boddam Burn this also gives a **slight beneficial effect (not significant)**.

12.7. MITIGATION, MONITORING AND ENHANCEMENT MEASURES

12.7.1 CONSTRUCTION PHASE

12.7.1.1. Mitigation of adverse impacts on the water environment during the construction phase will be achieved principally through embedded measures identified in Section 12.5, notably the adoption of a CEMP and WMP.

12.7.1.2. A water quality monitoring programme will be set out in the WMP. This will need to be developed by the Principal Contractor in consultation with SEPA during the process of obtaining CAR permits for works affecting, or for temporary discharges to, waterbodies during the construction period.

12.7.1.3. At this stage the programme will include:

- Daily observations and monitoring using a calibrated, handheld water quality probe through the upstream and downstream reaches of water features hydrologically connected to the Site (principally the Den of Boddam Burn).
- Water quality sampling for laboratory analysis will be undertaken on a periodic as well as ad-hoc basis, dependent upon circumstances / activities onsite.
- Monitoring and sampling will be undertaken prior to the commencement of construction to allow a sufficient baseline understanding, with a minimum of 6 months monitoring required..

12.7.2 OPERATION PHASE

12.7.2.1. It is assumed that the need for long term water quality monitoring will be set out and agreed with SEPA through the PPC Permit.

12.8. CUMULATIVE EFFECTS

12.8.1 INTRODUCTION

12.8.1.1. This section of the chapter assesses the potential effects of the Proposed Development in combination with the potential effects of other development schemes (referred to as 'cumulative developments') within the surrounding area, as listed within **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4). Of those developments listed, the following are considered to have potential for cumulative effects on the water environment, due to being located in the study area or which might drain to Sandford Bay, the Den of Boddam Burn or its upstream tributaries:

- APP/2019/0982 - Application for Erection of Electricity Substation Comprising Platform Area, Control Building, Associated Plant and Infrastructure, Ancillary Facilities, Landscape Works and Road Alterations and Improvement Works – to be undertaken north of the electricity substation at the eastern extent of the Proposed Development Site boundary. Construction started in February 2021 and will take up to 30 months, and so there could be some temporal overlap during construction. Operational surface water drainage is assumed to be directed to the Den of Boddam Burn / Sandford Bay.
- APP/2018/1831 - National for Installation of Underground HVDC Cables | Landing At Shoreline At Land To The South Of Boddam, Peterhead, Travelling To Site At Four Fields, Boddam, Peterhead – the onshore elements of this scheme are partly within the catchment of the Den of Boddam Burn, and so cumulative impacts are possible. Construction is planned to commence between 2021 and 2024, and last 30 months, and so there is likely to be temporal overlap during construction. Operational surface water drainage is assumed to be directed to the Den of Boddam Burn.
- APP/2018/1288 - Formation of Supply Base Including Provisions for Warehousing, Offices and Pipe Storage without Compliance with Condition 3 (Investigation of Potentially Contaminated Sites) and Condition 4 (Remedial Works) of Permission Reference APP/2015/0327. This development would discharge surface water to the River Ugie catchment, and on to the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody as a downstream receptor where there is potential for cumulative effects.
- ENQ/2021/1139 - Residential Mixed Use Development Comprising Circa 800 Residential Homes, a Local Neighbourhood Centre, Land reserved for Employment Purposes, a Primary School and a Possible Future Rail Halt, Associated Roads and Drainage Infrastructure, New Landscaping and Open Spaces and a Local Nature Reserve. This development would discharge surface water to the River Ugie catchment, and on to the

Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody as a downstream receptor where there is potential for cumulative effects.

- APP/2015/1121 – North Connect Converter Station. Operational surface water drainage is to be directed to an unnamed burn which appears to be a tributary of the Den of Boddam Burn and will ultimately discharge to Sandford Bay.
- APP/2021/2681 - Erection of HVDC Electrical Converter Station and Associated Access Tracks, Drainage Works and Landscaping Including Enclosure. This development would discharge surface water to an unnamed drain which then flows through the north of the Proposed Development, and on to the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody as a downstream receptor.
- APP/2021/2392 - Construction of Synchronous Condenser and Associated Infrastructure at Land to the east of Buckie Farm, Boddam. This development would discharge surface water to an unnamed drain which then flows through the north of the Proposed Development, and on to the Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody as a downstream receptor.

12.8.2 CUMULATIVE EFFECTS DURING CONSTRUCTION

12.8.2.1. There is likely to be overlap between construction of some of these adjacent schemes and construction of the Proposed Development. Thus, there is the potential for short term, temporary construction related pollutants generated from both the Proposed Development and all the above schemes to impact on watercourses in the study area (with watercourses affected included in the list above). However, it is reasonable to assume that standard and good practice mitigation is implemented on the above construction sites through their respective CEMPs and as per the conditions of the relevant planning permission, environmental permits and licences, as is being proposed for this development. The cumulative risk can be therefore be effectively managed and there would not be a significant increase in the risks to any waterbodies. As such, there would not be any additional cumulative impacts during construction on the basis of the above assessment.

12.8.1 CUMULATIVE EFFECTS DURING OPERATION

12.8.1.1. It is reasonable to assume that drainage strategies for all of the above developments have been or will be produced with reference to the relevant policies and guidance documents outlined in Section 12.2. The Proposed Development assessed in this chapter will similarly be designed to ensure no long-term deterioration in surface or groundwater water quality. Attenuation and treatment will be provided for runoff from the Proposed Development prior to discharge to Sandford Bay. As such, provided that all the mitigation measures are implemented for all schemes, then the cumulative impacts from the Proposed Development and the above schemes will not lead to any significant effects.

12.9. LIMITATIONS OR DIFFICULTIES

12.9.1 SUMMARY

12.9.1.1. This assessment has been undertaken using available data and Proposed Development design details. However, at this concept design stage, details of the Proposed Development remain uncertain or under development, e.g. final process water treatment systems and design of drainage arrangements. For this reason, as described in Section 12.3, reasonable worst-case assumptions have been used following the Rochdale Envelope approach.

12.10. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

12.10.1 SUMMARY

12.10.1.1. A summary of residual effects on water quality and water resources and their significance is provided in Table 12.10.

12.10.1.2. No significant residual effects have been identified to the water environment given the implementation of the mitigation measures described within this chapter (Section 12.5) and **Appendix 12A** (including Conceptual Drainage Strategy) (EIA Report Volume 4).

Table 12-12: Summary of Residual Impacts and Effects

Description of Effect	Importance of Receptor	Magnitude of Impact	Initial Classification of Effect (with embedded mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
CONSTRUCTION					
Surface Water Quality – suspended fine sediments	Den of Boddam Burn – Medium; Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Very High; Unnamed drains / ditches - Low	Den of Boddam Burn – Minor; Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Negligible; Unnamed drains / ditches – Negligible	Den of Boddam Burn – **Slight adverse** (not significant); Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant); Unnamed drains / ditches – **Neutral** (not significant).	Further to the implementation of the CEMP and WMP (embedded mitigation), water quality monitoring pre-construction and during construction will be undertaken.	Den of Boddam Burn – **Slight adverse** (not significant); Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant); Unnamed drains / ditches – **Neutral** (not significant).
Surface Water Quality – chemical spillages	Den of Boddam Burn – Medium; Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Very High; Unnamed drains / ditches - Low	Den of Boddam Burn – Negligible; Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Negligible; Unnamed drains / ditches – Negligible.	Den of Boddam Burn – **Neutral** (not significant); Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant); Unnamed drains / ditches – Neutral (not significant).	Further to the implementation of the CEMP and WMP (embedded mitigation), water quality monitoring pre-construction and during construction will be undertaken.	Den of Boddam Burn – **Neutral** (not significant); Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant); Unnamed drains / ditches – **Neutral** (not significant).
Groundwater Resources (PWS)	Groundwater – High; PWS - High	Groundwater aquifer – Minor PWS- Negligible	Groundwater aquifer – **Slight adverse** (not significant) PWS – **Slight adverse** (not significant)	No further mitigation other than implementation of measures outlined in the CEMP.	Groundwater aquifer – **Slight adverse** (not significant) PWS – **Slight adverse** (not significant)
OPERATION					

Description of Effect	Importance of Receptor	Magnitude of Impact	Initial Classification of Effect (with embedded mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
Potential Pollution of Surface Watercourses: Routine Runoff and Accidental Spillages	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Very High	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Negligible	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant)	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant)
Potential Impacts on Water Quality of Sandford Bay from Operational Discharges	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Very High	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Negligible	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant)	Implementation of Drainage Strategy during detailed design (embedded mitigation).	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant)
Foul Water Discharge to Sandford Bay	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Very High	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Negligible	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant)	Consultation with SEPA regarding discharge permitting requirements	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant)
Demand for Water	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Very High	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – Negligible	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant)	Consultation with SEPA regarding abstraction permitting requirements	Sandford Bay / Ugie Estuary to Buchan Ness (Peterhead) Coastal WFD waterbody – **Slight adverse** (not significant)
Watercourse Morphology: Re-Routing of the Den of Boddam Burn Culvert	Den of Boddam Burn – Low Importance (for morphology)	Den of Boddam Burn – Minor Adverse	Den of Boddam Burn – **Neutral** (not significant)	Water quality monitoring pre-construction and during construction will be undertaken.	Den of Boddam Burn – **Neutral** (not significant)

Description of Effect	Importance of Receptor	Magnitude of Impact	Initial Classification of Effect (with embedded mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
Groundwater Resources (PWS)	Groundwater – High; PWS - High	Groundwater aquifer – Negligible PWS - No Impact	Groundwater aquifer – **Slight adverse** (not significant) PWS – No impact	None proposed	Groundwater aquifer – **Slight adverse** (not significant) PWS – No impact

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Environmental Impact Assessment Report
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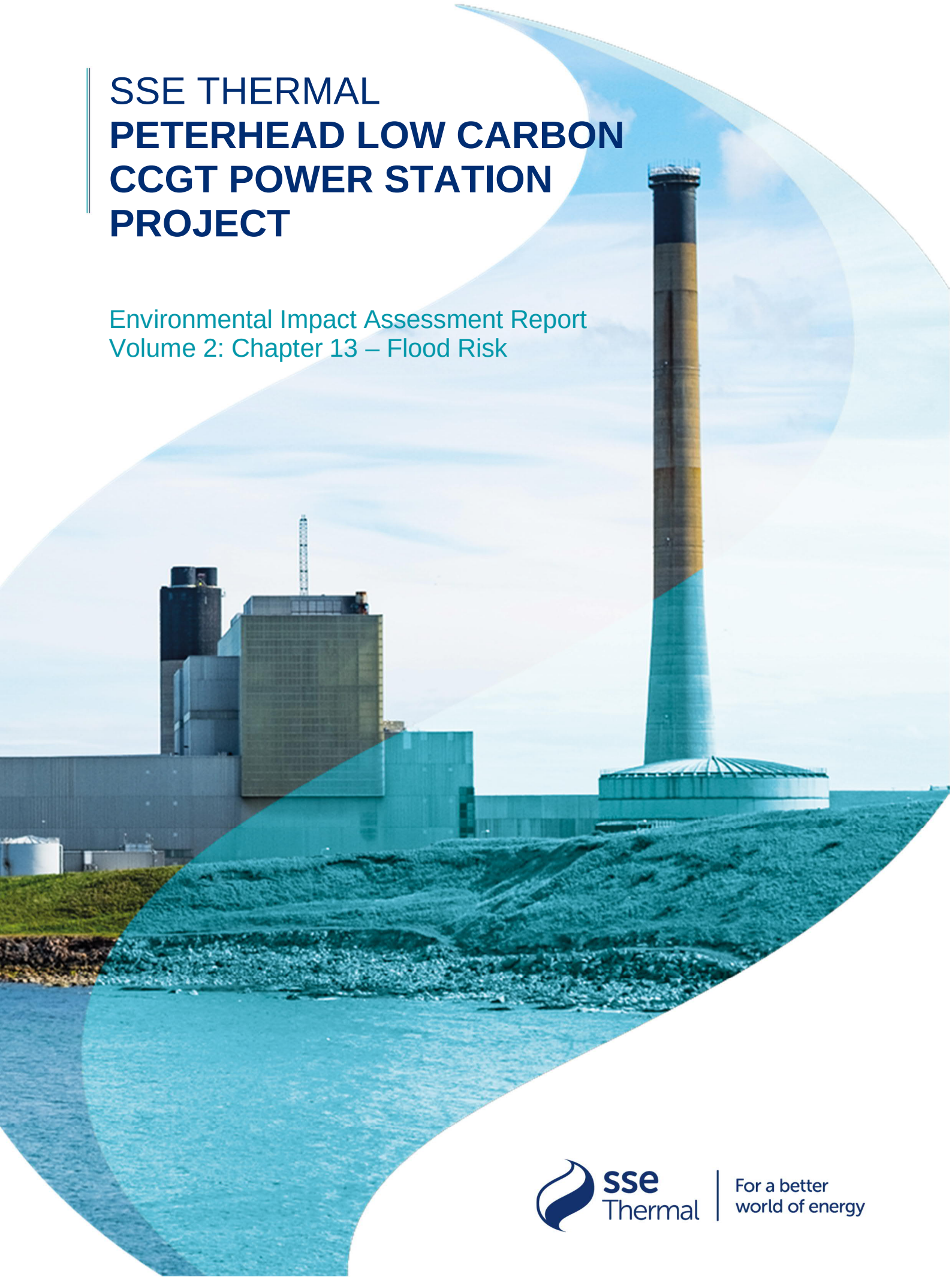

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CONTENTS

TABLES

13. Flood Risk

13.1. INTRODUCTION

13.1.1 INTRODUCTION

13.1.1.1. This chapter of the EIA Report provides an assessment of the potential effect on flood risk to and from the Proposed Development. This chapter should be read in conjunction with **Chapter 12: Water Environment** (EIA Report Volume 2).

13.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

13.2.1 INTRODUCTION

13.2.1.1. A full overview of the legislative and policy context that is relevant to the Proposed Development is provided within **Chapter 7: Legislative Context and Planning Policy** (EIA Report Volume 2).

13.2.1.2. A summary of the legislation and planning policy relevant to the assessment of potential impacts on flood risk to and from the Proposed Development is provided in this section. These have been considered in the assessment.

- Water Framework Directive 2000/60/EC (WFD); transposed into the Water Environment and Water Services Act (Scotland) 2003, as amended ('the WEWS Act').
- Linked to the WFD and WEWS Act, the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR), as amended, ('the CAR Regulations').
- The European Union (EU) Floods Directive 2007/60/EC; transposed by the Flood Risk Management (Scotland) Act 2009, as amended, ('the Flood Risk Management Act') and linked to this, the Flood Risk Management (Flood Protection Schemes, Potentially Vulnerable Areas and Local Plan Districts) (Scotland) Regulations 2010, as amended.

13.2.1.3. This legislation aims to protect and enhance the status of aquatic ecosystems, prevent further deterioration to such ecosystems, promote sustainable use of available water resources, and contribute to the mitigation of floods and droughts.

13.2.2 NATIONAL PLANNING POLICY AND GUIDANCE

13.2.2.1. The purpose of Scottish Planning Policy (SPP) is to set out national planning policies which reflect Scottish Ministers' priorities for the operation of the planning system and for the development and use of land. The relevant policy principles to the water environment are the presumption in favour of development that contributes to sustainable development, taking account of flood risk, and the protection and improvement of the water environment.

13.2.2.2. Scottish Government Planning Advice Notes (PANs) provide national guidance on various topics, those relevant to the water environment are:

- PAN 1/2013 - Environmental Impact Assessment (2013).
- PAN 51 - Planning, environmental protection and regulation (2006).
- PAN 61 - Sustainable Urban Drainage Systems (2001).
- Flood risk: planning advice (2015).
- PAN 79 - Water and drainage (2006).

13.2.2.3. Scottish Environment Protection Agency (SEPA) has published several documents and good practice guides to support planning and the implementation of the CAR Regulations. These include:

- SEPA (2020). Flood Risk Standing Advice for Planning Authorities and Developers.
- SEPA (2018). Flood Risk and Land Use Vulnerability Guidance.
- SEPA (2019). Technical Flood Risk Guidance for Stakeholders.

13.2.2.4. Other relevant national guidance includes:

- SNH (2018) Environmental Impact Assessment Handbook.
- The Construction Industry Research and Information Association CIRIA (2015) C753 The SuDS Manual.
- Delivering Sustainable Flood Risk Management (Scottish Government) (Feb 2019).
- Surface Water Management Planning Guidance (Scottish Government) (Sept 2018).

13.2.3 LOCAL POLICY

Aberdeenshire Council Local Development Plan

13.2.3.1. Aberdeenshire Council's Local Development Plan (2017) sets out a policy framework for managing flooding risk (Policy C4). Relevant extracts from this policy framework are set out below:

- Policy C4 outlines the process to be undertaken to assess flood risk, and the requirement for ensuring development is resilient, that developments should provide buffer strips and the use of Sustainable Urban Drainage System (SuDS), and that the principals of lands raising, and compensatory storage are followed.

Draft Aberdeenshire Council Local Development Plan 2022

13.2.3.2. Aberdeenshire Council's Proposed Local Development Plan (2022) sets out a policy framework for managing flooding risk (Policy C4) and is in line with the current LDP (2017).

Aberdeen City and Shire Strategic Development Plan

13.2.3.3. The plan sets out the objectives for the local region, including for Sustainable Development and Climate Change. As part of this objective, one of the targets is:

- "To avoid developments on land which is at an unacceptable risk from coastal or river flooding (as defined by the 'Indicative River and Coastal Flood Map for Scotland' or through a detailed flood risk assessment), except in exceptional circumstances."

North East Local Plan District – Local Flood Risk Management Plan 2016 – 2022

13.2.3.4. As part of the Flood Risk Management Act (2009), local authorities alongside other statutory bodies are required to produce local flood risk management plans, setting out the scale of the flooding issue in the region and the actions in place or planned to reduce and manage this risk. Peterhead, Stirling Boddam and the Proposed Development are within Potentially Vulnerable Area 06/08, with surface water flooding the dominant issue for the area.

Aberdeenshire Council SuDS Guidance

13.2.3.5. The Aberdeenshire Council: Drainage Impact Assessment (2002) document was produced to assist developers and agents, and others involved in approving waste and surface water drainage facilities for new development. The guidance highlights general requirements for surface water runoff, as well as further technical requirements and design considerations.

13.3. ASSESSMENT METHODOLOGY

13.3.1 INTRODUCTION

13.3.1.1. This section presents the following:

- Details of consultation undertaken with respect to flooding.
- The methodology behind the assessment of flooding impact, including the criteria for the determination of the significance of the receptor and the magnitude of change from the baseline condition.
- An explanation as to how the identification and assessment of flooding effects has been reached.
- The significance criteria and terminology for assessment of the residual effects to the water environment.

13.3.2 CONSULTATION

13.3.2.1. A Scoping Report was issued to Aberdeenshire Council for comment in May 2021 and comments have been received. The comments relevant to flood risk are outlined in Table 13.1 below and specific responses provided. Scoping responses are included in **Appendix 1B** (EIA Report Volume 4).

Table 13-1: Summary of scoping responses

Organisation	Comment	AECOM Response
Aberdeenshire Council	The contents of Chapter 12 are noted. The baseline within Section 12.2 appears correct, however I will draw your attention to flooding instances affecting the A90, local homes and playing field at the nearby Stirling Village which may need to be considered.	Further information has been requested from Aberdeenshire Council and is shown in Section 13.4.
	The proposed surveys, desk studies, site visits and modelling outlined within Section 12.5 are appropriate. Infrastructure Services (Flood Risk and Coast Protection) request the submission of a Flood Risk Assessment and full details of the proposed means of surface water drainage, including SUDS, within the EIA Report.	Included in **Appendix 13A and Appendix 13B** (EIA Report Volume 4)
	The potential impacts during the construction and operational phases of the development, including increased surface water runoff, increased flows and increased vulnerability to flooding events are noted. Mitigation through surface water management and drainage systems appears reasonable, however any additional mitigation required (identified through FRA and other assessments) should be included within the proposal and highlighted within the EIA Report.	Noted, this has been provided in **Appendix 13A and 13B** (EIA Report Volume 4) and is part of the assessment in Section 13.6
	It is advised that contact be made with Infrastructure Services (Flood Risk and Coast Protection) to discuss the proposals and any potential mitigation to avoid impact upon	Contact has been made and a brief record of flood events

Organisation	Comment	AECOM Response
	the area prone to flooding at Stirling Village. Contact can be made via flooding@aberdeenshire.gov.uk.	has been provided in Section 13.4.
Scottish Environment Protection Agency	We note and welcome a Flood Risk Assessment will be carried out and submitted as part of the application.	Included in **Appendix 13A** (EIA Report Volume 4).
	We note the presence of one watercourse, the Den of Boddam Burn, which is culverted through the existing power station site and that realignment of the burn is required to enable the proposed development. We would very much welcome the investigation into the possibility of opening up of this watercourse as part of any realignment, part or whole, and for an investigation into whether the burn can be redirected to its historical course as a possible environmental enhancement to the development.	Noted, this has been assessed and is included as **Appendix 13C** (EIA Report Volume 4).
Scottish Water	**Surface Water** For reasons of sustainability and to protect our customers from potential future sewer flooding, Scottish Water will not accept any surface water connections into our combined sewer system. There may be limited exceptional circumstances where we would allow such a connection for brownfield sites only, however this will require significant justification from the customer taking account of various factors including legal, physical, and technical challenges. To avoid costs and delays where a surface water discharge to our combined sewer system is anticipated, the developer should contact Scottish Water at the earliest opportunity with strong evidence to support the intended drainage plan prior to making a connection request. We will assess this evidence in a robust manner and provide a decision that reflects the best option from environmental and customer perspectives.	Noted, surface water is to be treated and discharged via the existing outfall. See Section 13.5. and **Appendix 13C** (EIA Report Volume 4).

13.3.3 STUDY AREA

13.3.3.1. The Proposed Development Site comprises land within and adjacent to the boundary of the existing Peterhead Power Station site near Peterhead, Aberdeenshire and falls within the administrative area of Aberdeenshire Council. The Proposed Development Site is approximately centred on national grid reference (NGR) 412597, 842972 and is shown in **Figure 1.1: Site Location** (EIA Report Volume 3). The town of Peterhead is 1.5km north of The Proposed Development Site. West of the A90, the landscape is more rural, composed of single-track roads and agricultural fields. To the south of Boddam is an area of undeveloped coastal land.

13.3.3.2. The Proposed Development Site boundary is shown on **Figure 3.1: Proposed Development Site Boundary** and **Figure 3.2: Aerial Photo of Proposed Development Site** (EIA Report Volume 3).

13.3.3.3. The Den of Boddam Burn is the closest watercourse to the Proposed Development Site. It historically ran from Millbank in a northerly direction to Sandford Lodge and discharged into the North Sea. As part of the development of the existing Peterhead Power Station, the watercourse was culverted and discharges further to the south-east near Furrah Head.

13.3.3.4. For the purposes of this assessment, a study area of circa 1km from the Proposed Development Site has been considered to identify areas of flood risk or routes for flood flows to and from the Proposed Development. However, where relevant, the assessment also considers a wider study area based on professional judgement to account for any relevant flooding issues.

13.3.4 IMPACT ASSESSMENT METHODOLOGY

13.3.4.1. This section of the chapter presents the following:

- The basis of the assessment;
- Identification of the information sources used to inform the assessment;
- Assessment methodology;
- An explanation as to how the identification and assessment of flood risk effects has been reached; and,
- The significance criteria and terminology for assessment of the residual effects on flood risk.

Basis of Assessment

13.3.4.2. The following sources of information that define the Proposed Development have been reviewed and form the basis of this assessment:

- **Chapter 4: The Proposed Development** (EIA Report Volume 2);
- **Figure 3.1: Proposed Development Site Boundary** (EIA Report Volume 3);
- **Figure 3.3: Proposed Development Site: Indicative Layout** (EIA Report Volume 3);
- **Figure 4.3: Den of Boddam Burn Diversion** (EIA Report Volume 3); and
- **Figure 12.1: Water Resource Features and their Attributes** (EIA Report Volume 3).

Desk Study

13.3.4.3. Desk based research has been undertaken to identify the risk of flooding within and adjacent to the Proposed Development Site, and to gather and critically evaluate relevant data.

13.3.4.4. In summary, the key background reports, websites and data used include the following (all web sources last accessed in December 2021):

- SEPA Scotland's Environment Web Map;
- Online Ordnance Survey (OS) maps and aerial photography;
- Aberdeenshire Council Biennial Reports (2005, 2007 and 2009);
- Flood history provided by Aberdeenshire Council;
- Strategic Flood Risk Assessment, Aberdeenshire Councill (2019); and,
- AECOM Flood Risk Assessment, 2021 in **Appendix 13A** (EIA Report Volume 4).

Site Surveys

13.3.4.5. A site walkover was undertaken on 17th August 2021 by a water scientist and hydromorphologist in wet and windy conditions following a week of dry weather. The walkover focused on surface waterbodies in the study area, observing their current character and condition, the presence of existing risks and any potential pathways for construction and operational impacts from the Proposed Development. Potential alternative routes for the Den of Boddam Burn were also assessed during the visit.

13.3.4.6. The assessment of potential effects on flood risk has been carried out with reference to the guidance and techniques presented within the 'Design Manual for Roads and Bridges' (DMRB), 'LA 113 Road drainage and the water environment' (Highways Agency, 2020).

13.3.4.7. The DMRB methodology considers the importance or sensitivity of receptors and the magnitude of predicted impacts on flood risk. Importance/sensitivity is based on the value of the feature or resource, whilst the magnitude of a potential impact is estimated based on the degree of effect and is independent of the importance of the feature.

13.3.4.8. The predicted effects arising from the construction and operation phases of the Proposed Development have been assessed using the impact assessment methodology as set out within **Chapter 2: Assessment Methodology** (EIA Report Volume 2).

13.3.4.9. Following these criteria, the magnitude of impact (Table 13.2) and the receptor sensitivity (Table 13.3) are determined independently from each other, and the results from each are then used to determine the overall significance of effects using the matrix presented in Table 13.4.

13.3.4.10. Where significant adverse effects are predicted, options for mitigation have been considered and committed to where possible. The assessment considers all embedded mitigation that is either integrated into the design or a standard control measure (such as good practice guidance for construction works). The residual effects of the Proposed Development, with any additional mitigation in place, are then reported.

Magnitude of Impact

13.3.4.11. The magnitude of impact will be determined based on the criteria in Table 13.2, considering the likelihood of the impact occurring. The likelihood of an effect occurring is based on a scale of certain, likely or unlikely. Consideration is also given to the duration and reversibility of the impact, as well as consideration of relevant legislation, policy and guidelines.

Table 13-2: Magnitude of impact

Magnitude of impact	Descriptor
High	Total loss or major alteration to key elements/features of the baseline conditions, such that post development character/composition of baseline condition will be fundamentally changed. For example: Increase in peak flood level (1% annual probability) >100 mm.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions, such that post development character/composition of the baseline condition will be materially changed. For example: Increase in peak flood level (1% annual probability) >50 mm.

Magnitude of impact	Descriptor
Low	Minor shift away from baseline conditions. Changes arising from the alteration will be detectable, but not material; the underlying character/composition of the baseline condition will be similar to the pre-development situation. For example: Increase in peak flood level (1% annual probability) >10mm.
Very Low	Very little change from baseline conditions. Change is barely distinguishable, approximating to a 'no change' situation. For example: No measurable effect on flood risk.

Receptor Sensitivity

13.3.4.12. The importance of the baseline conditions is assessed according to the relative sensitivity of existing flood risk receptors on or near to the Proposed Development Site. A level of sensitivity (high to very low) is assigned to the receptor based on the SEPA Land Use Classification and modified from the DMRB guidance to match SEPA terminology (Table 13.3).

Table 13-3: Sensitivity of receptor

Value of receptor	Criteria	Example resource / sensitive receptor
High	Nationally significant attribute of high importance	Essential infrastructure or most vulnerable development
Medium	Locally significant attribute of high importance	Highly vulnerable development
Low	Of moderate quality and rarity	Least vulnerable development
Very Low	Lower quality	Water compatible development

13.3.4.13. The significance of effect has been determined using the matrix presented in Table 13.4. For the purposes of this EIA, effects predicted to be 'Minor' or 'Negligible' are generally considered to be 'Not Significant'. Effects assessed as either 'Moderate' or 'Major' are generally considered to be 'Significant'.

Table 13-4: Classification of effects

Magnitude of Impact	Sensitivity / Importance of Receptor			
	High	**Medium**	**Low**	**Very Low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

13.3.5 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

13.3.5.1. The assessment has been undertaken using available data and Proposed Development design details at the time of writing in February 2022. It is also based on understanding of flow pathways as observed during the site walkover. Assumptions have been made regarding flow pathways for culverted sections of the Den of Boddam Burn, based on Ordnance Survey mapping and topographic data. Understanding of flow pathways is described in the baseline (Section 13.4).

13.3.5.2. Surface water drainage from the Proposed Development will be discharged to Sandford Bay via the existing outfall.

13.3.5.3. As an Engineering, Procurement and Construction (EPC) contractor has not yet been appointed, construction method statements are not available at this time, and therefore reasonable assumptions have been made that all works will take place using best practice. Such measures are set out in the Framework CEMP (**Appendix 5A** EIA Report Volume 4).

13.4. BASELINE CONDITIONS

13.4.1 OVERVIEW

13.4.1.1. The baseline site and flood risk conditions relevant to the assessment are outlined below.

13.4.2 TOPGRAPHY

13.4.2.1. The existing Power Station is on a lowered platform at between 8.8-9mAOD, surrounded by raised screening bunds and profiled ground to the south and west (see **Figure 13.1** EIA Report Volume 3). The site of the Proposed Development is currently at an elevation of between 15.4-15.6mAOD. The existing access road to the Peterhead Power Station is bound by the screening landforms, running from around 26.7mAOD to 9mAOD and is therefore a low-lying, down-slope route into the existing Power Station. At the A90 and around the Millbank Garage, ground levels are relatively flat and low lying compared to surrounding ground, with slopes to the south and east, and screening landforms to the north and west.

13.4.3 FLUVIAL FLOOD RISK

13.4.3.1. The following watercourses are within the 1km study area; generally rising to the west and discharging to the coast on the east:

- Invernettie Burn;

- Den of Boddam Burn; and
- Drains and ditches.

13.4.3.2. The Invernettie Burn rises to the north of Mountpleasant, approximately 4km to the east of the Proposed Development Site. The watercourse flows to the east before turning north to join a tributary form Grange Moss and a second tributary flowing from Saddle Hill before crossing the A90. The watercourse has been historically modified for much of its length and particularly through Whitehill. The final reach of the burn is culverted before being discharged to the coast adjacent to the sewage treatment works. SEPA online flood maps indicate that floodplain flow from the Invernettie Burn occurs all along its course but is particularly notable upstream of the A90 and through Whitehill and adjacent industrial areas. The Invernettie Burn is hydraulically disconnected from the Proposed Development Site due to topography and therefore flooding from the burn is not predicted to affect the Proposed Development Site.

13.4.3.3. The Den of Boddam Burn rises to the south of Wellsforest Farm, located to the south-west of Boddam at around 70mAOD. The burn has been historically modified to facilitate industry and is therefore realigned. It enters a culvert within the Millbank Garage site for approximately 43m before discharging to an open channel for approximately 44m. At the A90, the burn enters an arch culvert which conveys it to a twin Armco culvert located on the grassed verge on the north side of the A90. This culvert conveys the burn through the Proposed Development Site to the coastline where it discharges to the sea at around 6mAOD.

13.4.3.4. The burn is generally confined in the valley setting and therefore there is only minor floodplain in the upper reaches. SEPA flood maps show that towards the A90, upstream of Millbank, out of bank flooding occurs from the high likelihood event (10% AEP). This is confirmed by hydraulic modelling undertaken for the FRA provided in **Appendix 13A** (EIA Report Volume 4). Spill first occurs from the culverted length of burn alongside the Millbank Garage site and flows overland through the Garage complex to the A90. A secondary flow route occurs down the access road beside Millbank to the A90. In the 10% AEP event, surface water flooding occurs along the existing access road to the Peterhead Power Station. This may be fluvial flooding caused by lack of capacity of the culvert, resulting in flow along the road but is not represented as such. Flood extents for the 0.5% and 0.1% AEP events are shown as fluvial and are the same for both events. Flow spills out of bank at Millbank, travels through the Millbank Garage complex, building up along the A90 and spilling down the existing access road to the existing Power Station. Floodwater is then shown to inundate the existing Power Station, within the area of lowered ground before spilling out to the coast. The water level on the existing Power Station site is predicted to be 8.98mAOD in a 0.5% AEP event with an allowance for climate change.

13.4.3.5. There are numerous ditches and drains identified using maps/aerial photography within the study area as outlined in **Figure 12.1** (EIA Report Volume 3). Many of the drains and ditches are agricultural or relate to historical quarrying activity. They are generally expected to have minimal flow, and many are likely to be ephemeral (i.e. flowing for only part of the year or only after storms). These watercourses are not discretely modelled as part of SEPA flood mapping, however, in places they may be associated with surface water flooding.

13.4.4 COASTAL FLOOD RISK

13.4.4.1. The Proposed Development Site is located directly adjacent to the Aberdeenshire coastline; however, the topography is such that it is unaffected by coastal flooding. Adjacent low-lying areas are likely to be affected by coastal flooding, including the footpath below the existing Power Station and at Boddam Harbour, however this is limited, and ground levels generally rise

steeply from the shore. No properties or infrastructure appear to be at risk from coastal inundation within the study area.

13.4.4.2. Historic coastal flood events related to wave overtopping have occurred at Roanheads in Peterhead, which is approximately 2km to the north of the Proposed Development Site. There are no records of coastal flooding events in the study area.

13.4.5 PLUVIAL FLOOD RISK

13.4.5.1. Surface water flooding is predicted to occur across the study area, including the existing Power Station and Proposed Development Site in a range of AEP events. The corridor of the Den of Boddam Burn is not discretely modelled as part of SEPA flood maps and is therefore shown to be subject to pluvial flooding however in reality, this is likely to be predominantly fluvial.

13.4.5.2. Ground levels at the existing Power Station are lower than surrounding land, and therefore flow travels towards it and ponds here. Pluvial flooding occurs from a high probability event (10%AEP) and therefore the existing Power Station is highly vulnerable to pluvial flooding.

13.4.5.3. Low lying areas related to historic infrastructure at the Proposed Development Site are currently at risk of pluvial flooding at a range of AEP events, although this area is disconnected from flooding at the existing Power Station due to topography.

13.4.5.4. The A90 within the study area is shown to flood extensively from pluvial sources in a range of AEP events. Land to the south-west side is higher and mounding of land around the existing Power Station on the north-east side may have resulted in the road lying in a slight depression, causing ponding. Flooding from the A90 is shown to spread across playing fields at Boddam/Stirling Village and along Station Road in a range of AEP events and several properties are affected. This may be connected to overland flow from the Den of Boddam Burn as well as issues with the drainage network, however this is not confirmed. The road rises between the Den of Boddam Burn at Millbank, and properties at Stirling Village by up to 1m, therefore fluvial flooding may not contribute to this wider issue. A further hotspot of pluvial flooding is indicated at Buchan Braes.

13.4.5.5. The electricity substation within the Proposed Development Site is affected by overland flow in a range of AEP events as it is on a low-lying platform, surrounded by higher ground. On the eastern side of the substation, the ground levels are artificially raised, blocking flow routes away from the substation site, which is likely a remnant of the historic rail line. Flooding may also be exacerbated by overland flow from a drainage ditch which enters a culvert at the minor road to the west of the substation.

13.4.6 HISTORIC FLOOD EVENTS

13.4.6.1. A record of historic flood events has been provided by Aberdeenshire Councill and is shown in Table 13.5, with surface water events recorded on the A90 at Boddam and Millbank Motors. SSE have confirmed that the existing Power Station has not been flooded.

Table 13-5: Flood history provided by Aberdeenshire Council

Date of Incident	Address	Incident Description	Flooding Affected	Source
01/11/2002	Boddam Junction, Boddam	No watercourses had contributed to the flooding and the road surface water was only a contributing factor. Field had been filled in, was 5 feet lower in the past and any road water drained into it.	Garden	Surface Water
01/01/2003	Lendrum Terrace, Peterhead	Domestic property flooded west of Lendrum Terrace, Boddam by surface water from the trunk road	Domestic Property	Watercourse
01/02/2003	GCG Shotblasting, Peterhead	Damage to office and plant and machinery. The works were under 6 feet of water. Burn backed up due to restricted culvert and flooded industrial property	Business Property	Watercourse
16/05/2008	13 Dundonnie Street, Boddam	Water in Sollum, having to be pumped out. This is a council property	Council Land	Groundwater issues
01/07/2009	Harbour Street, Boddam	Erosion problems at rear of house.		Coastal Erosion
06/08/2012	Rocksley Inn, Boddam	Car stuck in floodwater on road (A90) outside pub	Council Land	Surface Water
06/08/2012	Lendrum Terrace, Boddam	Property flooding, water coming in from road	Domestic Property	Surface Water
06/08/2012	Seaview Road, Boddam	Drains not coping, garages in danger of flooding	Domestic Property	Surface Water
06/08/2012	Harbour Street, Boddam	Side of house is subsiding, property in danger of flooding. Water in garage	Garage	Surface Water
06/08/2012	Seaview Road, Boddam	Flooding in house, water pouring off road	Domestic Property	Surface Water
06/08/2012	Station Road, Boddam	4 properties (Stevenson's Cars, Millbank Motors, The Cottage and Parkview) all	Domestic Property	Surface Water

Date of Incident	Address	Incident Description	Flooding Affected	Source
		flooded from surface water run off on road at junction between A90 and B9108)		
Ongoing	8 Lendrum Terrace	Customer's garage is flooding due to surface water not being conveyed away quickly enough. He explained that he has rodded his drain to beyond his property - into roadway. No SW drains present so have asked Roads to investigate our own drains.	Garage	Surface Water
14/06/2021	Dundonnie Street, AB42 3NT	Blocked drainage causing flooding in car park area	Car park	Surface Water

13.4.7 RECEPTOR IMPORTANCE

13.4.7.1. Receptors in the study area have been identified and classified according to the methodology in Table 13.3, as outlined in Table 13.6 below.

Table 13-6: Receptor Importance

Receptor	Land Use Vulnerability Classification	Importance	Description
Existing Power Station and Proposed Development	Essential Infrastructure	High	The existing Power Station and Proposed Development require to be located adjacent to the coastline to provide water supply and discharge and therefore are classified as essential infrastructure and are therefore highly important.
Isolated properties	Most Vulnerable	High	Properties such as Milbank, Millbank Cottage, Bevailey, Newton of Sandford, Sandford Cottage, Sandford Bungalow and houses along the A90 at Stirling Village are classified as most vulnerable, and are therefore highly important.
Petrol station	Most Vulnerable	High	Millbank Garage petrol station is classified as most vulnerable as it will require a hazardous substance consent and is therefore highly important.
Electricity substation	Essential Infrastructure	High	The electricity substation to the south-west of the Proposed Development is classified

Receptor	Land Use Vulnerability Classification	Importance	Description
			as essential infrastructure as it requires to be in this location for operational reasons and is therefore highly important.
Roads	Essential Infrastructure	High	Road infrastructure including the A90, existing access road to the existing Power Station, B9108, and other local roads are classified as essential infrastructure and are therefore highly important.
Properties in Boddam	Highly Vulnerable uses	Medium	Residential and other properties within the village of Boddam are classified as highly vulnerable, and they therefore have medium importance.
Seafood factory, Boddam	Water Compatible Uses	Very low	The seafood processing factory at Boddam Harbour is classified as water compatible as it requires a waterside location and therefore has very low importance.

13.5. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

13.5.1 INTRODUCTION

13.5.1.1. Several embedded mitigation features could be incorporated into the design of the Proposed Development to avoid, minimise and reduce potential adverse impacts on flood risk, and these are described in the following sections.

Platform Level

13.5.1.2. The Proposed Development is to be situated at a ground level of 9mAOD, which is slightly above the existing Power Station. The Proposed Development is not predicted to flood, however there is not freeboard above the existing flood levels to account for modelling uncertainties and the potential for structure blockages upstream. To avoid a potential impact, the Proposed Development could be constructed at a higher ground level than the existing Power Station, which would prevent flood inundation of the new infrastructure.

Surface Water Drainage

13.5.1.3. The concept of a (SuDS) has been developed for the Proposed Development, to capture and treat surface runoff, discharging it to coastal water. It is proposed that this scheme be designed to a 0.5%AEP standard, due to the existing flood risk at the Peterhead Power Station. A SuDS strategy is provided in **Appendix 13B** (EIA Report Volume 4).

Den of Boddam Burn Culvert

13.5.1.4. As described in Section 13.4.3, the Den of Boddam Burn is culverted through the Proposed Development Site and discharges into Sandford Bay near Furrah Head. To accommodate the Proposed Development infrastructure, it is necessary to divert the culvert from its existing route around the north and east of the Proposed Development site to a new route shown in **Figure 4.6** (EIA Report Volume 3) and then to tie-in with the existing discharge location into Sandford

Bay. The route has been designed to maintain the hydraulic gradient by retaining the existing intake and outfall but has been lengthened by 15.4m and will be placed at a lower depth. The gradient of the culvert will therefore be lowered for a short length, before tying back into the existing route.

13.6. LIKELY IMPACTS AND EFFECTS

13.6.1 INTRODUCTION

13.6.1.1. The Proposed Development has the potential to be affected by or cause adverse effects to flood risk during construction, operation and decommissioning phases. Flood risk receptors described in Section 13.4 have therefore been assessed for the likelihood of actual effects occurring because of these phases of the Proposed Development (considering the mitigation measures as detailed in Section 13.5).

13.6.2 CONSTRUCTION

13.6.2.1. The existing Power Station site is predicted to be at flood risk from pluvial and fluvial sources and therefore there is potential for flooding during construction, affecting working areas, excavations and plant as well as access and egress routes and any welfare facilities on site. Flooding would only affect construction areas that are below an elevation of 8.98mAOD in a 0.5% AEP flood event including climate change, and for any areas below this level, a flood event of this magnitude is likely to result in very shallow flood depths. At higher probability events, the extent of flooding and subsequent depths are lower. Therefore, the magnitude of impact is assessed to be low for the Proposed Development, resulting in a temporary **minor adverse effect** which is **not significant**.

13.6.2.2. Earthworks required for the construction of the Proposed Development may result in changes to runoff patterns towards the A90 and isolated properties. As there are existing flood risk issues from overland flow to the A90, Stirling Village and Boddam, there is potential for an increase in risk to isolated properties, local roads (including the A90) and the Millbank Garage petrol station. Construction stage SuDS will be utilised and assuming good practice is followed, there should be no impact on runoff rates outwith the Proposed Development site. Therefore, the magnitude of effect is assessed to be low, resulting in a temporary, **minor adverse effect** which is **not significant**.

13.6.2.3. Construction traffic along the A90, and the existing access road could cause siltation and blockage of road gullies and drains, resulting in an increase of pluvial flooding. This has the potential to affect local roads (including the A90) and isolated properties including those which are already flood prone at Stirling Village. Assuming good practice for wheel washing and covering loads is followed, the impact on the road network is assessed to be low, resulting in a temporary, **minor adverse effect** which is **not significant**.

13.6.3 OPERATION

13.6.3.1. During the operation phase the following potential flood risk impacts may occur if appropriate mitigation is not applied:

- Flooding of the Proposed Development Site; and
- Increased flooding of local roads and nearby properties through modification of ground levels and increased hardstanding, resulting in increased flow towards the A90.

Flooding of the Proposed Development Site

13.6.3.2. Construction of a 9mAOD platform, is not indicated to lead to flooding of the Proposed Development from overland flow and the Den of Boddam Burn, however no freeboard above fluvial flood levels would be maintained. The existing Power Station is predicted to flood from pluvial and fluvial sources from a high probability (10%AEP) event, with a similar pattern but greater extents in medium and low probability events (0.5%AEP and 0.1%AEP respectively). Flood depths on the existing Power Station are generally predicted to be <0.1m, but with some areas of up to 0.5m depth. The modelled fluvial water level on the existing Power Station is 8.93mAOD in the 0.5% AEP event and 0.98 in the 0.5% AEP event plus climate change. With no freeboard provided to account for modelling tolerances and uncertainties, or potential structural blockages upstream, there is a risk of shallow but widespread flooding of the Proposed Development. Therefore, the magnitude of impact is assessed to be medium due to the lack of freeboard, and as the Proposed Development Site is a high importance receptor, this would result in a short term but permanent **major adverse effect** which is **significant**.

Flooding of local roads and residential properties

13.6.3.3. Modification of the ground levels around the Proposed Development may result in a change of runoff characteristics. As there are existing flood risk issues from overland flow to the A90 and Stirling Village and Boddam, there is potential for an increase in risk to isolated properties, local roads (including the A90) and the Millbank Garage petrol station.

13.6.3.4. The Proposed Development Site is downslope from the A90, with the platform level proposed to be at 9mAOD. Also, the main bunding around the Proposed Development Site is not expected to change. Hardstanding areas will be drained, with discharge to the coast and away from the A90 and local properties. Therefore, there is not anticipated to be any change in flow away from the Proposed Development Site to adjacent areas. A Surface Water Maintenance and Management Plan will be prepared during the detailed design phase to describe the requirements for access and frequency for maintaining drainage infrastructure proposed on the Proposed Development Site. The maintenance regime must be fully implemented throughout the lifetime of the Proposed Development to avoid issues such as blockages which could lead to flooding. The magnitude of impact is therefore assessed to be very low to the high sensitivity receptors, resulting in a permanent **minor adverse effect**, which is **not significant**.

13.6.4 DECOMISSIONING

13.6.4.1. The power generation and carbon capture elements of the Proposed Development have a design life of approximately 25 years. At the end of their design life, it is expected that these elements of the Proposed Development may have some residual life remaining and the operational life may be extended. If the operating life were to be extended, the Proposed Development would be upgraded in line with the legislative requirements at that time. On this basis, decommissioning activities are currently anticipated to commence after 2053.

13.6.4.2. At the end of its operating life, it is anticipated that all above-ground equipment associated with the parts of the Proposed Development to be decommissioned will be removed from the Proposed Development Site. Once the relevant plant and equipment have been removed to ground level, it is expected that the hardstanding and concrete areas will be left in place. Any areas of the Proposed Development which are to be decommissioned that are below ground level will be backfilled to ground level to leave a levelled area.

13.6.4.3. With the hardstanding to be left in place, it is expected that there will be no change to the flood risk at the Proposed Development Site or neighbouring areas and are therefore considered to be the same as the operation phase.

13.7. MITIGATION, MONITORING AND ENHANCEMENT MEASURES

13.7.1 STANDARD MITIGATION

13.7.1.1. During the construction phase, there is potential for flooding of the works areas. Standard mitigation should be followed to reduce the likelihood of this occurring including:

- Regular review of weather reports;
- Storing plant and stockpiled materials above the predicted flood levels (see Section 13.6); and,
- Design SuDS scheme to manage additional off-site runoff if appropriate.

13.7.2 OTHER MITIGATION

13.7.2.1. Further mitigation of the adverse flood risk impacts anticipated during the construction and operation phase are outline below; implementation of such measures would be of benefit at both stages of the Proposed Development.

13.7.2.2. There is an existing flood risk issue for the A90, existing access road and the Peterhead Power Station caused by lack of culvert capacity on the Den of Boddam Burn. Flood modelling has shown that the culvert located within the Millbank Garage complex is undersized and causes water levels in the burn to rise so that it flows out of bank through the garage complex, onto the A90 and down the access road, flooding the existing Power Station site. During construction, there is potential for flooding of the works, and during operation to the Proposed Development platform as there would be no provision for freeboard. Therefore, it is recommended that a solution be sought with the landowners of the Millbank Garage complex to remove this structure or increase its capacity. Flood modelling has shown that if the culvert is removed, flooding is not predicted to impact the existing Power Station site during a 0.5% AEP event, with an allowance for climate change.

13.7.2.3. Flood modelling has indicated that the existing Power Station is at flood risk during a range of events. The Proposed Development is above this flood level, however without any freeboard allowance. Construction of the Proposed Development on a platform set at an elevation of 9.58mAOD would provide 600mm freeboard above the 0.5% AEP event with an allowance for climate change (although there is no specific requirement for freeboard). An alternative design should be considered to mitigate existing and future flood risk to the existing Power Station and the Proposed Development.

13.8. CUMULATIVE EFFECTS

13.8.1 OVERVIEW

13.8.1.1. This section of the chapter assesses the potential effects of the Proposed Development in combination with the potential effects of other development schemes (referred to as 'cumulative developments') within the surrounding area, as listed within **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4). Of those developments listed, the following are considered to have potential for cumulative effects with regard to the water environment, due to being located in the study area or which might drain to the Den of Boddam Burn, its upstream tributaries or within or adjacent to existing pluvial flood risk sites:

- APP/2019/0982 - Application for Erection of Electricity Substation Comprising Platform Area, Control Building, Associated Plant and Infrastructure, Ancillary Facilities, Landscape

Works and Road Alterations and Improvement Works – to be undertaken north of the electricity substation at the eastern extent of the Proposed Development Site boundary. Construction started in February 2021 and will take up to 30 months, and so there could be some temporal overlap during construction. Operational surface water drainage is assumed to be directed to the Den of Boddam Burn / Sandford Bay. The development is likely to have an impact on the overland flow which is currently indicated to affect the existing substation and the A90. It is unknown whether this impact will be positive (through improved drainage) or negative (by increasing surface water runoff), however it is assumed that SuDS will be designed in line with national standards such that discharge rates will be attenuated and flood waters retained within the Proposed Development Site.

- APP/2021/2392 - Construction of Synchronous Condenser and Associated Infrastructure. The proposed site is located to the west of the Proposed Development.
- APP/2018/1831 - Application for Installation of Underground HVDC Cables, Landing At Shoreline At Land To The South Of Boddam, Peterhead, Travelling To Site At Four Fields, Boddam, Peterhead – the onshore elements of this scheme are partly within the catchment of the Den of Boddam Burn, and so cumulative impacts are possible. Construction is planned to commence between 2021 and 2024, and last 30 months, and so there is likely to be temporal overlap during construction. Operational surface water drainage is assumed to be directed to the Den of Boddam Burn. Existing pluvial flooding could be enhanced because of the works, without suitable mitigation. However, it is assumed that SuDS will be designed in line with national standards such that discharge rates will be attenuated and flood waters retained within the Proposed Development Site.
- APP/2015/1121 - NorthConnect Converter Station located at Four Fields Boddam Peterhead. The scheme is partly within the catchment of the Den of Boddam Burn, and so cumulative impacts are possible. Construction is planned to commence between 2021 and 2024, and last 30 months, and so there is likely to be temporal overlap during construction. Operational surface water drainage is assumed to be directed to the Den of Boddam Burn. Existing pluvial flooding could be enhanced because of the works, without suitable mitigation. However, it is assumed that SuDS will be designed in line with national standards such that discharge rates will be attenuated and flood waters retained within the Proposed Development Site.

13.8.2 CUMULATIVE EFFECTS DURING CONSTRUCTION

13.8.2.1. There is potential for overlap of the construction phase of the projects outlined above and the Proposed Development. In this case it is possible that increased runoff from construction areas could exacerbate existing pluvial flooding issues at the substation and along the A90 to Stirling Village and Boddam. However, provided that standard and good practice mitigation is implemented on the above construction sites to manage surface water runoff, the cumulative risk can be effectively managed and there would not be a significant increase in the risk of pluvial flooding. As such, there would not be any additional cumulative impacts during construction based on the above assessment.

13.8.3 CUMULATIVE EFFECTS DURING OPERATION

13.8.3.1. It is assumed that the proposed substation development will utilise SuDS, with runoff restricted to greenfield rates and therefore no increase in runoff is anticipated. As such, provided that all the mitigation measures are implemented for all schemes, then the cumulative impacts from the Proposed Development and the above schemes will not lead to any significant effects.

13.9. LIMITATIONS OR DIFFICULTIES

13.9.1 SUMMARY

13.9.1.1. This assessment has been undertaken using available data and Proposed Development design details. However, at this concept design stage, details of the Proposed Development remain uncertain or under development, e.g. final platform level and design of drainage arrangements. For this reason, as described in Section 13.3, reasonable worst-case assumptions have been used. As such the assessment provided herein should be considered provisional, and where additional detail becomes available, will be re-evaluated where necessary.

13.10. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

13.10.1 SUMMARY

13.10.1.1. A summary of residual effects on flood risk and their significance is provided in Table 13.7.

13.10.1.2. No significant residual effects for flood risk have been identified, given the implementation of the mitigation measures described within this chapter (Section 13.7).

Table 13-7: Summary of Residual Impacts and Effects

Description of Effect	Importance of Receptor	Magnitude of Impact	Initial Classification of Effect (with embedded mitigation)	Additional Mitigation and Monitoring	Residual Effect Significance
CONSTRUCTION and DECOMMISSIONING					
Flooding of working areas	Existing Power Station and Proposed Development - High	Low	**Minor adverse** (not significant)	Measures outlined in CEMP	**Minor adverse** (not significant)
Change in overland flow paths	Isolated properties, Petrol station, Roads - High	Low	**Minor adverse** (not significant)	Measures outlined in CEMP	**Minor adverse** (not significant)
Blockage of local road drainage	Isolated properties, Petrol station, Roads - High	Low	**Minor adverse** (not significant)	Measures outlined in CEMP	**Minor adverse** (not significant)
OPERATION					
Flooding of the Proposed Development Site	Existing Power Station and Proposed Development - High	Medium	**Major adverse** (significant)	Removal of Den of Boddam culvert on Millbank Garage property Raising of Proposed Development platform	**Minor adverse** (not significant)
Flooding of local roads and residential properties	Isolated properties, Petrol station, Roads - High	Very low	**Minor adverse** (not significant)	Measures outlined in SuDS strategy	**Minor adverse** (not significant)

13.11. REFERENCES

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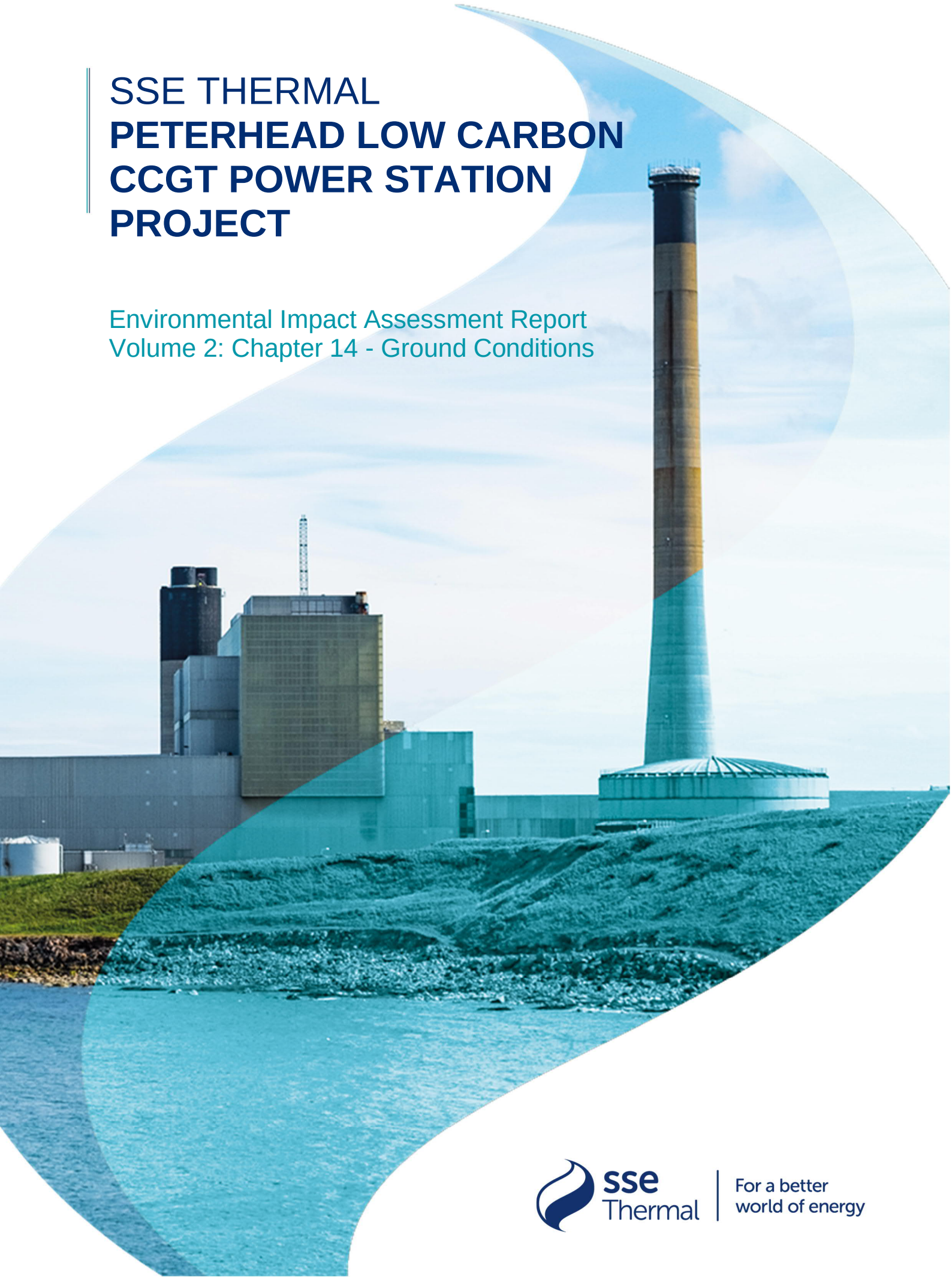
PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 14 - Ground Conditions



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CONTENTS

TABLES

14 Ground Conditions

14.1 INTRODUCTION

14.1.1 INTRODUCTION

14.1.1.1 This chapter of the Environmental Impact Assessment Report (EIA Report) addresses the potential effects of the construction, operation (including maintenance) and decommissioning of the Proposed Development on ground conditions, including geology, hydrogeology, and land contamination (considering effects to and from any existing contamination and also any potential to cause contamination). The assessment considers:

- The present-day and future baseline geological and hydrogeological conditions during construction and at opening;
- The likely nature and existing sources of contamination which may be present at the Proposed Development Site;
- The effects of construction and operation of the Proposed Development on geology, ground conditions and groundwater; and
- The potential effects of the eventual decommissioning of the Proposed Development.

14.1.1.2 This chapter is supported by **Appendix 14A: Phase 1 Desk Based Assessment** (EIA Report Volume 4). It should be noted that given the considerable overlap between disciplines, some of the potential impacts and effects relating to hydrogeology (for example, assessing groundwater as a water resource as well as its behaviour in response to dewatering) are also addressed within **Chapter 12: Water Environment** and **Chapter 13: Flood Risk** (EIA Report Volume 2).

14.2 LEGISLATION, PLANNING POLICY AND GUIDANCE

14.2.1 INTRODUCTION

14.2.1.1 This section outlines the planning policy of relevance to ground conditions. An overview of all relevant planning policy is provided in **Chapter 7: Legislative Context and Planning Policy Framework** (EIA Report Volume 2), which also sets out the primacy of 'The Scottish Energy Strategy', detailing the Scottish Government's vision for the future energy system in Scotland, notably the potential carbon capture and storage (CCS) resource, such as the Proposed Development.

14.2.2 LEGISLATION

14.2.2.1 The following key legislation (UK Acts/ Regulations) are of potential relevance to the assessment of effects of the Proposed Development on this topic chapter:

The Environmental Protection Act 1990 And Part IIA (The Contaminated Land Regime, 2005)

14.2.2.2 Current legislation relating to contaminated land in the UK is contained within Part 2A of The Environmental Protection Act (EPA), which was inserted by s57 of the Environment Act 1995 and elaborated upon within the Contaminated Land (Scotland) Regulations 2005 [S.I. 2005/658]. Under Part IIA, sites are identified as 'contaminated land' if they are: causing significant harm, if there is a significant possibility of significant harm, or if a site is causing, or could cause, significant pollution of controlled waters (i.e. both surface and groundwater). The

Environmental Protection Act 1990 - Part IIA Contaminated Land: statutory guidance edition 2 (Scottish Executive, 2006) promulgates revised statutory guidance for the operation of the contaminated land regime following implementation of the Contaminated Land (Scotland) Regulations 2005. It replaces the earlier 2000 version.

Water Environment and Water Services (Scotland) Act 2003

14.2.2.3 The Water Environment and Water Services (Scotland) Act 2003 is the enabling legislation for the Water Framework Directive and makes major changes to the administration of water and sewerage provision in Scotland. This includes arrangements for the protection of the Scottish water environment (surface water and groundwater).

Environmental Liability (Scotland) Regulations 2009

14.2.2.4 These regulations relate to significant damage to water bodies in terms of the Water Framework Directive, to land where public health is at significant risk of being adversely affected and to habitats and species damage. The purpose of the policy is to implement the Environmental Liability Directive 2004/35/CE. These regulations require operators to take preventative measures where there is an imminent threat of environmental damage, and to remediate any environmental damage caused by their activities.

The Water Environment (Groundwater and Priority Substances) (Scotland) Regulations 2009

14.2.2.5 The purpose of these regulations is to complete the transposition into Scottish law of two daughter Directives of the Water Framework Directive (2000/60/EC): the Groundwater Directive 2006 (2006/118/EC) and the Priority Substances Directive 2008 (2008/105/EC) (also known as the Environmental Quality Standards (EQS) Directive).

14.2.2.6 The Groundwater Directive 2006 builds on and clarifies the requirements for groundwater protection set out in the Water Framework Directive. It requires measures to prevent inputs of any hazardous substances into groundwater, and it requires limits on non-hazardous pollutants so that they do not cause deterioration or significant upward trends in the concentrations of pollutants in groundwater.

14.2.2.7 The EQS Directive 2008 requires Member States to apply environmental standards for the defined priority substances and certain other pollutants. The standards apply to surface waters as well as to groundwater. The standards will be implemented through directions from the Scottish Ministers to the Scottish Environmental Protection Agency (SEPA).

Other potentially relevant legislation

14.2.2.8 Other legislation (EU Directives, followed by UK Acts then Regulations) of reference to this topic, and not already outlined above, includes:

- Town & Country Planning (Scotland) Act 1997;
- Dangerous Substances Directive (2006/11/EC);
- Renewable Energy Directive (2018/2001/EU)
- Climate Change (Scotland) Act (2009);
- The Climate Change Plan (February 2018).
- Nature Conservation (Scotland) Act (2004);
- Pollution Prevention and Control (Scotland) Regulations 2012;
- Historic Environment Scotland Act 2014;
- Scotland's Zero Waste Plan (2010);
- The Environmental Protection (Duty of Care) (Scotland) Regulations 2014;
- The Construction (Design and Management) Regulations 2015;

- Scottish Energy Strategy (2017);
- Electricity Act 1989;
- Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- Ten Point Plan for a Green Industrial Revolution (November 2020); and
- Energy White Paper: Powering our net zero future (December 2020).

14.2.3 PLANNING POLICY

14.2.3.1 The following planning policy and guidance documents are of direct relevance to the assessment of effects of the Proposed Development on ground conditions.

Scottish Planning Policy (SPP) (Revised 2020) and National Planning Framework 3

14.2.3.2 **Chapter 7: Legislative Context and Planning Policy Framework** (EIA Report Volume 2) sets out the overarching policy context for the Proposed Development (the need for consideration of CCS) provided by the National Planning Framework 3 (2014) (NPF3) and the Scottish Planning Policy (2020) (SPP). The NPF3 was published in 2014 by the Scottish Government and is intended to guide Scotland's spatial development priorities for the next 20 to 30 years. NPF4 is currently in development and will guide Scotland's spatial development strategies until 2050.

14.2.3.3 The SPP is a policy statement on land use planning matters should be addressed across Scotland.

14.2.3.4 Tables 14.1 and 14.2 identify the policies in the SPP and the NPF3 (respectively), directly relevant to ground conditions, and where in this EIA chapter, information is provided to address these policies.

Table 14-1: Relevant SPP policies for ground conditions

Relevant SPP Paragraph Reference	Requirement of the SPP	Where in the EIA Chapter is Information Provided to Address this Policy
194	Promote protection and improvement of the water environment, including rivers, lochs, estuaries, wetlands, coastal waters, and groundwater, in a sustainable and co-ordinated way.	Section 14.5; controlled waters are assessed as a receptor to contamination in Sections 14.6 and 14.7. See also **Chapter 12: Water Environment and Chapter 13: Flood Risk** (EIA Report Volume 2).
194	Protect soils from damage such as erosion or compaction.	Sections 14.5, 14.6 and 14.7.
195	Further the conservation of biodiversity. and protect and improve Scotland's water environment.	Section 14.5 and water and ecology sites are assessed as a receptor to contamination in Sections 14.6 and 14.7. See also **Chapter 11: Biodiversity and Nature**

Relevant SPP Paragraph Reference	Requirement of the SPP	Where in the EIA Chapter is Information Provided to Address this Policy
		Conservation, Chapter 12: Water Environment and **Chapter 13: Flood Risk** (EIA Report Volume 2).
202	Minimise adverse impacts through careful planning and design, considering the services that the natural environment is providing and maximising the potential for enhancement.	Sections 14.5, 14.6 and 14.7.
203	Demonstrate that the nature or scale of proposed development would not have an unacceptable impact on the natural environment.	Sections 14.5, 14.6 and 14.7.
234	Safeguard mineral resources	Section 14.4 – Mining and Mineral Resources.

Table 14-2: Relevant NPF3 policies for ground conditions

Relevant NPF3 Paragraph Reference	Requirement of the NPF3	Where in the EIA Chapter is Information Provided to Address this Policy
4.13	Appropriate remediation of derelict land.	Sections 14.3, 14.5, 14.6 and 14.7.
4.25	Consider changing water supplies and water quality issues, coastal erosion and increased vulnerability of the historic building stock.	Section 14.5 and controlled waters are assessed as a receptor to contamination in Sections 14.6 and 14.7. See also **Chapter 12: Water Environment** and **Chapter 13: Flood Risk** (EIA Report Volume 2).

Planning Advice Note 33 (PAN33), Development of contaminated land

14.2.3.5 Planning Advice Note (PAN) 33 provides advice on the implications of the contaminated land regime for the planning system, including:

- the implications of the new contaminated land regime for the planning system;
- the development of contaminated land;
- the approach to contaminated land in development plans;

- the determination of planning applications when the site is or may be contaminated; and
- where further information and advice can be found.

Aberdeen City and Shire Strategic Development Plan (2020) and Aberdeenshire Local Development Plan 2017

14.2.3.6 Other relevant policies and guidance have been considered as part of this ground conditions chapter where these have informed the identification of receptors and resources and their sensitivity; the potential for significant environmental effects; and required mitigation. These policies include:

- Aberdeen City and Shire Strategic Development Plan (Aberdeenshire Council and Aberdeen City, 2020); and
- Aberdeenshire Local Development Plan (Aberdeenshire Council, 2017) – notably Policy PR1 'Protecting important resources' and Policy P4 'Hazardous and potentially polluting developments and contaminated land'. It is acknowledged that Aberdeenshire Council are currently in the process of preparing their Proposed Aberdeenshire Local Development Plan 2020. This is currently under examination by the Directorate of Planning and Environmental Appeals (DPEA).

Guidance/best practice

14.2.3.7 The following includes a non-exhaustive list of additional guidance considered pertinent and applicable to the ground conditions topic:

- BS 10175 (2011 +A2 2017), Investigation of Potentially Contaminated Sites - Code of Practice (British Standards, 2017);
- BS 8576 (2013), Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs) (British Standards, 2013);
- BS 8485 (2019), Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (British Standards, 2019);
- CIRIA C665, assessing risks posed by hazardous ground gases to buildings, 2007 (CIRCA, 2007);
- CIRIA C692 3rd Edition 'Environmental Good Practice on Site' 2010 (CIRCA, 2010);
- Land Contamination and Development, Guidance for assessing and addressing land contamination issues to meet the requirements of Contaminated Land regulators in Scotland, Version 2.12 (Environmental Protection Scotland, 2019); and
- Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66, 2008 (NHBC, 2008).

14.3 ASSESSMENT METHODOLOGY

14.3.1 CONSULTATION

14.3.1.1 The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal Scoping Opinion (**Appendix 1B** EIA Report Volume 4) and in response to the formal consultation and other pre-application engagement is summarised in Table 14.3.

Table 14-3: Consultation summary table

CONSULTEE OR ORGANISATION APPROACHED	DATE AND NATURE OF CONSULTATION	COMMENTS RAISED	RESPONSE PROVIDED IN THIS CHAPTER
Aberdeenshire Council	Email sent requesting information on 31 March 2021	An email received from the Freedom of Information Co-ordinator at Aberdeenshire Council on 14 April 2021 included the following documents: • A Phase II ground investigation report submitted for the site in relation to planning application APP/2006/3038. • A report of investigation works undertaken by Aberdeenshire Council in respect of land located to the south of the site. • Petroleum licence regarding a 500 gallon underground petroleum storage tank installed at Sandford Lodge in 1965. The email confirmed that: • there are no Part 2A sites within or up to 250m from the site. • a PWS record is held for Denend Croft, Boddam, AB42 3BD. An email received from the Freedom of Information Co-ordinator at Aberdeenshire Council on 15 April 2021 confirmed that there are no landfills, designated Local Geological Sites (LGS)/ Regionally Important Geological Sites (RIGS), Mineral Safeguarding/ Consultation Areas (MSA/ MCA), designated or safeguarded sites or mining/ quarrying information within 250m of the site. An email received from the Freedom of Information Co-ordinator at Aberdeenshire Council on 21 April 2021 adds that the PWS is for domestic use and the source is a well which is located at grid ref – 411570 842541. The supply was sampled by the Environmental Health department at the council in 2010. No further information was provided.	The documents provided by Aberdeenshire Council have been summarised in **Appendix 14A**: **Phase 1 Desk Based Assessment** (EIA Report Volume 4). The PWS record is detailed in Section 14.4. Reference to additional information provided by Aberdeenshire Council is provided throughout the baseline conditions (Section 14.5); LGS/ RIGS, MSA/ MCA, designated or safeguarded mineral sites and mines/ quarries are scoped out of the assessment.

CONSULTEE OR ORGANISATION APPROACHED	DATE AND NATURE OF CONSULTATION	COMMENTS RAISED	RESPONSE PROVIDED IN THIS CHAPTER
	Scoping Opinion, response received 13 July 2021	In relation to the 'Ground conditions' chapter of the scoping report; Aberdeenshire Council considers the suggested 250m/1km study area from the proposed site boundary appropriate for the scope. It is understood that there is the potential for contamination within the Proposed Development Site, however the proposed mitigation including a ground investigation, remediation strategy (if required), compliance with relevant standards and use of best practice techniques, a pollution response plan, Construction Environmental Management Plan (CEMP) and Decommissioning Environmental Management Plan (DEMP) would reduce impacts throughout the various stages of the development's life. Infrastructure Services (Contaminated Land) notes the contents of the chapter are satisfactory and makes no further comment. The intention to re-use material excavated on site within the development to avoid off-site removal is welcomed.	The 250m/1km study area is detailed in Section 14.3.2. Noted. Further details regarding the ground investigation, remediation strategy (if required), compliance with relevant standards and use of best practice techniques, pollution response plan, CEMP and DEMP are detailed in Section 14.5 and 14.6.
Scottish Water	Scoping Opinion, response received 4 June 2021	A review of Scottish Water' records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity.	Noted. Further details relating to groundwater, surface water and abstractions is provided in Section 14.4.
SEPA	Scoping Opinion, response received 21 June 2021	*Water abstraction* It is noted from initial discussions with SEPA that the intent of the developer is to utilise the current cooling water intake system to serve the proposed facility which will continue to be licensed through the CAR Registration for the existing Power Station. It is also noted that confirmation of any Private Water Supplies (PWS) within 1km will be identified as part of the Environmental Impact Assessment. Should any PWS be	Details of water abstractions, including PWS, is provided in Section 14.4. Further details regarding the ground investigation

CONSULTEE OR ORGANISATION APPROACHED	DATE AND NATURE OF CONSULTATION	COMMENTS RAISED	RESPONSE PROVIDED IN THIS CHAPTER
		found to be within 250m of the proposed site then SEPA Land Use Planning Guidance Note 31 should be referred to when assessing the impact on these. *Previous land use* As noted in the Scoping report, the site currently has a potentially contaminating land use and this should be taken into consideration by suitable ground investigations. The council's contaminated land team will provide further advice on this. *Pollution prevention and environmental management* A schedule of mitigation should be included which outlines the measures to be taken to limit the impacts on the environment during the construction period. They must include reference to best practice pollution prevention and construction techniques and regulatory requirements.	is provided in Section 14.5. Measures to be taken to limit the impacts on the environment during the construction period are detailed in Section 14.5 and 14.6.
	Website query sent requesting information on landfills, mining, water abstractions, geological sites and potential contaminated sites on 29 March 2021 Website query and email sent again on 28 June 2021	Response not yet received	N/A

CONSULTEE OR ORGANISATION APPROACHED	DATE AND NATURE OF CONSULTATION	COMMENTS RAISED	RESPONSE PROVIDED IN THIS CHAPTER
NatureScot	Email sent requesting information on LGS/ RIGS on 29 March 2021 Email request sent again on 19 April 2021	Response not directly received, however link to NatureScot's Site Link website (NatureScot, 2021) has been examined and there are no Geological Conservation Review sites within the Proposed Development Site or the study area.	LGS/ RIGS are scoped out of the assessment, as detailed in Section 14.3.

14.3.2 STUDY AREA

14.3.2.1 For the purposes of determining the local baseline conditions with respect to geology and land contamination, a study area that extends 250m from the boundary of the Proposed Development Site is adopted (see **Figure 14.1** EIA Report Volume 3). This is extended for hydrogeology to 1km from the boundary of the Proposed Development Site. This is appropriate to assess the local geological and hydrogeological setting and any influence that potential land contamination might have on the Proposed Development or local receptors.

14.3.3 IMPACT ASSESSMENT METHODOLOGY

Geology and hydrogeology

14.3.3.1 Geological and hydrogeological conditions at the Proposed Development Site are summarised in Section 14.4 and will be assessed in the EIA, where applicable, as potential receptors to land contamination. LGS/ RIGS, MSA/ MCA, designated or safeguarded mineral sites and mines/ quarries are scoped out of the assessment.

14.3.3.2 The resource value of groundwater is addressed within **Chapter 12: Water Environment and Chapter 13: Flood Risk** (EIA Report Volume 2).

Land contamination

14.3.3.3 For this EIA chapter, areas of potential land contamination have been identified within the study area of the Proposed Development Site.

14.3.3.4 In line with the Environmental Protection Scotland (2019), 'Land Contamination and Development, Guidance for assessing and addressing land contamination issues to meet the requirements of Contaminated Land regulators in Scotland, Version 2.12', the assessment of land contamination takes the form of a phased approach, as summarised below:

- Phase 1 – Preliminary investigation and risk assessment (desktop study); a Conceptual Site Model (CSM) will be produced which is a summation of all information about the site and all potential pollutant linkage relationships;
- Phase 2 – Exploratory site investigation and risk assessment;
- Phase 3 – The remediation scheme; and
- Phase 4 – Remediation completion and verification reporting.

14.3.3.5 A risk assessment is a site specific, structured and iterative process involving progressively detailed investigations to gather, evaluate and assess information about a site to aid decision making. A risk assessment should identify all the potential contaminant hazards (sources) and plausible pollutant linkages (pathways), then assess the likelihood of harm caused to human health and the wider environment (receptors).

14.3.3.6 A desk-based assessment has been completed to identify and qualitatively assess potential contaminative uses at the Proposed Development Site (see **Appendix 14A** EIA Report Volume 4). This desk-based assessment identified the potential for land contamination and potential pathways to sensitive receptors and considered the potential for mobilisation of contaminants associated with current and historical land use in and around the Proposed Development Site.

14.3.4 SCREENING ASSESSMENT (UNDERTAKEN AS PART OF PHASE 1)

14.3.4.1 A qualitative assessment of the risks posed by land contamination within the study area has been undertaken as part of this EIA chapter by first assigning a 'baseline risk score' to each identified historical or current area of potential land contamination identified in the baseline

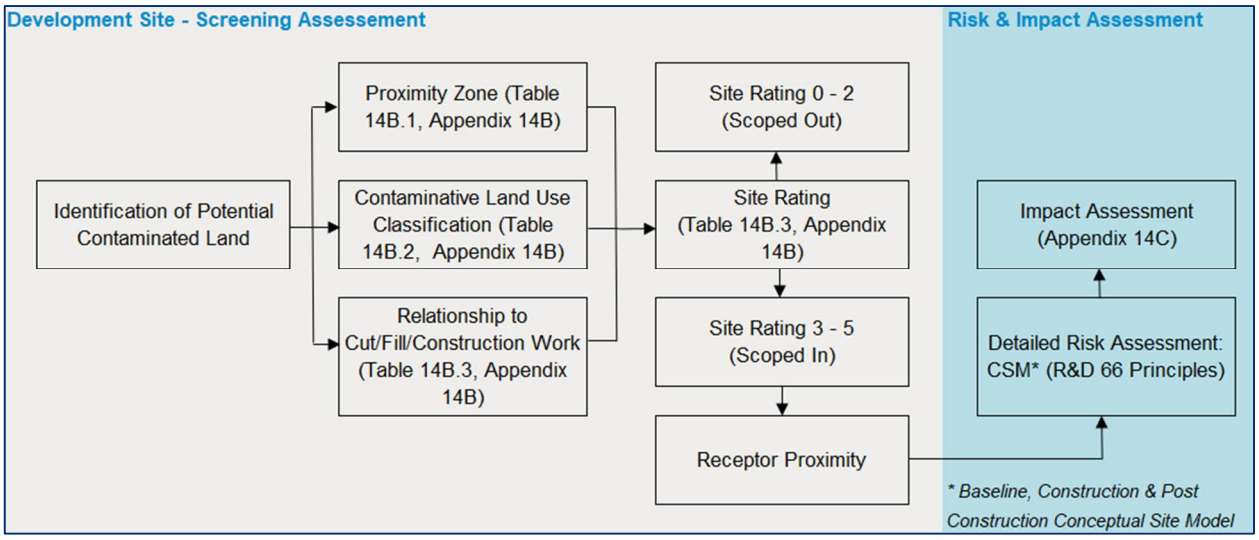
review. The baseline risk score has been determined using the tables provided in **Appendix 14B** (EIA Report Volume 4). The baseline risk score is based partly on the relationship between the identified area of potential land contamination and its proximity to the Proposed Development Site (**Appendix 14B** EIA Report Volume 4) together with the proposed cut/ fill of the Proposed Development design at its closest point (**Appendix 14** EIA Report Volume 4). The baseline risk score also considers the nature of the current and/ or historical land use, as certain land uses typically result in a greater potential for contamination of the ground to have occurred (**Appendix 14B** EIA Report Volume 4). The lower the baseline risk score then the lower the perceived level of risk.

14.3.4.2 Professional judgement has been applied in reviewing the generated baseline risk scores. Generally, baseline risk scores of two or less are considered not to pose an unacceptable risk and will not be considered for further assessment. Baseline risk scores of three or more have been considered for further, more detailed risk and impact assessment.

14.3.4.3 The next stage of screening relates to a review of sensitive receptors and their proximity to the potential area of land contamination identified. A combination of this review and the baseline risk score defines whether a site advances to the detailed assessment stage for further risk and impact assessment which is described in the following sections. The review of sensitive receptors and their proximity to the potential contaminated site are presented in **Appendix 14C** (EIA Report Volume 4).

14.3.4.4 A flow chart summarising the screening, risk and impact assessment steps is presented in Plate 1.

Plate 1: Land contamination assessment flow chart



14.3.5 RISK AND IMPACT ASSESSMENT

14.3.5.1 The approach to assessing the potential impacts of the Proposed Development has been undertaken by comparing the risk levels at baseline with the CSM and the risk levels for the construction and post-construction stages respectively, to determine any change in risk at each stage.

14.3.5.2 Potential risks have been determined and assessed based on the likelihood (or probability) and consequence using the principles given in the R&D Publication 66 National House Building Council (NHBC), Environment Agency (EA), and Chartered Institute of Environmental Health

(CIEH), (NHBC, 2008). This provides guidance on development and application of the consequence and probability matrix to risk assessment and broad definitions of consequence. The risk classification matrix is presented in Table 14.4.

Table 14-4: Classification of risk

Probability (Likelihood)	Consequence			
	Severe	**Medium**	**Mild**	**Minor**
High likelihood	Very high risk	High risk	Moderate risk	Low risk
Likely	High risk	Moderate risk	Moderate/low risk	Low risk
Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

14.3.5.3 The significance of the effects of land contamination has been assessed by comparing the difference in risk for each contaminant linkage at baseline to those at construction and at post construction stages. Where there is shown to be a decrease in contamination risk the Proposed Development is assessed as having a beneficial effect on the environment in the long term.

14.3.5.4 The definitions of the significance criteria used are presented in Table 14.5 below. This provides details of how increases and decreases in the contamination risks identified are related to the significance criteria adopted. Potential effects that are determined as being moderate or major are classed as 'significant' effects. Where an effect has been anticipated to be neutral or minor, these effects are classed as 'not significant'. Predicted effects of minor or neutral/ negligible significance are acceptable and do not require further consideration. It is only predicted effects of moderate or high that require a more detailed assessment.

Table 14-5: Definitions of the significance criteria

Significance Criteria	Definition
Major adverse effect	An increase in contamination risk of 4 or 5 risk levels in the risk matrix, e.g. from land that has a very low contamination risk in the baseline becomes a high or very high risk.
Moderate adverse effect	An increase in contamination risk of 2 or 3 risk levels in the risk matrix, e.g. land that has a low contamination risk in the baseline becomes a moderate or high risk.
Minor adverse effect	An increase in contamination risk of 1 risk level in the risk matrix, e.g. land that has a low contamination risk in the baseline becomes a moderate/low risk.
Neutral effect	No change in contaminated land risks.
Minor beneficial effect	A reduction in contamination risk of 1 risk level in the risk matrix, e.g. land that has a moderate/low contamination risk in the baseline becomes a low risk.

Significance Criteria	Definition
Moderate beneficial effect	A reduction in contamination risk of 2 or 3 risk levels in the risk matrix, e.g. land that has a high contamination risk in the baseline becomes a moderate/low or low risk.
Major beneficial effect	A reduction in contamination risk of 4 or 5 risk levels in the risk matrix, e.g. land that has a very high contamination risk in the baseline becomes a low or very low risk.

14.3.6 DATA SOURCES

14.3.6.1 This EIA chapter draws on information from a combination of the following sources:

- Historical mapping included as part of a professional Envirocheck Report provided by the Landmark Information Group (May 2021) [31] (see **Appendix 14A** (Annex A) EIA Report Volume 4);
- Envirocheck (in GIS data format – May 2021) (Landmark Information Group, 2021);
- British Geological Survey (BGS) Geological Mapping and Memoirs (BGS, 2021a);
- SEPA website (SEPA, 2021a);
- BGS Geoindex website BGS, 2021b);
- Soil Map of Scotland (1:25,000) (Scotland's Soil, 2021);
- Hydrogeological Map of Scotland (1:625,000) (BGS, 2021c);
- Stakeholder consultation (as detailed in Table 14.3); and
- Current and recent-historical aerial imagery from Google Earth Pro (for additional historical information).

14.3.7 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

14.3.7.1 As described in **Chapter 4: The Proposed Development** (EIA Report Volume 2), three indicative site layout options have been considered in this EIA for the placement of the core infrastructure within the Proposed Development Site. Each of the site layout options considered for the Proposed Development may produce slightly different impacts in terms of height and massing of structures, emissions to air, discharges to water and generation of waste. This chapter assesses the reasonable worst-case for each geological, soils and hydrogeological effect (from these three indicative layouts) to define the reasonable worst-case effect of the Proposed Development.

14.3.7.2 The assessment has been based on the collation and evaluation of readily available documentation provided to date by SEPA, BGS, Envirocheck historical mapping, Envirocheck site sensitivity data, and other data sources made available.

14.3.7.3 Any borehole data from BGS sources are included on the basis that: "*The British Geological Survey accept no responsibility for omissions or misinterpretation of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation"*

14.3.7.4 This chapter should be read in light of the legislation, statutory requirements and/ or industry good practice applicable at the time of the assessment being undertaken. Any subsequent changes in this legislation, guidance or design may necessitate the findings to be reassessed in the light of these circumstances.

14.3.7.5 Request for information sent to SEPA on landfills, mining, water abstractions, geological sites and potential contaminated sites, however no response received.

14.4 BASELINE CONDITIONS

14.4.1.1 This section presents the baseline conditions for geology, soils and hydrogeology. It also considers potential receptors that could be impacted upon by any existing or resulting ground contamination. There is therefore reference made to surface water, groundwater and ecological features in this section which are discussed in more detail in **Chapter 11: Biodiversity and Nature Conservation, Chapter 12: Water Environment and Chapter 13: Flood Risk** (EIA Report Volume 2).

14.4.2 SOILS

14.4.2.1 Information obtained from the Soil Map of Scotland (1:25,000) indicates that the majority of the site lies on 'imperfectly drained brown soils'.

14.4.2.2 Soils classified as 'mixed bottom land', composed of a wide range of soil types, including immature soils and alluvial soils, and associated with 'narrow stream channels and gullies; unstable steep slopes along valley sides; cliffs' can also be found mapped in narrow strips along the eastern boundary and in the southern and northern portions of the site. These are indicated in the location of the 'Den of Boddam' surface water course and the buried gully as described in Table 14.7 and Table 14.8, respectively.

14.4.2.3 In addition, 'poorly drained non-calcareous gleys' are mapped in the north and north-west of the site.

14.4.2.4 The same units can be found in the surrounding area of the site (non-calcareous gleys to the north and west, brown soils to the south). Alluvial soils of undifferentiated texture and drainage are also mapped adjacent to the south-western boundary of the site.

14.4.2.5 The site has a high risk of topsoil compaction and a moderate risk for soil runoff. The subsoil compaction risk varies from 'extremely vulnerable' within the mixed bottom land soils to 'not particularly vulnerable' in the brown soils.

14.4.2.6 Similarly, the risk of soil erosion is broadly mapped as low or moderate in the areas with brown soils, and moderate in the rest of the site. The soil leaching potential is indicated to be high along the mixed bottom soils ('soils with little ability to retain potential pollutants because they are either shallow or allow flow directly to rock, gravel or shallow groundwater') and low in the rest of the site.

14.4.2.7 According to the land capability for agriculture (partial cover), the agricultural class is indicated to be 'urban' soils.

14.4.3 GEOLOGY

14.4.3.1 The BGS Geoindex website and published 1:50,000 scale geological maps of the area have been reviewed, alongside selected historical BGS borehole records available from locations within the footprint of the main building areas of the existing Peterhead Power Station, the former Heavy Fuel Oil (HFO) tank farm and the area to the west and south of the existing Power Station. These records indicate that the Proposed Development Site is underlain by the geological succession summarised in Table 14.6. Note that the historical borehole records pre-date the existing Power Station's construction, and therefore thicknesses of superficial deposits may vary from what is detailed on the records. For the geological succession after the Power Station construction, see Section 14.5.2.1; this was taken from historical ground investigations (summarised in **Appendix 14A** EIA Report Volume 4).

Table 14-6: Geological succession from published mapping and on-site BGS logs

Geology	Expected Location	Anticipated Thickness	BGS Lithological Description	Historical Borehole Logs Description
Hatton Till Formation - Diamicton, clay, sand and gravel Nb. also referred to as 'glacial till' or 'glacial deposits' throughout this report)	Across the majority of the Proposed Development Site and the study area.	c. 8–20m (where present)	Diamicton, clayey, pebbly, calcareous, red, crudely stratified. Besides local rock types it contains red sandstone, mudstone and limestone, shell fragments.	Generally red brown, dark brown, grey stiff clay, with occasional gravel and sand. Boulder and cobbles strata are encountered at variable depths.
Marine Beach Deposits - Gravel, sand and silt	May be located along the eastern and north-eastern boundaries of the Proposed Development Site and between the site boundary and the North Sea.	c. 3m (when present)	Shingle, sand, silt and clay; may be bedded or chaotic; beach deposits may be in the form of dunes, sheets or banks; in association with the marine environment.	Brown silty medium sand with coarse gravel, cobbles and boulders.
Blown Sand	May be in the northern-most tip of the Proposed Development Site	Unknown	Sand	Not encountered
Peterhead Pluton	Underlying the superficial deposits in the vast majority of the Proposed Development Site or occasionally underlying the topsoil.	Up to 200m	Granite	Slightly to highly weathered, kaolinised, biotite granite.

Geological succession after power plant construction

14.4.3.2 Publicly available borehole logs refer to investigations undertaken before the construction of Peterhead Power Station; major earthworks, with landscaping and earth reworking were carried out for the existing Power Station construction and have altered the topography and the

geological succession of the Proposed Development Site. More recent ground investigations[1] have confirmed the following ground conditions:

- The main buildings area (north-eastern portion of the site) was confirmed to be generally underlain by Made Ground recorded up to a depth of 4m. Superficial deposits were also encountered across the area. They comprised soft to stiff, orange brown, gravelly clay with occasional cobbles and boulders of granite, and occasionally orange brown sand and gravel layers. Weathered pink granite bedrock was encountered at depths as shallow as 1.5 metres below ground level (m bgl);
- The former HFO tanks area was shown to be underlain by up to 2m Made Ground, which in turn was underlain directly by weathered granite; and
- The unused area north-west and west of the Proposed Development Site was underlain by Made Ground in the form of an earthworks stockpile (most likely deriving from the Power Station construction excavations and of a thickness reaching approximately 10m), generally overlying glacial till (up to more than 25m thickness) with occasional sand lenses. Granite was encountered below the glacial till. The extent of Made Ground/reworked material to the south of the existing Power Station is unknown as no ground investigations have targeted this area.

14.4.4 HYDROGEOLOGY

Aquifer classification

14.4.4.1 SEPA classifies the underlying geology as a low productivity aquifer and it is described by the BGS as having "*small amounts of groundwater in the near surface weathered zone and secondary fractures and rare spring*". Known groundwater abstraction records are described in Section 14.5.3.3. The 1:625,000 Hydrogeological Map of Scotland (BGS, 2021c) published by the BGS defines the region as underlain by impermeable intrusive rocks, generally without groundwater except at shallow depth.

14.4.4.2 According to the SEPA Water Environment hub (SEPA, 2021b), the quality of groundwater in the area is classed as 'good'.

14.4.4.3 Further details are provided **Chapter 12**: **Water Environment** (EIA Report Volume 2).

Drinking water protected areas

14.4.4.4 Correspondence with Scottish Water (see also Table 14.3) indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the Proposed Development.

Groundwater abstractions

14.4.4.5 Records held by the local authority for private abstractions (Aberdeenshire Council) report the presence of a private abstraction well for domestic use located approximately 470m west of the site and associated with the property known as "Denend Croft". Depth of the groundwater intake is unknown.

14.4.4.6 Engagement is ongoing with SEPA to obtain records of any further groundwater abstractions within a 1km radius of the Proposed Development Site; this is discussed further in **Chapter 12: Water Environment** (EIA Report Volume 2).

[1] Sources: Previous ground investigation reports (URS, 2006), (Fugro Engineering Services, 2005), (SSE and Shell, 2015), (Wimpey Laboratories Ltd, 1973), (Mott MacDonald, 1998), (ERM, 2006), (Soil Mechanics, 2006), (Arcadis, 2011), (K-Land Solutions, 2012), (KDC Contractors Ltd, 2013).

Groundwater levels

14.4.4.7 Groundwater levels within the historical borehole records indicate generally a discontinuous presence of groundwater. Boreholes and trial pits dated from the 1970s encountered groundwater at depths from 0.45m to 11m bgl, within the superficial deposits; however, most of the investigation points were found to be dry.

14.4.4.8 A lower aquifer was also encountered on a granular bed overlying the bedrock in a trial shaft located within the footprint of the current Power Station.

14.4.4.9 A borehole located in proximity of the outfall discharge, closer to the coast, encountered groundwater seepages at 2.30m bgl. The borehole log suggests it could be of tidal origin.

14.4.4.10 It is noted that the publicly available borehole logs refer to investigations undertaken before the construction of the existing Power Station; major earthworks, with landscaping and earth reworking were carried out for the Power Station construction that could have had an impact on the groundwater regime. During the ground investigations carried out after the Power Station construction, groundwater was indicated to be discontinuous, and encountered at highly variable depths, mostly within the superficial deposits. Previous investigations also suggest the presence of an upper and lower aquifer.

14.4.5 HYDROLOGY

Surface watercourses and drainage

14.4.5.1 There are numerous unnamed drains and ponds located within the Proposed Development Site and study area.

14.4.5.2 The eastern and north-eastern boundaries of the Proposed Development Site run parallel to the North Sea coastline and are in close proximity to the Mean High Water Springs (MHWS) line, except for the surroundings of the outfall where the boundaries extend to comprise part of the sea. Boddam Harbour is located approximately 250m south-east of the Proposed Development Site boundary.

14.4.5.3 Surface water features, along with river quality information (where available) are detailed in Table 14.7, and water features are shown on **Figure 12.1: Water Resource Features and Attributes** (EIA Report Volume 3).

Table 14-7: Surface water features

Surface Water Feature Name	Location	Surface Water Quality Information
Den of Boddam (culverted)	On-site, culverted running under the A90 and then to the north-west of the HFO former tanks area; it discharges into Sandford Bay to the west of the existing cooling water outfall. It is a former glacial drainage channel that cuts through the gravels in the area, used in prehistoric times for chalk flint mining upstream of the Proposed Development Site [48]	Unknown
Unnamed drains	On-site, in the central portion of the Proposed Development Site, flowing along steep	Unknown

Surface Water Feature Name	Location	Surface Water Quality Information
	landscaped areas between the central building areas and the surroundings.	
Unnamed pond	On-site, adjacent to the western boundary, west of the A90.	Unknown
Unnamed drains	On-site, in the north of the Proposed Development Site.	Unknown
Unnamed drain	Adjacent to the Proposed Development Site, flowing towards the south-western boundary of the Proposed Development Site	Unknown
Unnamed ponds	Approximately 50m and 110m north of the Proposed Development Site	Unknown
Unnamed drain	Approximately 170m west of the Proposed Development Site	Unknown
Sandford Bay (North Sea)	30m – 210m east of the Proposed Development Site	The quality of seawater in the area of the Ugie Estuary to Buchan Ness is considered 'good'

14.4.5.4 Further information on the quality and status of relevant watercourses can be found in **Chapter 12: Water Environment and Chapter 13: Flood Risk** (EIA Report Volume 2).

Surface water abstractions

14.4.5.5 Aberdeenshire Council does not hold any records of surface water abstractions within 1km from the Proposed Development Site.

14.4.5.6 Except for the Coastal Abstraction license from Boddam Harbour for the existing Peterhead Power Station (for a daily volume not exceeding 2,436.48 Ml/day), there are no further surface water abstractions licences identified within 1km of the site.

14.4.5.7 Engagement is ongoing with SEPA to obtain records of any further surface water abstractions within a 1km radius of the Proposed Development Site; this is discussed further in **Chapter 12: Water Environment** (EIA Report Volume 2).

Nitrate vulnerable zones

14.4.5.8 The Proposed Development Site and the study area are located within the nitrate vulnerable zone: 'Aberdeenshire, Banff, Buchan and Moray'.

Drinking Water Protected Areas

14.4.5.9 Correspondence with Scottish Water (Table 14.3) indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the Proposed Development.

14.4.6 MINING AND MINERAL RESOURCES

14.4.6.1 The SPP (Scottish Government, 2020) requires that planning should safeguard mineral resources and facilitate their responsible use (see Table 14.1, SPP paragraph reference 234).

14.4.6.2 The adopted 2017 Aberdeenshire Council Local Development (Aberdeenshire Council, 2017) plan indicates that there are no Mineral Safeguarding Areas (MSA) within the study area of the Proposed Development Site. The closest MSA is located approximately 800m south. Note that the 2017 Aberdeenshire Council Local Development Plan is due to be replaced by the 2021 Plan. This is currently under examination by the Directorate of Planning and Environmental Appeals (DPEA). The MSA defined by the emerging Local Development Plan do not fall within the study area of the Proposed Development Site. Furthermore, local authority consultation carried out confirms no MSA or MCA at, or in the study area of the Proposed Development Site. Therefore, these features are scoped out of the assessment.

14.4.6.3 Based on available data and local authority consultation carried out, there are no records of mining/quarrying within the study area of the Proposed Development Site. Information provided by the BGS and the Envirocheck GIS data confirms that the Proposed Development Site is located in an area defined by the BGS as '*where non-coal mining is highly unlikely, although localised small-scale underground mining may have occurred*'. As such, the risk from quarrying and mining can be considered negligible and these features are scoped out of the assessment.

14.4.7 LOCAL GEOLOGICAL SITES (LGS)/ REGIONALLY IMPORTANT GEOLOGICAL AND GEOMORPHOLOGICAL SITES (RIGS)

14.4.7.1 Based on available data and consultation carried out with the local authority, Aberdeenshire Council, there are no records of LGS or RIGS on or within 250m of the Proposed Development Site. Furthermore, the NatureScot Site Link website (2021) has been examined and there are no Geological Conservation Review sites within the Proposed Development Site or the study area. Therefore, these features are scoped out of the assessment.

14.4.8 LAND CONTAMINATION

Regulated processes and pollution incidents

14.4.8.1 Information on regulated processes and pollution incidents has been collated from SEPA and local authority datasets within the Envirocheck GIS data presented in **Appendix 14A: Phase 1 Desk Based Assessment** (EIA Report Volume 4). Recorded pollution incidents can indicate a potential for land contamination, whilst regulated processes provide a good indicator as to the nature of the processes undertaken at a site, which whilst regulated may nonetheless have, over time, resulted in the potential for some residual land contamination. Key information is summarised as follows:

- Integrated Pollution Controls – 7 located within the Proposed Development Site. They are named under Scottish Hydro Electric Plc, BP Exploration Operating Co Ltd, Scottish and Southern Energy Plc and BP Exploration (Alpha) Ltd, concerning combustion or gasification and associated processes within the Fuel & Power Industry and Integrated Pollution Control (Part A Processes);
- Discharge Consents – 10 located within the Proposed Development Site; 9 are named under N O S Hydro Board or Scottish Hydro-Electric Plc and concern sewerage and trade effluents discharging into Sandford Bay or the Den of Boddam; 1 is named under Mr G. Keith and concerns a sewage effluent discharged in an unnamed stream. There are 9

located in the study area, associated with trade effluent/septic tanks discharging into the Den of Boddam, its tributary or in Sandford Bay;

- Planning Hazardous Substances Consents – 2 located within the Proposed Developed Site; 1 is named under Scottish Hydro Electric Plc and concerns "Part A, toxic substance, chlorine, where amount held is greater than or equal to 10 tonnes."; 1 is named under BP Alternative Energy Holdings Ltd. and concerns automotive petrol and other petroleum spirits;
- Notification of Installations Handling Hazardous Substances (NIHHS) –1 located within the Proposed Development Site, named under North of Scotland Hydro-Electric Board;
- There are no pollution incidents to controlled waters within the study area; however,1 prosecution relating to pollution entering controlled waters is present, associated with the seafood factory located immediately south-east of the Proposed Development Site, dated 2000. Records report a poor record of compliance over the previous years. The facility had already been charged for a similar offence in 1998. Furthermore, URS (2006) reports 8 pollution incidents recorded at the Power Station from February 2002 to March 2006, involving fuel, oil and distillate spillages and leaks (note that the source of this information was not specified in the report). Further details can be found in **Appendix 14A: Phase 1 Desk Based Assessment** (EIA Report Volume 4); and
- There are no Integrated Pollution Prevention and Controls, Local Authority Pollution Prevention and Controls, Registered Radioactive Substances or records of COMAH (Control of Major Accidents Hazards) sites or licenses listed on the Proposed Development Site or in the study area.

Previous Ground Investigations

14.4.8.2 Detailed summaries of previous ground investigations are presented in **Appendix 14A: Phase 1 Desk Based Assessment** (EIA Report Volume 4). A summary of identified contamination is as follows:

- Previous studies have identified hydrocarbon contamination in soils in locations within the footprint of the existing Power Station or in its vicinity, including in one borehole located in an area reportedly never affected by industrial activities and up-hydraulic gradient, south-west of the existing Power Station;
- Elevated concentrations of hydrocarbons in soils and presence of free product were detected in the former HFO tanks area; bioremediation and validation activities were undertaken on the former HFO tank farm by KDC Contractors/K-Land Solutions in November 2012 to January 2013. Site works comprised the creation of an on-site waste treatment area (WTA) on the former tank bases of the northern-most and southern-most tanks, with treatment of approximately 2,700m^3 soil. Soils were reinstated at the end of the treatment. There is the potential for residual contamination to exist in this area; and
- Exceedances of hydrocarbons C21-C35 were identified in 2006 in two groundwater wells in proximity of the western boundary of the site; they were considered to be have been caused by a localised fuel spillage; sporadic exceedances of chromium, barium, carbon tetrachloride, TPH C6-C10 and TPH C10-C40 were detected in 2014 in two groundwater wells located in the existing Power Station area.

Proposed Development Site and surrounding area history

14.4.8.3 Historical mapping has been reviewed to evaluate the potential for past activities, both on and adjacent to the Proposed Development Site, to have impacted upon the site's environmental and land quality. A detailed appraisal is presented in **Appendix 14A: Phase 1 Desk Based Assessment** (EIA Report Volume 4) and an overall summary provided in Table 14.8.

Table 14-8: Summary of historical development within the study area

Map/ Date	On the Proposed Development Site	Within the 250m Study Area
1868-1885	Largely agricultural land. A road runs along the majority of the western boundary, crossing into the Proposed Development Site occasionally. Small buildings and three wells are located in the western area, Sandford Lodge in the northern area. A drain crosses the Proposed Development Site from south to north, out falling to the sea. A gully is located in the south-eastern area.	Undeveloped or agricultural land. Several wells, located less than 100m to the west, north-west and south. Peterhead Polishing Works (Granite) located adjacent to the south-west. Boddam Harbour is located in proximity to the south-eastern boundary. An aqueduct is in proximity to the Peterhead Polishing Works (1872 map). A building labelled 'Smithy' (ironmonger/ works) is adjacent to the north-western boundary (1872 map).
1901	A pump is located in the southern corner. The drain is labelled "Den of Boddam". Further buildings are shown in the south-west. A railway line occasionally crosses the western portion of the site, running approximately parallel to the road; a tank is present adjacent to the railway in proximity of the western boundary.	Two tanks located approximately 250m south-east. Two mineral railway tracks; one crossing the Proposed Development Site and one ending approximately 250m from the Proposed Development Site.
1964-1974	No significant changes to the Proposed Development Site.	Village of Boddam developed adjacent to the south. A garage is located approximately 150m south-east. Peterhead Polishing Works have been dismantled; a filling station is located in this area. The mineral railway is disused.
1975-1979 1969-1992 (for study area description)	Peterhead Power Station buildings have been constructed: main buildings with a chimney in proximity, three above-ground storage tanks north of the main buildings (HFO tanks), a tank located immediately north of the main buildings, and an electrical substation in the west. Anecdotal evidence from SSE confirms that construction of the Station began in 1973. The Den of Boddam was reportedly culverted, crossing the site north of the HFO tanks before discharging into Sandford Bay.	Another filling station is located adjacent to the south-western corner. An electrical substation is located approximately 50m south. A factory with two tanks is shown in proximity to the south-eastern boundary. The area previously occupied by the Peterhead Polishing Works/ fuel station is now labelled as a garage.

Map/ Date	On the Proposed Development Site	Within the 250m Study Area
	Sewage works are located immediately east of the electrical substation. The railway is no longer visible on-site.	
1980-1987	A total of ten tanks are located in the north-eastern area. An additional sewage works and a small electrical substation are located immediately south of the larger electrical substation in the west of the Proposed Development Site. Further buildings and facilities are now visible in the south-eastern area of the site, possibly associated with the intake structures (cooling water abstraction).	See description above, which is from the 1969-1992 map that also covers this date.
1994	The Power Station had expanded further to the west and south with the construction of additional buildings and tanks, alongside the construction of gas turbines 3 and 4 in 1989. The gully located in the south-eastern area of the Proposed Development Site is no longer visible. Available information suggests the gully was infilled during the construction of the Power Station.	No significant changes to the study area.
2000 2003	Further facilities on, and immediately south, of the main buildings, consistent with the repowering development reportedly undertaken in 2000.	Buildings previously labelled 'Smithy', near the south-western boundary, are shown as 'works'.
2016	The HFO tanks in the northern portion of the site are no longer present and the rectangular building located approximately in the central portion of the Proposed Development Site, is partially demolished.	No significant changes to the study area.
2021	No significant changes to the Proposed Development Site.	The works near to the south-western boundary are no longer present.

Potential land contamination sources

14.4.8.4 Data obtained from the SEPA and the local authorities that is contained in the Envirocheck data, along with historical Ordnance Survey mapping (see **Appendix 14A: Phase 1 Desk Based Assessment** (Annex A) EIA Report Volume 4), and aerial mapping have been reviewed to identify current and historical potential contaminative land uses. A summary of the areas of potential land contamination identified within the study area is presented in Table 14.9. The

sites are mapped and have been allocated a unique reference number as shown on **Figure 14.2** EIA Report Volume 3.

Table 14-9: Summary of potential sources of contamination within the study area

ID[1]	Site Title	Location
CS1	Peterhead Power Station and historic tanks	Entirely within the Proposed Development Site.
CS2	SHETL electrical substation	In the western portion of the Proposed Development Site.
CS3	Historic "petrol pump" and tank	Approximately in the north-western portion of the Proposed Development Site.
CS4	Dismantled mineral railway	Crossing the Proposed Development Site in proximity of the SHETL substation and running roughly parallel to the western boundary of the Proposed Development Site.
CS5	Historical workshop and repair centre at Sandford Lodge	In the northern area of the Proposed Development Site.
CS6	Historic sewage works, south of SHETL substation	Within the Proposed Development Site, immediately south of the SHETL substation
CS7	Historic sewage works, north-east of SHETL substation	Within the Proposed Development Site, north-east of the SHETL substation
CS8	Seafood factory with historic tanks	Adjacent to the south-eastern tip of the boundary of the Proposed Development Site.
CS9	Sandford Garage - car dealers and historic fuel station	Adjacent to the south-western tip of the boundary of the Proposed Development Site.
CS10	Millbank Motors - garage and filling station	Adjacent to the south-western tip of the boundary of the Proposed Development Site.
CS11	Electrical substation with historic tank	Approximately 250m south-east of the Proposed Development Site.
CS12	Electrical substation with historic tank	Approximately 50m south of the Proposed Development Site.
CS13	Electrical substation with historic tank	Approximately 100m south of the Proposed Development Site.
CS14	Park Garage - car dealer and car service	Approximately 200m south-east of the Proposed Development Site.
CS15	Former military land - railway and railway terminal - workshop and retail centre - gas monitoring facility with historic tank	Approximately 200m south of the Proposed Development Site at its closest point
CS16	VS Auto Services - potential workshop and repair centre	Approximately 100m west of the Proposed Development Site.
CS17	Boddam Harbour and associated infilled area	Approximately 120m south-east of the Proposed Development Site.
CS18	Fill/ stockpile/ Made Ground, north-western area	Within the Proposed Development Site, north-western portion.
CS19	Fill/ stockpile/ Made Ground, southern area	Within the Proposed Development Site, southern portion

ID[1]	Site Title	Location
CS20	Farm	Approximately 200m west of the Proposed Development Site.
CS21	Electrical substation	Approximately 150m south-west of the Proposed Development Site.

[1] Each potentially contaminated site is allocated a unique reference number (e.g.CS1) as shown on Figure 14.2.
[2] Study area is between 0 – 250m from the Proposed Development Site boundary.
[3] It is acknowledged that minor infilled land areas are present in the study area; however, these have been scoped out from the initial screening as their impact on the Proposed Development Site was considered not to be significant.

Potential pathways

14.4.8.5 The following potential pathways have been identified which outline the mechanism through which any potential land contamination could impact upon a receptor:

- Direct contact/ ingestion of contaminants within Made Ground/ soils, together with soil derived dust and groundwater;
- Inhalation of organic vapours from Made Ground/ soils, soil derived dust, and groundwater;
- Leaching of soluble contaminants and migration or mobile contaminants into shallow groundwater;
- Vertical groundwater flow through Made Ground and superficial deposits to underlying bedrock aquifer;
- Lateral groundwater flow and direct run-off to surface waters;
- Vertical migration of ground gases to indoor and outdoor air and migration of ground gases into enclosed spaces (inhalation/ asphyxiation/ explosion);
- Inhalation of asbestos fibres;
- Direct contact of buried concrete with contaminated soils (i.e. hydrocarbons) and aggressive ground conditions (pH and sulphate)/ direct contact of services and supply pipes with contaminated soils; and
- Indirect pathway: migration of hazardous gases/ vapours via permeable strata into enclosed spaces and service/utility trenches.

Identified receptors

14.4.8.6 Potential receptors associated with the Proposed Development Site are as follows:

- Current and future on-site human health users including;
  - Commercial users (workers at Peterhead Power Station and SHETL substation); and
  - Public open space users (outside the Power Station footprint/future development footprint).
- Current and future off-site human health users including;
  - Commercial and public open space users (surrounding); and
  - Residential users (Boddam village, adjacent to the south and sporadic dwellings to the west).
- Groundwater including;
  - Superficial geology (Hatton Till, Blown Sand and Marine Beach Deposits);
  - Groundwater abstraction located off-site (domestic use); and
  - Bedrock geology (Peterhead Pluton) (classified as a low productivity aquifer).

- Surface water located on-site and off-site including;
  - Watercourses: Den of Boddam (partially culverted), various unnamed drains and ponds, Sandford Bay (North Sea).
- Building and infrastructure located on-site and off-site: infrastructure at risk from ignition of gas within confined space, below ground infrastructure at risk from aggressive ground conditions; and
- Ecological sites including;
  - Buchan Ness to Collieston Coast SPA; and
  - Non-statutory designated ecological sites: Skelmuir Hill, Stirling Hill, Duwick Local Nature Conservation Site (LNCS).

14.5 DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

14.5.1 INTRODUCTION

14.5.1.1 Measures that have been integrated into the Proposed Development to avoid or reduce adverse environmental effects are described in the following section. The assessment of impacts and effects will take account of these measures already being in place.

14.5.1.2 As part of the Proposed Development, any on-site contamination that poses a plausible risk to any of the receptors will be mitigated or remediated such that potential risks to identified receptors are minimised to a standard suitable for the proposed end use of the site.

14.5.1.3 Potential pollution of the environment will also be prevented occurring, either through disturbance of land contamination or through the introduction of potential contaminative materials during construction.

14.5.2 GROUND INVESTIGATION

14.5.2.1 A ground investigation will be undertaken before construction to inform the development of the detailed design; it is anticipated that this will be secured by planning condition. The ground investigation will validate the assumptions made in the initial Conceptual Site Model and Preliminary Risk Assessment (**Appendix 14A** EIA Report Volume 4) and provide site-specific data upon which to base a land contamination risk assessment. The ground investigation will be designed to target the potentially contaminative sources identified, including the historical earthwork stockpiling activities (derived from the Power Station construction excavations) and which were identified on the Proposed Development Site. Where risks are deemed to be significant, detailed remediation strategies will be developed accordingly, pursuant to the process set out by the planning authorities.

14.5.3 CONSTRUCTION

Legislation and regulation

14.5.3.1 A Construction Environmental Management Plan (CEMP) will be developed that will contain measures to ensure compliance with relevant standards and legislation. The CEMP will set out the environmental control and mitigation requirements to be used during construction. Measures contained within the CEMP will be designed to limit the potential for dispersal and accidental releases of potential contaminants, soil derived dusts and uncontrolled run-off to occur during construction. For example, the CEMP will set out how material is to be excavated, segregated, and stockpiled to minimise the potential for run-off, soil quality degradation and wind dispersal

of dusts. The CEMP will also establish procedures for dealing with unexpected soil or groundwater contamination that may be encountered.

14.5.3.2 The framework CEMP (**Appendix 5A** EIA Report Volume 4) identifies the relevant procedures to be adhered to throughout construction. A detailed CEMP will be prepared by the appointed construction contractor(s) which will be issued to Aberdeenshire Council for approval to discharge a planning condition if consent is granted.

Soil and groundwater pollution control mitigation

14.5.3.3 Foundation design for the Proposed Development Site is currently not finalised, but it is assumed at this stage that the principal structures may require piling. There will be a requirement to avoid creating flow pathways between potentially contaminated soils and/or groundwater within the underlying aquifer. Foundation options will be fully defined on conclusion of the proposed ground investigation. A piling risk assessment will be required for the Proposed Development Site to satisfy planning conditions.

14.5.3.4 Potential impacts to construction workers during site preparation and construction would be controlled and mitigated by the following measures and through working in accordance with CIRIA C692, (2010):

- Measures to minimise dust generation;
- Provision of Personal Protective Equipment (PPE), such as gloves, overalls etc. to minimise direct contact with soils;
- Provision of adequate hygiene facilities and clean welfare facilities for all construction site workers;
- Monitoring of confined spaces for potential ground gas accumulations, restricting access to confined spaces, i.e. to suitably trained personnel only, and use of specialist PPE, where necessary; and
- Preparation and adoption of a site and task specific health and safety plan as is required under Health and Safety legislation.

14.5.3.5 A Pollution Response Plan will be in place prior to the commencement of construction works. The plan will outline key pollution mitigation measures to be adopted including a Control of Substances Hazardous to Health (COSHH)/ fuel inventory and key contacts to be notified in the event of a significant pollution incident. All bulk fuel and COSHH items will be stored in accordance with the relevant SEPA Guidance for Pollution Prevention notes (GPPs), or Pollution Prevention notes where GPPs are not yet available (these are gradually being withdrawn and replaced by the GPPs), and storage regulations. Tanks and dispensing pumps will be locked when not in use to prevent unauthorised access.

14.5.3.6 Any hazardous materials will be stored in designated locations with specific measures to prevent leakage and the release of their contents. This will include a requirement to position storage areas at least 10m away from surface water features/ drains (and take into consideration the positions of any groundwater wells), on an impermeable base with an impermeable bund that has no outflow and is of adequate capacity to contain at least 110% of the contents. Valves and trigger guns will be protected from vandalism and kept locked when not in use.

14.5.3.7 Only well-maintained plant will be used during construction to minimise the potential for accidental pollution from leaking machinery or damaged equipment. Static machinery and plant are expected to be stored in hardstanding areas when not in use and, where necessary, to make use of drip trays beneath oil tanks/ engines/ gearboxes/ hydraulics. Spill response kits

containing equipment that is appropriate to the types and quantities of materials being used and stored during construction will be maintained on Project Area for the duration of the works.

14.5.3.8 The CEMP will set out procedures for dealing with unexpected soil or groundwater contamination that may be encountered. This would typically require affected works to stop to enable appropriate people to be notified, and further characterisation and risk assessment to be undertaken before remediation or mitigation proposals are agreed with all required stakeholders.

14.5.3.9 Specific mitigation measures may be required in the form of treating/ remediating any contamination encountered during construction (e.g. any contamination that may be associated with any potentially contaminative sites identified as part of the assessment, notably the areas of potentially infilled land or any residual contamination associated with the former HFO tank farm). This will be confirmed based on information gathered through ground investigation.

14.5.3.10 Any remediation works, or the removal of contaminated soils or waters associated with the construction of the Proposed Development would be expected to result in the enhancement of the local environment.

Excavated materials management

14.5.3.11 Prior to construction, a strategy will be prepared as part of the design development, which will set out how the earthworks stage of the construction phase will be undertaken. Where necessary the strategy will consider what excavated materials can be reused or are required for the various components of the Proposed Development, and what materials are surplus and require either disposal or onward management to ensure appropriate re-use.

14.5.3.12 To minimise the effects on soil resources during any earthworks, including materials management following foundation construction in relation to the Proposed Development, high standards of soil handling and management will be employed with a view to minimising where possible the double handling of soils and the extent to which exposed soils will be left vulnerable to erosional processes.

14.5.3.13 There is potential for asbestos to be present in any Made Ground on site (albeit none has been encountered during the previous ground investigations). Any Made Ground found to be contaminated with asbestos will require suitable management if it is to be retained on-site or removed. As asbestos only presents a risk if it is disturbed, it is considered that the highest risk would be during the construction and decommissioning phases. Asbestos management will be covered within the CEMP and DEMP.

14.5.3.14 The disposal of soil waste, contaminated or otherwise, to landfill sites would be mitigated by minimisation of the overall quantities of waste generated during construction, and by considering whether that excavated material consigned to landfill cannot, as an alternative, could be put to use either on the Proposed Development or on other sites.

14.5.3.15 Where there is a requirement to dispose of surplus excavated materials off site as waste, the material will be characterised to determine firstly whether it is Hazardous or Non-Hazardous waste in accordance with the SEPA's Technical Guidance WM3 and then once this is established, the appropriate disposal facility will be determined through Waste Acceptance Criteria (WAC) analysis, as required.

14.5.4 OPERATION

14.5.4.1 Operational materials, including chemicals, fuels and oils (acetylene, lubricating oils, distillate fuels, or other fuels), will be stored at the Proposed Development Site. In common with other

modern infrastructure development, secondary containment appropriate to the level of risk will be included in the installed design.

14.5.4.2 The design of the Proposed Development includes measures that would contain and control any releases of contaminants to ground and surface and foul drainage network. Drainage control for the Proposed Development is considered further in **Chapter 12: Water Environment and Chapter 13: Flood Risk** (EIA Report Volume 2).

14.5.4.3 The Proposed Development will be operated in accordance with the PPC Permit.

14.5.5 DECOMMISSIONING

14.5.5.1 The Proposed Development is expected to operate for at least 25 years. At the end of its operating life, the most likely scenario is that the Proposed Development would be shut down and all above ground structures removed. The Proposed Development Site would then be suitably remediated as required to facilitate re-use.

14.5.5.2 A Decommissioning Plan (including Decommissioning Environmental Management Plan (DEMP)) would be produced and agreed with SEPA as part of the Environmental Permitting and site surrender process. The DEMP would consider in detail all potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated. This would include details of how surface water drainage should be managed on the CCGT and CCP site during the decommissioning and demolition.

14.6 LIKELY IMPACTS AND EFFECTS

14.6.1 LAND CONTAMINATION

14.6.1.1 **Figure 14.2** (EIA Report Volume 3) illustrates the identified historical and current areas of potential contamination within the Proposed Development Site boundary and 250m study area. In accordance with the screening methodology presented in Section 14.3, a baseline risk score has been calculated as defined in **Appendix 14B** (EIA Report Volume 4) (this is based on the proximity of the identified area of potential land contamination to the Proposed Development Site, the proposed cut/ fill of the Proposed Development design at its closest point, and the nature of the current and/ or historical land use (whether the land use is deemed to have a low, medium or high risk of potential contamination)) and assigned to each of these areas and this is presented in **Appendix 14C Table 1** (EIA Report Volume 4), and is also visually represented on **Figure 14.2** (EIA Report Volume 3). For the purposes of this EIA chapter, it has been conservatively assumed at this stage that excavation (cut) may occur anywhere within the Proposed Development Site boundary. Those areas with a baseline risk score of three and above have been considered for further risk and impact assessment in this EIA chapter (see Section 14.3 for further details). Those with a baseline risk score of two or below are not considered to pose a significant risk within the context of Proposed Development Site's construction or operation and have therefore been scoped out.

14.6.1.2 Table 14.10 presents a summary of the potential areas of contamination with baseline risk scores of 3 to 5.

Table 14-10: Areas of contamination (baseline risk scores 3 to 5)

Site ID	Site name	Proximity zone[1]	Land use class[2]	Relationship to cut/ fill/ construction work[3]	Baseline risk score[4]
CS1	Peterhead Power Station and historic tanks	Zone 1	Class 3	Cut	5
CS2	SHETL electrical substation	Zone 1	Class 2	Cut	4
CS3	Historic "petrol pump" and tank	Zone 1	Class 3	Cut	5
CS4	Dismantled mineral railway	Zone 1	Class 2	Cut	4
CS5	Historical workshop and repair centre at Sandford Lodge	Zone 1	Class 2	Cut	4
CS6	Historic sewage works, south of SHETL substation	Zone 1	Class 2	Cut	4
CS7	Historic sewage works, north-east of SHETL substation	Zone 1	Class 2	Cut	4
CS8	Seafood factory with historic tanks	Zone 1	Class 2	Cut	4
CS9	Sandford Garage - car dealers and historic fuel station	Zone 1	Class 3	Cut	5
CS10	Millbank Motors - garage and filling station	Zone 1	Class 3	Cut	5
CS18	Fill/ stockpile/ Made Ground, north-western area	Zone 1	Class 2	Cut	4
CS19	Fill /stockpile/ Made Ground, southern area	Zone 1	Class 2	Cut	4

[1] Proximity zone definition is included within Table 1, **Appendix 14B**

[2] Land use class types are defined within Table 2, **Appendix 14B**

[3] For the purposes of this EIA chapter, it has been conservatively assumed at this stage that excavation (cut) may occur anywhere within the Proposed Development Site boundary

[4] Baseline risk scoring method is defined within Table 3, **Appendix 14B**

14.6.1.3 For the sites identified for further assessment (listed in Table 14.10), site-specific CSM have been produced. These include a CSM for each of the following:

- Baseline conditions;
- Construction phase; and
- Post-construction (operational) phase.

14.6.1.4 For the purposes of the further assessment, where appropriate, the sites have been grouped based on their land use type and whether they are on the Proposed Development Site or within the study area but outside of the Proposed Development Site. The grouping of the sites is as follows:

- Industrial sites (baseline risk score 5 sites) (within the Proposed Development Site);
- Fill/ stockpile/ Made Ground (within the Proposed Development Site);
- Light industrial sites (within the Proposed Development Site);
- Current/ historic filling stations (outside the Proposed Development Site);
- Light industrial sites (outside the Proposed Development Site); and
- Railway land (within and outside the Proposed Development Site).

14.6.1.5 Table 14.11 presents a summary of the groups of sites/individual sites, together with justification as to why the site has been considered in the assessment to be within, or outside of the Proposed Development Site boundary, recognising that some sites fall within both. The table also includes a summary of the corresponding baseline CSM risk outcomes.

14.6.1.6 The potential impacts and baseline risks quoted are those before any mitigation is applied. The assessed baseline risk is based on the information provided at the time of the assessment. Where limited information is available, the assessment is based on precautionary, reasonable worst-case assumptions and may, therefore, report a higher risk than that which actually exists. The detailed baseline CSM are presented in **Appendix 14C** (EIA Report Volume 4).

Table 14-11: Summary of baseline CSM for sites which may pose a contaminative risk in relation to the Proposed Development Site

Group/ Individual Site	Site Title (site ID) and Land Use Class	Consideration of Whether Within or Outside of the Proposed Development Site Boundary	Human Health Risk	Ground-water Risk	Surface Water Risk	Ecosystem Risk	Building Risk
Potential areas of contamination located within the Proposed Development Site boundary							
Industrial sites (baseline risk score 5 sites)	Peterhead Power Station and historic tanks – (CS1) Class 3	Located entirely within the Proposed Development Site.	Very low to moderate / low	Moderate / low	Moderate / low to moderate	Moderate / low	Low to moderate / low risk
	Historic "petrol pump" and tank – (CS3) Class 3	Located approximately in the north-western portion of the Proposed Development Site.					
Fill/ stockpile/ Made Ground	Fill/ stockpile/ Made Ground, north-western area – (CS18) Class 2	Located within the Proposed Development Site, north-western portion.	Very low to moderate / low	Low	Low	Low	Very low to low
	Fill/ stockpile/ Made Ground, southern area – (CS19) Class 2	Located within the Proposed Development Site, southern portion.					
Light industrial sites	SHETL electrical substation – (CS2) Class 2	Located in the western portion of the Proposed Development Site. Includes a historic tank entry.	Very low to low	Very low to low	Low	Low	Very low
	Historic sewage works, south of SHETL substation – (CS6) Class 2	Located within the Proposed Development Site, immediately south of the SHETL substation.					
	Historic sewage works, north-east of SHETL substation – (CS7) Class 2	Located within the Proposed Development Site, northeast of the SHETL substation.					
	Historical workshop and repair centre at Sandford Lodge – (CS5) Class 2	Located in the northern area of the Proposed Development Site.					

Group/ Individual Site	Site Title (site ID) and Land Use Class	Consideration of Whether Within or Outside of the Proposed Development Site Boundary	Human Health Risk	Ground-water Risk	Surface Water Risk	Ecosystem Risk	Building Risk
Potential areas of contamination located outside the Proposed Development Site boundary							
Current/ historic filling stations	Sandford Garage - car dealers and historic fuel station – (CS9) Class 3.	Located adjacent to the south-western tip of the boundary of the Proposed Development Site.	Very low to moderate /low	Low to moderate /low	Low	Low	Very low to low
	Millbank Motors - garage and filling station – (CS10) Class 3	Located in proximity of the south-western tip of the boundary of the Proposed Development Site.					
Light industrial sites	Seafood factory with historic tanks – (CS8) Class 2	Located adjacent to the south-eastern tip of the boundary of the Proposed Development Site.	Very low to moderate /low	Low	Low	Low	Very low to low
Potential areas of contamination located within and outside the Proposed Development Site boundary							
Railway land	Dismantled mineral railway with tank – (CS4) Class 2	Crossing the Proposed Development Site in proximity of the SHETL substation and running roughly parallel to the western boundary of the Proposed Development Site	Very low to low	Low	Low	Low	Very low

Construction impacts

14.6.1.7 In the locations of the identified potentially contaminative land uses and in the event of ground disturbance occurring, there is the potential for construction to affect human, controlled waters, building and infrastructure, and ecological receptors, and for the ground conditions to impact upon the design of the Proposed Development.

14.6.1.8 Potential impacts include but are not limited to:

- Mobilising existing contamination in soil and groundwater as a result of ground disturbance and potential de-watering during construction;
- Increasing the potential for contaminants in unsaturated soils to leach to groundwater in open excavations during construction;
- Increasing the potential for contaminated surface run-off to migrate to surface water and groundwater receptors as a result of leaching from uncovered stockpiles;
- Introducing new sources of contamination, such as fuels and oils used in construction plant;
- Creating preferential pathways for the migration of soil contamination and gases, for example, along new below ground service routes, service ducts and as a result of potential de-watering; and
- Introducing new human health receptors such as site staff during and post construction.

14.6.1.9 Construction activities can also result in physical damage to soil, including soil compaction because of heavy construction vehicle movements or the exacerbation of soil erosion through handling and storage of soils.

Temporary Effects

14.6.1.10 To determine whether there are any potential temporary effects on human, controlled waters, building and infrastructure, and ecological receptors during the construction phase, the baseline condition risk and construction risk levels (see Table 14.12), as defined in their respective CSM have been compared in **Appendix 14C** (EIA Report Volume 4).

14.6.1.11 Where there is no predicted change between the main baseline risk and the main construction risk, the during-construction effect significance is deemed to be neutral even if the risk from the land contamination site is deemed to be high.

14.6.1.12 An increase in risk at the construction stage compared to baseline would result in an adverse effect and conversely, any improvement resulting from construction, for example where remediation is undertaken or a contaminant linkage is broken or removed, would result in a beneficial effect.

14.6.1.13 Whilst adoption of the measures included as part of a CEMP would make it unlikely that there would be adverse effects during construction there may still be some temporary minor adverse effects during construction from ground disturbance or groundwater controls which may inadvertently mobilise contamination or create preferential pathways. In particular, this may occur for groundwater and ground gas migration, which may cause a temporary worsening in groundwater quality or increased ground gas risk compared to baseline.

14.6.1.14 Furthermore, the Den of Boddam is being realigned as part of the Proposed Development works, therefore ground disturbance caused by earthworks may cause temporary worsening of surface water quality compared to baseline.

14.6.1.15 The assessment of effects during the construction phase has shown that whilst there are some predicted minor adverse effects associated with the construction stage, none of these would be regarded as significant following adoption of the measures in the CEMP.

14.6.1.16 A summary of the assessment is provided in Table 14.12 and the details of these comparisons are presented in **Appendix 14C** (EIA Report Volume 4).

Table 14-12: Summary of temporary effects (during construction)

Group/ Individual Site	Site Title (Site ID) and Land Use Class	Construction Effect Significance	Concerning Groundwater and/or Ground Gas Migration (which may cause a temporary worsening in groundwater quality or increased ground gas risk compared to baseline)
Potential areas of contamination located within the Proposed Development Site boundary			
Industrial sites (baseline risk score 5 sites)	Peterhead Power Station and historic tanks – (CS1) Class 3	Neutral to minor adverse (not significant)	Groundwater, surface water[1]
	Historic "petrol pump" and tank – (CS3) Class 3		
Fill/ stockpile/ Made Ground	Fill/ stockpile/ Made Ground, north-western area – (CS18) Class 2	Neutral to minor adverse (not significant)	Groundwater, ground gas
	Fill /stockpile/ Made Ground, southern area – (CS19) Class 2		
Light industrial sites	SHETL electrical substation – (CS2) Class 2	Neutral to minor adverse (not significant)	Groundwater
	Historic sewage works, south of SHETL substation – (CS6) Class 2		
	Historic sewage works, north-east of SHETL substation – (CS7) Class 2		
	Historical workshop and repair centre at Sandford Lodge – (CS5) Class 2		

Group/ Individual Site	Site Title (Site ID) and Land Use Class	Construction Effect Significance	Concerning Groundwater and/or Ground Gas Migration (which may cause a temporary worsening in groundwater quality or increased ground gas risk compared to baseline)
Potential areas of contamination located outside of the Proposed Development Site boundary			
Current/historic filling stations	Sandford Garage - car dealers and historic fuel station – (CS9) Class 3	Neutral to minor adverse (not significant)	Groundwater
	Millbank Motors - garage and filling station – (CS10) Class 3		
Light industrial sites	Seafood factory with historic tanks – (CS8) Class 2	Neutral (not significant)	-
Potential areas of contamination located within and outside the Proposed Development Site boundary			
Railway land	Dismantled mineral railway with tank – (CS4) Class 2	Neutral to minor adverse (not significant)	Groundwater

[1] The Den of Boddam is being realigned as part of the redevelopment works, therefore this may temporarily worsen surface water quality compared to baseline.

Permanent Effects

14.6.1.17 To determine whether there are any potential permanent effects, the baseline risks posed to receptors and post-construction risks to receptors based on the CSM have been compared (**Appendix 14C** EIA Report Volume 4). Where there is no change between the main baseline risk and the post-construction risk, the permanent effect significance is deemed to be neutral even if the risk is assessed to remain as high, post construction. This will be the case where the construction of the Proposed Development Site will have no impact on the risks from a potentially contaminated site. This typically applies to sites that are within the study area but located outside of the Proposed Development Site boundary. The assessment indicates there will be no adverse permanent effects on the sites outside of the study area, post construction.

14.6.1.18 It is anticipated that if any remediation is carried out on potentially contaminated sites identified within the Proposed Development Site boundary, there will be overall beneficial effects. However, the risk and impact assessment has not considered these to be significant beneficial effects based on the applied methodology. This considers that the extent to which remediation is likely to be needed is low, and if it is deemed to be required as the design develops, it is expected to be localised and targeted, rather than widespread across the Proposed Development Site...

14.6.1.19 If required, (subject to ground investigation at the Proposed Development Site), site-specific permanent remediation measures, which will focus on source removal, pathway breakage or receptor protection, will be developed during the detailed design stage. These measures will reduce risks to human health, controlled waters and property from contamination, gas and vapours in the ground (the principal risks in this area), to an acceptable level.

14.6.1.20 A summary of the assessment is provided in Table 14.13 and the details of these comparisons are presented in **Appendix 14C** (EIA Report Volume 4).

Table 14-13: Summary of permanent effects (post-construction)

Group/ individual site	Site title (site id) and land use class	Post-construction effect significance
Potential areas of contamination located within the Proposed Development Site boundary		
Industrial sites (baseline risk score 5 sites)	Peterhead Power Station and historic tanks – (CS1) Class 3	Neutral to minor beneficial (not significant)
	Historic "petrol pump" and tank – (CS3) Class 3	
Fill/ stockpile/ Made Ground	Fill/ stockpile/ Made Ground, north-western area – (CS18) Class 2	Neutral to minor beneficial (not significant)
	Fill/ stockpile/ Made Ground, southern area – (CS19) Class 2	
Light industrial sites	SHETL electrical substation – (CS2) Class 2	Neutral (not significant)
	Historic sewage works, south of SHETL substation – (CS6) Class 2	
	Historic sewage works, north-east of SHETL substation – (CS7) Class 2	
	Historical workshop and repair centre at Sandford Lodge – (CS5) Class 2	
Potential areas of contamination located outside of the Proposed Development Site boundary		
Current/historic filling stations	Sandford Garage - car dealers and historic fuel station – (CS9) Class 3	Neutral (not significant)
	Millbank Motors - garage and filling station – (CS10) Class 3	

Group/ individual site	Site title (site id) and land use class	Post-construction effect significance
Light industrial sites	Seafood factory with historic tanks – (CS8) Class 2	Neutral (not significant)
Potential areas of contamination located within and outside of the Proposed Development Site boundary		
Railway land	Dismantled mineral railway with tank – (CS4) Class 2	Neutral (not significant)

Operational impacts

14.6.1.21 During the operational stage of the Proposed Development, conditions may have altered from the baseline because of, but not limited to:

- Introducing commercial users (workers at the Proposed Development), and new development infrastructure as new receptors;
- Contamination which has been encountered having been removed, remediated or mitigated;
- Additional drainage and discharge routes and the potential for polluted surface water run-off and drainage to be directed towards groundwater and surface water receptors with the new drainage system acting as a more efficient pollutant pathway;
- Realignment and re-culverting of the Den of Boddam resulting in reduced risk of pathways for contamination in the culverted section (potential improvement in the construction quality of the culverted section compared to the current condition (although the current construction quality is unknown));
- The potential for impacts arising from pollutants e.g. fuel spillages (acetylene, lubricating oils, distillate fuels, or other fuels), to pass directly into the underlying ground/ aquifers, bypassing the drainage system; and
- Reduction in soil erosion through additional hardstanding, improved drainage design and improvement in surface water runoff quality from on-site surface water attenuation features required which would be incorporated into the layout of the Proposed Development.

14.6.1.22 It is anticipated that there will be no significant effects during the operation of the Proposed Development as maintenance and operation of the Proposed Development will be in accordance with established environmental legislation, permitting requirements and good practice. In particular the Proposed Development will be required to operate in accordance with the use of Best Available Techniques and will be regulated by SEPA through a PPC Permit. This will specify preventative maintenance techniques and pollution prevention measures to be applied.

Decommissioning

14.6.1.23 During the decommissioning of the Proposed Development, conditions may alter from the baseline as a result of, but not limited to:

- Mobilising existing contamination in soil and groundwater as a result of ground disturbance during decommissioning;
- Increasing the potential for contaminants in unsaturated soils to leach to groundwater in open excavations during decommissioning;
- Increasing the potential for contaminated surface run-off to migrate to surface water and groundwater receptors as a result of leaching from uncovered stockpiles; and
- Introducing new sources of contamination, such as fuels and oils used in decommissioning plant.

14.6.1.24 It is anticipated that similar to the temporary effects during the construction phase, there may be some temporary minor adverse effects during the decommissioning period from ground disturbance (the construction CSM presented in **Appendix 14C** (EIA Report Volume 4) also apply to the decommissioning of the Proposed Development). These temporary minor adverse impacts at the construction stage are unlikely to be regarded as significant as the development of DEMP will mitigate the potential risks.

14.7 MITIGATION, MONITORING AND ENHANCEMENT MEASURES

14.7.1 OVERVIEW

14.7.1.1 As detailed in Section 14.5, ground investigation will be undertaken before construction to inform the development of the preliminary and detailed design. Depending on information gathered through this ground investigation, monitoring of groundwater and surface water may be recommended before construction commences, during construction works and post-construction.

14.7.1.2 As discussed in Section 14.5, the CEMP, which will be prepared prior to the commencement of construction activities, will set out the proposed environmental management, monitoring, control techniques and mitigation measures to be applied during construction of the Proposed Development.

14.7.1.3 A Decommissioning Plan (including DEMP) would be produced for the decommissioning stage. This would consider in detail all potential environmental risks on the Proposed Development Site and contain guidance on how risks can be removed or mitigated.

14.7.1.4 No additional mitigation, compensation and enhancement measures are considered to be required during the construction, operation or decommissioning phase.

14.8 CUMULATIVE EFFECTS

14.8.1 CUMULATIVE EFFECTS

14.8.1.1 An assessment of potential cumulative ground conditions effects due to the Proposed Development is presented in Table 14.14. The full list of cumulative developments is presented in **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4). The developments located within the cumulative zone of influence (which is double the adopted study area for ground conditions) are application reference APP/2019/0982 (ID - 3), APP/2021/2681 (ID - 21) and APP/2021/2392 (ID - 22).

Table 14-14: Cumulative effects assessment

ID	Application Reference	Applicant for 'Other Development' and Brief Description	Assessment of Cumulative Effect with Development	Proposed Mitigation Applicable to The Development including any Apportionment	Residual Cumulative Effect
3	APP/2019/0982	Application for erection of electricity substation comprising platform area, control building, associated plant and infrastructure, ancillary facilities, landscape works and road alterations and improvement works	Details of the cumulative developments are not currently available, but it is assumed that trenching and minor dewatering may be required during their construction. Based on the contaminated land risk and impact assessment in Section 14.6, there may be some temporary minor adverse effects during construction from ground disturbance or where groundwater controls may inadvertently mobilise contamination or create preferential pathways. It is assumed that the cumulative developments will have their own CEMP to mitigate impacts during construction and therefore no resulting significant adverse effects are anticipated. There may be beneficial effects associated with remediation if the cumulative developments affect contaminated land that results in removal of potential contaminant sources or mitigation. However, it is not considered that this will result in any significant beneficial effects. There is unlikely to be any potential for cumulative effects.	Other than the mitigation measures proposed in Section 14.7, no further mitigation measures to reduce potential cumulative effects are required within this Application.	No significant residual effects are anticipated, and no cumulative effects are anticipated.
21	APP/2021/2681	Application for erection of HVDC electrical converter station and associated access tracks, drainage works and landscaping including enclosure			
22	APP/2021/2392	Application for construction of synchronous condenser and associated infrastructure			

14.9 SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

14.9.1 INTRODUCTION

14.9.1.1 A review of the baseline conditions within the study area has identified several potential contamination sources. In the locations of the identified potentially contaminative land uses, there is the potential for construction to affect human health, controlled waters, ecological and building and infrastructure receptors and for the ground conditions to impact on the design of the Proposed Development. A summary of the key effects identified based on the studies completed to date is provided below.

14.9.2 LAND CONTAMINATION

14.9.2.1 For land contamination, construction effects have the potential to be adverse in the short term in respect of mobilising existing contamination. However, post-construction there is the potential for a beneficial effect to be realised if land contamination is identified and has required remediation to be undertaken.

14.9.2.2 The potential exists to encounter contaminated soils during the construction phase of the Proposed Development, notably in the areas where Made Ground was recorded within the Proposed Development Site, associated with the existing Power Station. It is assumed that the principal structures at the Proposed Development Site may require piling. There will be a requirement to avoid creating flow paths between potentially contaminated soils and/or groundwater to the underlying aquifer. Foundation options will be fully defined on conclusion of a ground investigation. The ground investigation and piling risk assessment will be required for the Proposed Development Site to satisfy any planning conditions applied.

14.9.2.3 Construction activities could create dust, which combined with ground preparation and earthworks, soil handing and vehicle movements could disturb or spread existing contaminated soils which may result in potential adverse effects. This could result in harm to the human health of neighbouring residents, workers in, and visitors to, commercial properties, and members of the public accessing areas of open space and community facilities.

14.9.2.4 Hazardous materials will be introduced and stored on-site during construction, in the form of diesel fuel, oils, chemicals and solvents, as well as construction materials such as cement and bentonite. Improper handling and use of hazardous materials has the potential to introduce contaminants into underlying soils and groundwater which may in turn result in impacts to surface water courses through groundwater migration or uncontrolled run off with the water quality potentially reduced as a consequence. Leakages/ spillages from materials and fuel storage areas or from the incorrect disposal of waste or surplus material, could also impact on the underlying ground and hydrogeological conditions which would affect the groundwater resource potential. However, with the mitigation measures proposed and contained in the CEMP and DEMP associated impacts would be negligible.

14.9.2.5 There has been some ground investigation within the Proposed Development Site boundary. This is summarised in **Appendix 14A: Phase 1 Desk Based Assessment** (EIA Report Volume 4). Further ground investigation and assessment will be undertaken to identify potential contamination prior to the construction phase.

14.9.2.6 Significance of effects during the construction, operation and decommissioning phases has been assessed in Section 14.6. It is considered that there are no significant adverse

construction, operational or decommissioning effects in relation to land contamination. There is the potential for neutral to minor beneficial effects associated with remediation of the Proposed Development Site, if this were to be undertaken, however, this is not regarded as significant. This considers that the extent to which remediation is likely to be needed is low, and if it is deemed to be required as the design develops, it is expected to be localised and targeted, rather than widespread across the Proposed Development Site. With the implementation of a CEMP prepared prior to the commencement of construction activities, no residual environmental effects on geology, soils or groundwater are predicted.

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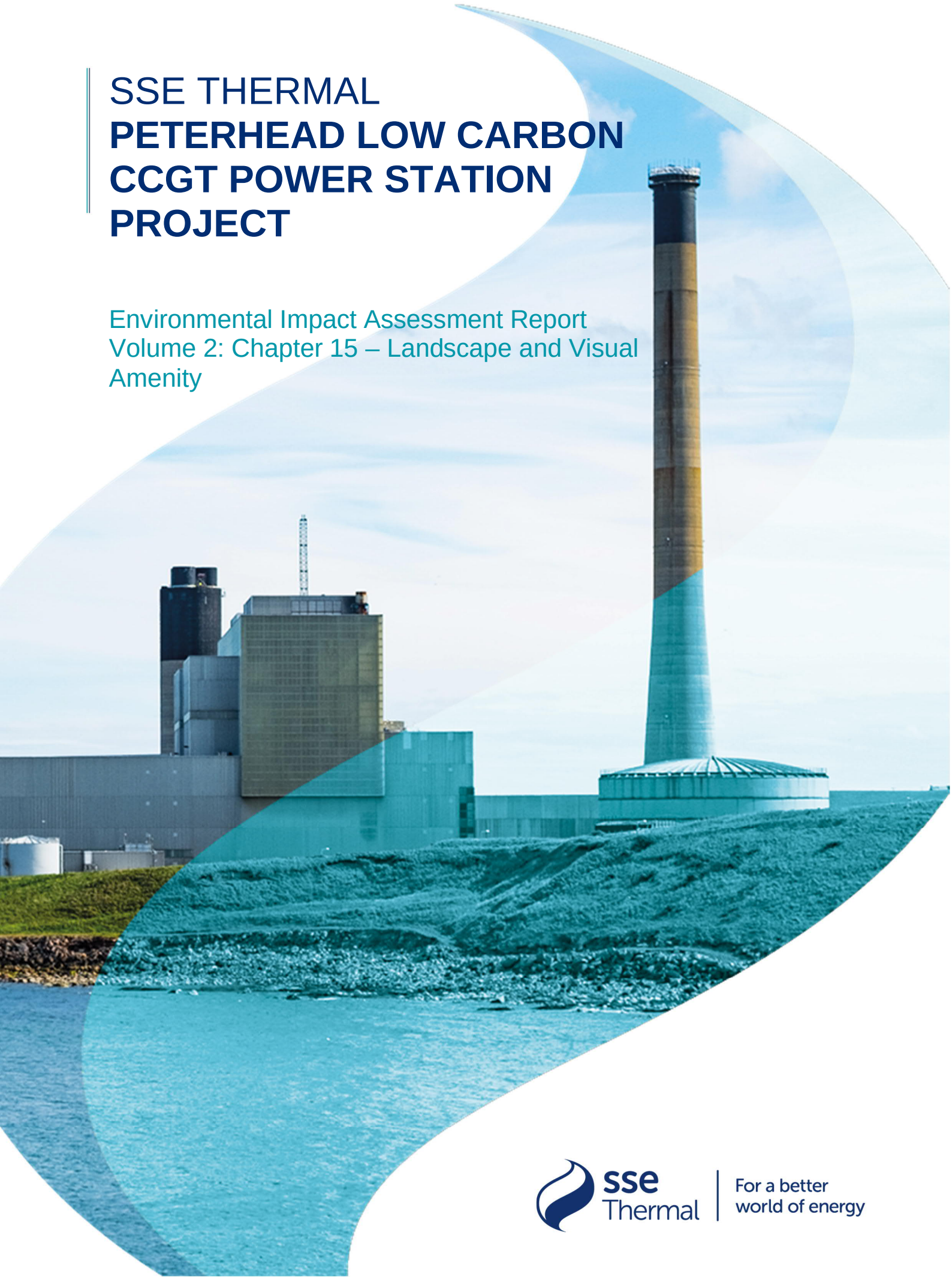
PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 15 – Landscape and Visual Amenity



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CONTENTS

TABLES

15. Landscape and Visual Amenity

15.1. INTRODUCTION

15.1.1 INTRODUCTION

15.1.1.1. This Landscape and Visual Impact Assessment (LVIA) chapter of the Environmental Impact Assessment Report (EIA Report) considers the likely effects of the Proposed Development on landscape character and visual amenity. Landscape and visual effects are interrelated but assessed separately. Landscape effects relate to changes to physical elements and the aesthetic and perceptual aspects of a landscape which contribute to its distinctive character. Visual effects relate to changes to views available to, and experienced by, people.

15.1.1.2. The Proposed Development Site subject to this LVIA is shown on **Figure 3.3** (EIA Report Volume 3). The LVIA focuses on likely significant effects that might arise from the Proposed Development and identifies the mitigation measures that will be implemented to avoid, minimise, or offset potential effects. The LVIA also provides an assessment of potential cumulative effects.

15.1.1.3. This Chapter is supported by the following figures, provided within EIA Report Volume 3:

- Figure 2.1 Cumulative Inter-Project Developments;
- Figure 15.1 LVIA Study Area;
- Figure 15.2 Zone of Theoretical Visibility;
- Figure 15.3 Landscape Designations;
- Figure 15.4 Landscape and Coastal Character Types;
- Figure 15.5 Representative Viewpoint and Visual Receptor Locations; and
- Figures 15.6.1 to 15.6.11 Visualisations.

15.1.1.4. Historic features and ecological designations can have an influence on the perception and value of the landscape character or view. Potential effects on the cultural or heritage value of historic sites are provided in **Chapter 16: Cultural Heritage** (EIA Report Volume 2), and potential effects on ecological assets are provided in **Chapter 11: Biodiversity and Nature Conservation** (EIA Report Volume 2). Tourist destinations and routes are identified as visual receptors within this chapter, and the effects on views experienced by these receptors are assessed in the LVIA. Effects relating to tourism and social-economic aspects are provided in **Chapter 17: Socio-Economics, Recreation and Tourism** (EIA Report Volume 2). **Chapters 4: The Proposed Development**, and **Chapter 6: Consideration of Alternatives** (EIA Report Volume 2), provide details of the design process, which has been influenced by landscape and visual considerations.

15.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

15.2.1 INTRODUCTION

15.2.1.1. The following section provides a brief outline of legislation, national and local planning policies, and good practice guidance relevant to landscape character and visual amenity. Further details of planning policy are provided in **Chapter 7: Legislative Context and Planning Policy** (EIA Report Volume 2) and also the Planning Statement which accompanies the consent application.

15.2.2 LEGISLATION

15.2.2.1. The Council of Europe Landscape Convention (LC) (amended by the 2016 protocol) was initial signed by the United Kingdom (UK) Government in 2006 and came into effect in March 2007. The LC was amended by the 2016 Protocol, with amendments coming into force in 2021. The LC recognises landscape in law. It focuses specifically on landscape issues and highlights the importance of integration of landscape into areas of policy, to promote protection, management and planning of all landscapes including the assessment of landscape and analysis of landscape change.

15.2.2.2. The LC defines landscape as an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors. The LC considers landscape (land or marine), from urban to rural areas, and whether special or degraded.

15.2.3 NATIONAL POLICY AND GUIDANCE

15.2.3.1. The National Planning Framework (NPF3 (Scottish Government, 2014) was published in 2014 by the Scottish Government and is intended to guide Scotland's spatial development priorities for the next 20 to 30 years. NPF3 highlights the importance and value of landscape to Scotland and outlines protection for nationally important landscapes such as National Scenic Areas, National Parks and Wild Land. NFP3 also highlights the importance of landscape in place making in sustaining local distinctiveness and cultural identity, particularly closer to settlements and the urban edge.

15.2.3.2. The Scottish Government published a draft of National Planning Framework 4 (NPF4) in November 2021, which is intended to replace NPF3 and provide the spatial strategy for Scotland to 2045. The draft NPF4 takes account of the target of net zero emissions by 2045 set by the Scottish Government. It therefore places a greater emphasis on addressing climate change and on protecting and enhancing natural capital and biodiversity. Protection for National Parks and National Scenic Areas is retained, with development outside these areas supported where it can be demonstrated to be acceptable through site specific assessment.

15.2.3.3. Scottish Planning Policy (SPP) (Scottish Government, 2014) is the statement of the Scottish Government's policy on nationally important land use planning matters and sets out policy that will help to deliver the objectives of NPF3.

15.2.3.4. Paragraphs 193 to 206 relate to Landscape and Natural Heritage. Paragraph 202 states:

'The siting and design of development should take account of local landscape character. Development management decisions should take account of potential effects on landscapes and the natural and water environment, including cumulative effects. Developers should seek to minimise adverse impacts through careful planning and design, considering the services that the natural environment is providing and maximising the potential for enhancement'

15.2.3.5. With regard to statutory designated landscapes, paragraph 203 states:

'Planning permission should be refused where the nature or scale of proposed development would have an unacceptable impact on the natural environment. Direct or indirect effects on statutorily protected sites will be an important consideration, but designation does not impose an automatic prohibition on development'.

15.2.3.6. Other national policy documents and statements that have been referred to include:

- Planning Advice Note (PAN) 60: Planning for Natural Heritage (Updated 2008) (Scottish Government, 2008): Provides guidance on the protection and enhancement of Scotland's

natural environment. This expands on the National Planning Policy Guideline on Natural Heritage (NPPG 14) (Scottish Government, 1999).

- PAN 68: Design Statements (Scottish Government, 2003) recognises the importance of providing and promoting effective links between planning and design. It encourages developers to consider and set out the design principles which determine the design and layout of the development proposal.

15.2.4 REGIONAL AND LOCAL POLICY AND GUIDANCE

15.2.4.1. Aberdeen City and Shire Strategic Development Plan (SDP) (Aberdeenshire Council, 2020a) was published in 2020 and sets out a vision and strategic aims and objectives at a regional level. In relation to landscape, the SDP includes an objective to ensure development safeguards, and where appropriate, enhances natural assets and is within the capacity of the environment.

15.2.4.2. The Aberdeenshire Council Local Development Plan (LDP) (Aberdeenshire Council, 2017a) was adopted in April 2017. This is the current LDP for the area that sets out the strategic vision for Aberdeenshire, and planning policies used for assessing planning applications.

15.2.4.3. The following list of LDP policies are relevant to a consideration of the landscape and / or visual resource:

- Policy E1 Natural Heritage: This policy seeks to conserve natural heritage, including designated nature conservation sites, areas of geological value, and protected landscape features (e.g. Ancient Woodland). The policy states that where impacts cannot be reasonably avoided, an ecological or geological management plan must demonstrate public benefits that outweigh the ecological or geological value of the site.
- Policy E2 Landscape: This is the principal landscape policy within the LDP. It states:

'We will refuse development that causes unacceptable effects through its scale, location or design on key natural landscape elements, historic features or the composition or quality of the landscape character. These impacts can be either alone or cumulatively with other recent developments. Development should not otherwise significantly erode the characteristics of landscapes as defined in the Landscape Character Assessments produced by Scottish Natural Heritage or have been identified as Special Landscape Areas of local importance ' (p.48).

- Policy PR1 Protecting important resources: This broad policy concerns the protection of a range of environmental resources. It states:

'We will not approve developments that have a negative effect on important environmental resources associated with the water environment, important mineral deposits, prime agricultural land, peat and other carbon rich soils, open space, and important trees and woodland' (p.56).

15.2.5 SUPPLEMENTARY GUIDANCE

15.2.5.1. Relevant Supplementary Guidance (SG) for landscape and / or visual matters that accompanies the LDP includes:

- SG 3: Energetica (Aberdeenshire Council, 2017b): The Energetica corridor is promoted in NPF3. It seeks to promote a high-quality lifestyle, leisure and a global business location showcasing the latest energy and low carbon technology. The policy states that development must contribute to the quality of life, environmental performance and economic development targets. Subject to other policies, the SG states that development will be approved if (inter alia) there is a commitment to the provision of high-quality

landscaping which contributes to a unified sense of place within the area [the Energetica corridor].

- SG 9 (A-C): Aberdeenshire Special Landscape Areas (Aberdeenshire Council 2016): This SG sets our three supplementary policies to support Policy E2 of the adopted 2017 LDP:
  - Policy A: Boundaries. *'Aberdeenshire Council will apply the SLA boundaries as set out in this Supplementary Guidance in the implementation of the Aberdeenshire Local Development Plan Policy E2 Landscape';*
  - Policy B: Development Management. *'Aberdeenshire Council will use the Statements of Importance supporting each of the Special Landscape Areas outlining the qualifying interests protected by Policy E2. Development will only be permitted if these are not being adversely affected or the effects of the development are clearly outweighed by social, environmental or economic benefits of at least local public importance.'; and*
  - Policy C: Landscape. *'Aberdeenshire Council will promote and encourage conservation and enhancement measures within the Special Landscape Areas that enhance appreciation of the special landscape or are measures that enhance the features identified in the Designation Statement contained in the Statement of Importance'.*

  SG 9 takes an 'all-landscapes approach', underpinned by the following principles:

  - *'Both town and country – Landscapes do not stop at the edge of settlements, nor do they necessarily change at the boundary of local authority areas.*
  - *Valuing landscapes – Views on what is important in a particular local landscape will vary and reflect personal responses as well as more objective assessments. Some landscapes are recognised to be of national importance, but people will also value their local landscapes as the places where they live and work. All these views should be respected and should be used to inform the planning and management of local landscapes.*
  - *Guiding landscape change – Landscapes are constantly changing and landscape planning and management at all levels should aim to facilitate positive change – be it the enhancement of existing qualities or the creation of new ones of equal or greater value. Higher standards in the planning and design of new development and management of land-use are essential components of such an approach.*
  - *A shared responsibility – Responsibility for local landscapes does not rest with any one organisation or individual. Action for local landscapes should accordingly be broad-based, though local authorities have a particularly important role to play in developing consensus on the direction, nature and extent of landscape change and facilitating a more integrated and collective approach to their planning and management'.*

15.2.5.2. Relevant SLAs, the Statement of Importance, and their value as part of the landscape resource within the study area is discussed in Section 0.

15.2.6 PROPOSED ABERDEENSHIRE LOCAL DEVELOPMENT PLAN 2022

15.2.6.1. It is acknowledged that Aberdeenshire Council is currently in the process of preparing a new LDP which, once adopted, will replace the current LDP. Until the new LDP is adopted, the statutory status of the current 2017 LDP remains. A review of the Aberdeenshire Proposed Local Development Plan (April 2020) has indicated that the principal policies related to landscape and visual considerations remain largely unchanged from those within the current adopted LDP (Aberdeenshire, 2020b).

15.3. ASSESSMENT METHODOLOGY

15.3.1 CONSULTATION

15.3.1.1. Table 15-1 summarises the issues raised in the scoping opinion in relation to landscape and visual amenity and outlines how and where this has been addressed in the LVIA chapter of the EIA Report. A copy of the Scoping Opinion is contained in **Appendix 1B** (EIA Report Volume 4).

Table 15-1: Scoping Opinion (landscape and visual amenity)

Consultee	Summary of Comment	How and where addressed
Aberdeenshire Council	The suggested viewpoints appear in the most part to capture areas with varying receptors, including residential, recreational and visitors while also taking account of the different landscape characters and special landscape areas Suggestions that an additional viewpoint in or around the Inverugie area, west of Peterhead is incorporated into the viewpoint selection. Further pre-application discussion is encouraged prior to the finalisation of viewpoints.	Further consultation held with Aberdeenshire Council and final viewpoint locations agreed. Additional location (VP11) near Inverugie included in the assessment. Approach to visualisations also agreed with Aberdeenshire Council. Type 3 visualisations (photomontages) provided from four viewpoints (VP4, VP5, VP6 and VP8) and Type 1 visualisations (annotated baseline photography) provided for the remaining seven viewpoints.
	The LVIA process should underpin the decision making regarding the location, layout, and detailed design of the development. The development should make use of the natural topography of the site to locate development on lower ground to be screened by higher ground to minimise impact on the character of the site and surrounding landscape. Earthworks for screening the proposed development should be modelled to fit the existing topography and be designed to appear natural and not uniform or engineered. The ZTV should be used to inform the location of any necessary screening features (tree planting or otherwise) to minimise impacts upon visual receptors. Any tree planting proposed for screening should take account of the coastal	Details of proposed landscape and visual mitigation measures, including those embedded within the design of the Proposed Development are provided in Section 0, below. These include: • Positioning of main structures at lower elevation, below surrounding ground level • Earthworks and planting to provide additional screening • Variable gradients and natural profile to outward slopes of earthworks • Native tree and scrub planting to reflect adjacent vegetation, with acknowledgement of coastal conditions

Consultee	Summary of Comment	How and where addressed
	conditions and use species appropriate to these.	• Meadow grassland seeding tailored to the specific conditions of the site
	The embedded mitigation including retention and maintenance of established vegetation, use of appropriate materials to reduce any glare and massing of buildings, reduction of unnecessary lighting during construction are welcomed and should be incorporated into the final design as suggested within Section 7.6 of the Scoping Report.	Embedded mitigation measures are described in Section 0, below, and in **Appendix 11H: Outline Landscape and Biodiversity Strategy** (EIA Report Volume 4). Measures relating the building layouts, materials and lighting will be finalised in consultation with Aberdeenshire Council at the detailed design stage.
	A list of other similar developments within the area were provided by Aberdeenshire Council to assist with defining the scope of the cumulative assessment. Further assistance was also offered in determining which developments should be included nearer to the time of assessment to ensure the most up-to date position in terms of planned development is given.	The shortlist of other similar schemes to be included as part of the cumulative assessment are listed in Table 15-9 below. These were agreed in consultation with Aberdeenshire Council and based on the status as of 31st December 2021.
	It is recommended that the landscape effects and visual effects be considered separately within the EIA Report chapter for ease of differentiation between the two elements.	Although linked, landscape and visual effects are considered separately in this chapter of the EIA Report.

15.3.2 STUDY AREA

15.3.2.1. A study area of 10km from the Proposed Development has been identified for the landscape and visual assessment, as shown on **Figure 15.1** (EIA Report Volume 3).

15.3.2.2. The extent of the study area has been informed by a review of the maximum parameters of the Proposed Development, Zone of Theoretical Visibility (ZTV) mapping, desk-based research, knowledge of the area and professional judgement. It is considered that it is highly unlikely that significant landscape of visual effects will occur beyond 10km from the Proposed Development.

15.3.2.3. The ZTV (**Figure 15.2** EIA Report Volume 3) is based on an assumed maximum absorber stack height of 130m above ordnance datum (AOD), which is representative of the potential 'worst-case' scenario. The ZTV also indicates the extent of theoretical visibility of the steam turbine hall (46m AOD) and the HRSG stack (96m AOD) to allow a greater understanding of potential visibility of different elements of the Proposed Development. It is important to note that the ZTV has been generated using a 'bare ground' digital terrain model, thus does not take into account of the screening effects of vegetation, buildings, or other structures, and therefore the true extent of visibility is likely to be less than is indicated. Further details on the use and limitations of ZTVs is provided in Section 15.3.4 of this chapter.

15.3.3 IMPACT ASSESSMENT METHODOLOGY

15.3.3.1. The LVIA has been undertaken with due reference to the following guidance documents:

- Guidelines for Landscape and Visual Impact Assessment (GLVIA), Third Edition (The Landscape Institute and Institute of Environmental Management and Assessment, 2013).
- Visual Representation of Development Proposals, Technical Guidance Note 06/19 (Landscape Institute, 2019).
- Assessing landscape value outside national designations, Technical Guidance Note 02/21 (Landscape Institute, 2021).
- Infrastructure, Technical Guidance Note 04/2020 (Landscape Institute, 2020).

15.3.3.2. GLVIA places a strong emphasis on the importance of professional judgement in identifying and defining the significance of landscape and visual effects. The LVIA is undertaken by Chartered Landscape Architects with experience in the assessment of similar types of project. Professional judgement is used in combination with structured methods and criteria to evaluate landscape and visual value and susceptibility, the resulting sensitivity, magnitude, and significance of effect.

15.3.3.3. The LVIA recognises that different stages of the Proposed Development may result in different levels of landscape and visual effects. In addition, it recognises the potential for landscape and visual effects to change over time, particularly where the Proposed Development incorporates mitigation planting. The LVIA therefore includes consideration of effects at the following stages:

- Construction (anticipated start Q4 2023, for three-to-four-year duration)
- Opening (winter year 1 of operation, anticipated 2027)
- Operation (summer 15 years post opening, anticipated 2042)

15.3.3.4. Effects relating to future decommissioning of the Proposed Development (anticipated after 2052) are expected to be similar to those of construction, and as such are not discussed further in this assessment.

15.3.3.5. The following section provides details of the methodology for the LVIA which builds on the general assessment methodology presented in **Chapter 2: Assessment Methodology** (EIA Report Volume 2). For clarity and in accordance with good practice, the assessment of potential effects on landscape character and visual amenity, although closely related, are undertaken separately.

Sensitivity of Landscape Receptors

15.3.3.6. Landscape receptors are described as components of the landscape that are likely to be affected by the Proposed Development. These can include overall character and key characteristics, individual elements or features and specific aesthetic or perceptual aspects. It is the interaction between the different components of the Proposed Development and these landscape receptors which has potential to result in landscape effects (both adverse and beneficial).

15.3.3.7. The sensitivity of the landscape receptor is a combination of the value of the landscape (undertaken as part of the baseline study) and the susceptibility to change of the receptor to the specific type of development being assessed.

15.3.3.8. Landscape value is frequently addressed by reference to international, national, regional, and local designations, determined by statutory bodies and planning agencies. Absence of such a designation does not necessarily imply a lack of quality or value. Factors such as accessibility and local scarcity can render areas of nationally unremarkable quality, highly valuable as a local resource. The evaluation of landscape value is informed by the Landscape Institute TGN

02/21 (Landscape Institute, 2021) and undertaken considering the following factors and classified as high, medium, or low with evidence provided as to the basis of the evaluation:

- *Natural heritage* - landscape with clear evidence of ecological, geological, geomorphological, or physiographic interest which contribute positively to the landscape
- *Cultural heritage* - landscape with clear evidence of archaeological, historical or cultural interest which contribute positively to the landscape
- *Landscape quality/condition* - the measure of the physical state of the landscape including the intactness of the landscape and the condition of individual elements
- *Scenic quality* - the level of visual and sensory appeal of the landscape
- *Perceptual aspects* - the extent that the landscape receptor is recognised for its perceptual qualities (e.g. scenic, wildness or tranquillity)
- *Functional* - landscape which performs a clearly identifiable and valuable function, particularly in the healthy functioning of the landscape
- *Rarity* - the presence of unusual elements or features
- *Representativeness/distinctiveness*- the presence of particularly characteristic features
- *Recreation* - the extent that recreational activities contribute to the landscape receptor
- *Association* - extent that cultural or historical associations contribute to the landscape receptor

15.3.3.9. Landscape susceptibility relates to the ability of a particular landscape to accommodate the Proposed Development. It is appraised through consideration of the baseline characteristics of the landscape, and in particular, the scale or complexity of a given landscape. The evaluation of landscape susceptibility is defined as high, medium or low and is supported by a clear explanation based upon the analysis of the landscape receptor and the extent to which it is able to accommodate the type of change proposed, specific to the Proposed Development.

15.3.3.10. The overall sensitivity assessment of the landscape receptor is made by employing professional judgement to combine and analyse the identified value and susceptibility with overall levels given from high, medium, low to very low.

Table 15-2: Sensitivity of Landscape Receptors

	Higher Sensitivity		Lower Sensitivity
Value	A designated landscape (National Park, National Scenic Area, World Heritage Site) or a landscape in very good condition, exceptional scenic quality and high recreational opportunities or a high degree of rarity.	⟷	Landscapes containing few if any notable elements / features, of poor condition or containing several detracting features and limited aesthetic qualities. Landscapes which are not formally designated.
Susceptibility	Attributes that make up the character of the landscape which offer very limited opportunities to accommodate change of the type proposed without fundamentally altering key characteristics.	⟷	Attributes that make up the character of the landscape which are tolerant of a large degree of the type of change proposed without fundamentally altering the key characteristics.

Sensitivity of Visual Receptors

15.3.3.11. Sensitivity of visual receptors is defined through appraisal of the viewing expectation, or value placed on the view as identified in the baseline study, and its susceptibility to change.

15.3.3.12. The value of the view is an appraisal of the value attached to views and is often informed by the appearance on Ordnance Survey or tourist maps and in guidebooks, literature or art or identified in policy. Value can also be indicated by the provision of parking or services, signage, and interpretation. The nature and composition of the view and its scenic quality is also an indicator. The value of the view is classified as high, medium, or low and is supported by evidenced, professional judgements.

15.3.3.13. The susceptibility of visual receptors is a function of the occupation or activity of people experiencing the view and the extent to which their attention or interest is focussed on the view and the visual amenity they experience at a particular location. For example, residents in their home, walkers whose interest may tend to be focused on the landscape or a particular view, or visitors at an attraction where views are an important part of the experience, may indicate a higher level of susceptibility. Whereas receptors occupied in outdoor sport where views are not important or at their place of work could be considered less susceptible to change.

15.3.3.14. Conclusions in relation to the susceptibility of visual receptors are described as high, medium, or low using consistent and reasoned judgements.

15.3.3.15. The overall sensitivity assessment of the visual receptor is determined by employing professional judgement to combine and analyse the identified value and susceptibility on a scale from high, medium to low. The basis of the assessment is made clear in the evaluation of each visual receptor.

Table 15-3: Sensitivity of Visual Receptors

	Higher Sensitivity		Lower Sensitivity
Value	Views protected by designation, or nationally recognised, or recorded on maps / guidebooks or with cultural associations. Views that have high scenic qualities relating to the content and composition of the view.	⟷	Views which are not documented or protected with minimal or no cultural associations. Views that exhibit low scenic qualities relating to the content and composition of the view.
Susceptibility	Viewers whose attention or interest is focused on their surroundings.	⟷	People whose attention or interest is not focused on their surroundings and where the view is incidental to their enjoyment.

Landscape Magnitude of Change

15.3.3.16. Magnitude of landscape change refers to the extent to which the Proposed Development would alter the existing characteristics of the landscape. It is an expression of the size or scale of change to the landscape, the geographical extent of the area influenced and its duration and reversibility. The variables involved are described below:

- The extent of existing landscape elements that would be lost, the proportion of the total extent that this represents and the contribution of that element to the character of the landscape.
- The extent to which aesthetic or perceptual aspects of the landscape are altered either by removal of existing components of the landscape or by addition of new ones.
- Whether the change alters the key characteristics of the landscape, which are integral to its distinctive character.
- The geographic area over which the change will be felt (within the application boundary itself, the immediate setting, at the scale of the landscape character area, on a larger scale influencing several landscape character areas).
- The duration of the change short term, medium term, or long term (which is defined in **Chapter 2: Assessment Methodology** EIA Report Volume 2), and its reversibility (whether it is permanent, temporary, or partially reversible).

15.3.3.17. An overall assessment of the magnitude of landscape change resulting from the Proposed Development on the landscape receptor is made combining the above judgements using evidence and professional judgement. The levels of magnitude of change are described as being high, medium, low, very low or none, with reference to the criteria descriptions set out in Table 15-4 below.

Table 15-4: Magnitude of Change – Landscape Receptors

Magnitude	Criteria
High	Large alteration to the landscape receptor or may impact an extensive area or unique characteristics at a local level. May be longer term impacts, permanent or reversible.
Medium	Partial alteration to the landscape receptor or may impact a wide area or characteristics at a local level. May be medium term impacts, permanent or reversible.
Low	Slight alteration to the landscape receptor or may impact a restricted area and few key characteristics. May be short to medium term impacts, permanent or reversible.
Very Low	Very slight alteration to the landscape receptor or may impact a limited area or no key characteristics. May be short term impacts, permanent or reversible.
None	No change to the landscape receptor.

Visual Magnitude of Change

15.3.3.18. Visual magnitude of change relates to the extent to which the Proposed Development would alter the existing view and is an expression of the size or scale of change in the view, the geographical extent of the area influenced and its duration and reversibility. The variables involved are described below:

- The scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the Proposed Development;
- The degree of contrast or integration of any new features or changes in the form, scale, composition, and focal points of the view;
- The nature of the view of the Proposed Development in relation to the amount of time over which it will be experienced and whether views will be full, partial or glimpsed;
- The angle of view in relation to the main activity of the receptor, distance of the viewpoint from the Proposed Development and the extent of the area over which the changes would be visible; and
- The duration of the change short term, medium term, or long term (which is defined in **Chapter 2: Assessment Methodology** (EIA Report Volume 2)) and its reversibility (whether it is permanent, temporary, or partially reversible).

15.3.3.19. An overall assessment of the magnitude of visual change resulting from the Proposed Development on the visual receptor is made combining the above judgements using evidence and professional judgement. The levels of magnitude of change are described as being high, medium, low, very low or none, with reference to the criteria descriptions set out in Table 15-5, below.

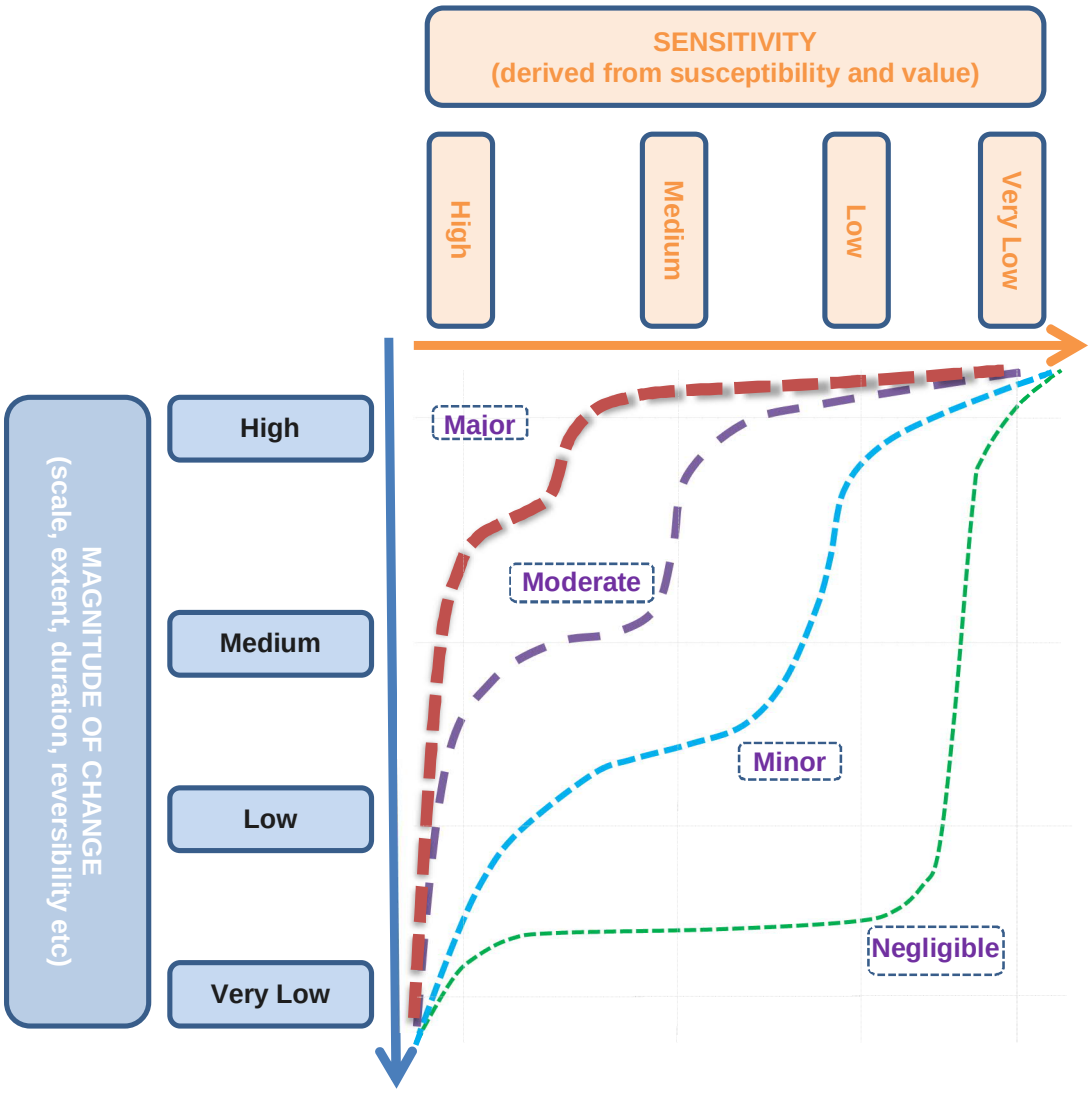
Table 15-5: Magnitude of Change – Visual Receptors

Magnitude	Criteria
High	A pronounced change to the composition of the view or change that may be viewed in the foreground or directly. May be longer term impacts, permanent or reversible.
Medium	A noticeable change to the composition of the view or change that may be viewed in the middle ground or indirectly. May be medium term impacts, permanent or reversible.
Low	An unobtrusive change in the composition of the view or change that may be viewed in the background or obliquely. May be short to medium term impacts, permanent or reversible.
Very Low	A barely perceptible change in the composition of the view or change that may be viewed in the background and/or very obliquely. May be short term impacts, permanent or reversible.
None	No change to the view.

Significance of Effects

15.3.3.20. Determination of the significance of landscape and visual effects has been undertaken by employing professional judgement and experience to combine and analyse the magnitude of change against the identified sensitivity of the receptor. Plate 15-1 gives an indication of how sensitivity and magnitude are considered together to inform determination of the level and significance of effects.

Plate 15-1: Classification of Landscape and Visual Effects



15.3.3.21. The assessments have taken account of direct and indirect change on existing landscape elements, features, key characteristics and evaluates the extent to which these would be lost or modified, in the context of their importance in determining the existing baseline character. The visual assessment considers likely changes to the visual composition, including the extent to which new features would distract or screen existing elements in the view or disrupt the scale, structure, or focus of the existing view.

15.3.3.22. The levels of landscape and visual effects are described with reference to the criteria outlined in

15.3.3.23. Table 15-6, below. For the purposes of this assessment, effects of **moderate or major** are generally considered to be significant.

Table 15-6: Significance of Effects

Significance of Effect Rating	Landscape Criteria	Views and Visual Amenity Criteria

Major Beneficial	Alterations that result in a considerable improvement of the existing landscape resource. Valued characteristic features would be restored or reintroduced.	Alterations that typically result in a pronounced improvement in the existing view.
Moderate Beneficial	Alterations that result in a partial improvement of the existing landscape resource. Valued characteristic features would be largely restored or reintroduced.	Alterations that typically result in a noticeable improvement in the existing view.
Minor Beneficial	Alterations that result in a slight improvement of the existing landscape resource. Characteristic features would be partially restored.	Alterations that typically result in a limited improvement in the existing view.
Negligible Beneficial	Alterations that result in a very slight improvement to the existing landscape resource, not uncharacteristic within the receiving landscape.	Alterations that typically result in a barely perceptible improvement in the existing view.
Neutral	No alteration to any of the components that contribute to the existing landscape resource.	No change to the existing view.
Negligible Adverse	Alterations that result in a very slight deterioration to the existing landscape resource, not uncharacteristic within the receiving landscape.	Alterations that typically result in a barely perceptible deterioration in the existing view.
Minor Adverse	Alterations that result in a slight deterioration of the existing landscape resource. Characteristic features would be partially lost.	Alterations that typically result in a limited deterioration in the existing view.
Moderate Adverse	Alterations that result in a partial deterioration of the existing landscape resource. Valued characteristic features would be largely lost.	Alterations that typically result in a noticeable deterioration in the existing view.
Major Adverse	Alterations that result in a considerable deterioration of the existing landscape resource. Valued characteristic features would be wholly lost.	Alterations that typically result in a pronounced deterioration in the existing view.

Cumulative Landscape and Visual Effects

15.3.3.24. An assessment of cumulative landscape and visual effects has been undertaken based on schemes of a similar type, nature and scale, and agreed in consultation with Aberdeenshire Council.

15.3.3.25. The assessment of cumulative effects follows a similar process to that described above, first identifying and describing the cumulative baseline, followed by an assessment of the magnitude of change and significance of effect.

15.3.3.26. The cumulative baseline involves a theoretical scenario in which consented and application stage schemes are present in addition to existing schemes. The assessment of cumulative magnitude of change and significance of effects involves consideration of the additional change resulting from the Proposed Development to the defined cumulative baseline scenario.

15.3.3.27. It is important to note that cumulative effects may vary from the effects of the Proposed Development considered in isolation. For example, it is possible for a scheme to have effects that are judged of relatively high significance on a particular receptor when taken on its own, but when considered together with the effects of other developments the additional *cumulative* effect of the scheme may be lower.

15.3.4 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

Rochdale Envelope

15.3.4.1. The landscape and visual impact assessments have been undertaken in accordance with the Rochdale Envelope principle. The Rochdale Envelope approach and maximum parameters for the Proposed Development (and in particular its main buildings and structures) are detailed in **Chapter 4: The Proposed Development** (EIA Report Volume 2).

15.3.4.2. The magnitude of visual impacts of the Proposed Development relate to (amongst other criteria) the size and scale of the structures and geographical extent of the area influenced by them. The assessment is based upon the largest possible dimensions for the Proposed Development and its structures and the maximum design level/final ground height of 11m AOD for the proposed Carbon Cycle Gas Turbine (CCGT) and Carbon Capture Plant (CCP) area, which is lower than the existing ground level to the north and west. The design level/ final ground height and the stack heights will be fixed at the detailed design (pre-construction) stage and may be lower than the maximum values provided. The maximum dimensions are based upon the widest building footprint and tallest potential height as listed in Table 15.7, below, and detailed in **Chapter 4: The Proposed Development** (EIA Report Volume 2).

Table 15.7: Maximum Design Parameters

Component	Length (m)	Width (m)	Height (m) above final ground level (AFGL)	Height (m) above ordnance datum (AOD)
Gas Turbine Hall	22	50	32	43
Steam Turbine Hall	50	40	35	46
HRSG Building	28	50	56	67
HRSG Stack	Up to 8.0m diameter		85	96
Carbon Dioxide Stripper	Up to 15m diameter		53	64
Single Absorber (Options 1 and 3 only)	16	43	88	99

Component	Length (m)	Width (m)	Height (m) above final ground level (AFGL)	Height (m) above ordnance datum (AOD)
Single Absorber Stack (Options 1 and 3 only)	Up to 6.7m diameter		119	130
Twin Absorber (Option 2 only)	Up to 19m diameter		66	77
Twin Absorber Stacks (Option 2 only)	Up to 6.7m diameter		87	98

15.3.4.3. Three layout options for the proposed CCGT and CPP area have been identified to give an indication of potential layouts of the Proposed Development, as shown in **Figures 4.1 – 4.3** (EIA Report Volume 3). Layout option 1 is considered to be the worst case in terms of potential landscape and visual effects and as such has been used as the basis for this assessment and accompanying figures, including visualisations.

15.3.4.4. In addition to the Rochdale Envelope parameters, there are also maximum design parameters set to which the Proposed Development could be constructed. Given the space constraints of the Proposed Development Site and the maximum design parameters for each part of the Proposed Development, it is considered that the overall conclusions of the assessment presented in this chapter would not be materially affected by the positioning of the buildings and structures within these parameters.

Zone of Theoretical Visibility Mapping

15.3.4.5. The ZTV maps indicate areas from where it may be possible to view part or the entirety of the Proposed Development. The use of these maps needs to be qualified by the following considerations:

- The ZTVs are based on a bare ground model - Ordnance Survey (OS) Terrain 5 digital terrain model (DTM);
- The bare ground ZTV mapping is limited by the detail of the DTM data used and does not take account of localised topographic variations, or screening from built form or vegetation within the landscape;
- Some areas of theoretical visibility may comprise woodland, moorland, or agricultural land, which do not tend to be visited, or may be inaccessible, and the likelihood of views being experienced is consequently low; and,
- The ZTV maps do not take account of the likely orientation of a viewer, such as the direction of travel, and there is no allowance for reduction of visibility with distance, weather, or light.

15.3.4.6. These limitations mean that the ZTV maps tend to overestimate the extent of the visibility, both in terms of the area from which a development is visible, and the extent of the development which is visible. They should be considered as a tool to identify areas of potential visibility for further targeted survey and assessment, and not a measure of the visual effect.

Visualisations

15.3.4.7. A series of visualisations, including annotated baseline photography and photomontages have been provided to support the LVIA. Photomontages have been produced from four of the representative viewpoint locations as agreed in consultation with Aberdeenshire Council. Two

versions of the photomontages are provided for each of the four viewpoints, showing an indication of how the Proposed Development would appear at opening and at year 15 of operation.

15.3.4.8. The photomontages for opening assume that all construction activities would be completed, with all temporary structures and elements removed, earthworks reprofiling completed and grass seeding established. The earthworks indicated on the photomontages have been informed by calculated volumes of available material based on a design level of 9m AOD for the CCGT and CPP area. They therefore indicate the maximum extent of change to existing topography on the Proposed Development Site. The heights of the CCGT and CCP structures are shown based on the slightly greater design level of 11m AOD to demonstrate the potential worst-case scenario in terms of visibility.

15.3.4.9. The photomontages for year 15 of operation are intended to provide an indication of how the Proposed Development would appear in the longer term once proposed mitigation planting has established. A conservative approach to tree heights (up to 5m) has been applied to proposed planting in the photomontages in recognition of the exposed coastal location of the Proposed Development Site.

15.3.4.10. It is important to note that visualisations are not able to show exactly what a proposed development will look like in reality but provide a reasonable representation of the scale and distance of the structures and their relationship to existing features in the view. Visualisations should be reviewed in the field at the viewpoint location in order to form the best impression of potential change.

Cumulative Developments

15.3.4.11. The cumulative situation changes frequently as applications are made, determined, or withdrawn. Layouts for proposed developments for which applications have been submitted may also change prior to being constructed. For the purposes of the cumulative assessment, it is therefore necessary to determine a cut-off date when the schemes to be included are assumed to be frozen in terms of layout and status. The cut-off date for information considered in the cumulative assessment was 31st December 2021 and any changes in the cumulative situation after this date are not assessed. The schemes included within the cumulative landscape and visual assessment are listed in Table 15-9, below, and have been agreed in consultation with Aberdeenshire Council.

15.4. LANDSCAPE BASELINE CONDITIONS

15.4.1 OVERVIEW

15.4.1.1. This section provides an overview and description of the landscape baseline of the study area.

15.4.2 LANDSCAPE DESIGNATIONS

15.4.2.1. Landscapes can be designated at a national or local scale for their special landscape or scenic qualities. The Proposed Development Site is not subject to any statutory or protected landscape designations and no national level landscape designations are present within the study area. However, parts of one local landscape designation, the North East Aberdeenshire Special Landscape Area, are located within the study area to the north and south of Peterhead, as shown on **Figure 15.3** (EIA Report Volume 3).

15.4.2.2. Aberdeenshire Special Landscape Areas (SLAs) are designated and defined within the adopted 2017 LDP and associated Supplementary Guidance.

North East Aberdeenshire Coast SLA

15.4.2.3. This SLA extends across two sections of the Aberdeenshire Coast: from Fraserburgh to Peterhead; and from Buchan Ness to Blackdog. Within the study area the SLA falls in two geographically distinct locations; the coastline to the north of Peterhead, from the River Ugie to the St. Fergus gas Terminal; and in the southern part of the study area from the east of Boddam to the southern tip of Cruden Bay. The western boundary of the SLA is formed by roads that run parallel to the coast, the A90 and A975, which the Statement of Importance notes contain areas with a strong maritime influence.

15.4.2.4. Based on desktop review and fieldwork, the following aspects and features of the SLA Designation Statement are considered relevant to the study area. The complete Statement of Importance can be accessed online[1]:

- *'The variation in breadth reflects topography, since in lower lying areas the influence of the sea is felt further inland, while high cliffs tend to screen the hinterland from the coastal edge*.
- *There are strong elemental qualities associated with this SLA and its dynamic character features tangible, remote and wildness qualities.*
- *The importance of the coast to the setting of settlements and numerous built heritage assets such as castles, towers, and churches.*
- *Settlements and industry have had a major impact on this landscape, most notably the St. Fergus Gas Terminal.*
- *Traditional fishing villages have a strong relationship with the coast and are nestled into the sheltered landform.*
- *The area is visible from the A90 and uninterrupted views out to sea are available from coastal paths including the clifftop walk at the Bullers of Buchan and the long distance Formartine and Buchan Way.*
- *Overriding horizontal composition, emphasised by low laying landform and "soft" gradual transition from land to sea.*
- *Expansive beaches backed by rolling dunes, views from beaches are typically directed out to sea or along the coast.*

[1] https://www.aberdeenshire.gov.uk/planning/plans-and-policies/aberdeenshire-local-development-plan-2017/ (accessed 11/08/21)

- *Rugged and dramatic cliffs to the south of Boddam, with intricate landforms such as the Bullers of Buchan.*
- *A popular coast for visitors, with coastal paths, accessible dunes, golf courses and popular beaches.*
- *Panoramic views out to sea from cliff tops and open beaches'.*

15.4.2.5. Taking into consideration its local importance and the aspects and features identified above, the value of the North East Aberdeenshire SLA is judged to be **Medium**.

15.4.3 LANDSCAPE AND SEASCAPE CHARACTER

15.4.3.1. NatureScot have undertaken a review of the landscape character of Scotland in order to identify, map and describe a series of Landscape Character Types (LCT), as set out in the following publication:

- Scottish Landscape Character Types and Descriptions (NatureScot, 2019).

15.4.3.2. The following three LCT have been identified within the study area and form the basis of the assessment of effects on landscape character:

- Beaches, Dunes and Links – Aberdeenshire LCT
- Coastal Agricultural Plain – Aberdeenshire LCT
- Fragmented Rocky Coast LCT

15.4.3.3. NatureScot have undertaken a similar, although more limited and broader scale review of the coastal character of Scotland, leading to the identification of 13 national scale Coastal Character Types (CCT). The following two CCTs have been identified within the study area and form the basis of the assessment of effects on seascape character:

- Rocky Coast with Open Sea Views CCT
- Deposition Coastline with Open Views CCT

15.4.3.4. In addition, reference has also been made to the Seascape Units (SU) defined within the following publication to help inform the baseline:

- An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103 (NatureScot, 2005).

15.4.3.5. It should be noted that the purpose of this study was to assess the seascape issues surrounding offshore wind energy developments, rather than onshore development. For this reason while the identified key characteristics of the SUs have helped to inform the baseline, the assessment is focused on the CCTs identified above.

15.4.3.6. The following provides a baseline description of the LCTs and CCTs found within the study area, the locations of which are shown on **Figure 15.4** (EIA Report Volume 3).

Beaches, Dunes and Links – Aberdeenshire LCT

15.4.3.7. This LCT is located along the coastal strip in the northern half of the study area. It covers much of the large settlement of Peterhead and the coastal farmland further north. The area north of Peterhead is characterised by a large-scale open landscape of relatively low lying and level topography, with a strong connection to the coast and sea. Land use is generally agriculture, principally livestock grazing and as such landcover is primarily improved and semi-improved grassland. There are generally few trees, although occasional blocks of woodland

and forestry are present, providing local containment of outward views. Land cover along the coast tends to be more natural, often comprising of marram grass on rolling dunes, leading to broad sandy beaches. Areas of wet grassland and march vegetation are often found within the coastal hinterland between the dunes and the agricultural fields further inland. The dunes provide a degree of containment and separation between the beach and the more inland areas of this LCT leading to a local sense of remoteness and focusing views out to sea or along the coast. Settlement within this part of the LCT includes the small village of St Fergus and a small number of scattered farms. The St Fergus Gas terminal located at the northern extent of the study area has a strong presence in this LCT, visible over a relatively large area due to the flat and open nature of the landscape. A series of small overhead lines and the A90 also have a local influence on the character of this LCT.

15.4.3.8. The southern part of this LCT is characterised by residential, fishing and industrial development centred around Peterhead Bay and the harbour. The topography of this part of the LCT is more varied and undulating which extends its influence northwards across the more open flat landscape.

15.4.3.9. Parts of this LCT, to the north of the River Ugie, lie within the locally designated North East Aberdeenshire Coast SLA. Within the study area the natural heritage qualities and distinctive perceptual aspects of this coastal LCT are noted to be influenced locally by industrial features, particularly the St. Fergus Gas Terminal. On balance, the value is judged to be **Medium**.

Coastal Agricultural Plain – Aberdeenshire LCT

15.4.3.10. This LCT covers an extensive part of the study area encompassing the landscape inland from the coast. There is a gradual transition from the coastal landscapes to this LCT which is characterised by a relatively low lying but gently undulating landform and agricultural land use. In some areas subtle ridges and valleys create a variable sense of openness and enclosure, although the overall impression is of a relatively large scale and open landscape with expansive views to the coast and sea. Topography broadly rises to the east and south and is lower along the shallow valley of the River Ugie in the north of the study area. Land cover is generally a mix of semi-improved grassland and arable crops arranged in a series of large geometric fields, although small areas of more natural moorland vegetation are also present. Small woodland blocks and shelterbelts are scattered throughout the area, with larger areas of forestry found towards the east. This is a well settled landscape including dispersed farms and a series of smaller settlements along key routes, also incorporating the western edge of Peterhead. A series of principal routes pass through this LCT, including the A90, A950 and A975, connected throughout this landscape by a network of smaller roads. A series of communication structures and mast, overhead lines and the Peterhead Power Station are notable features with this and adjacent landscapes. Small and occasionally large wind turbines add to the energy infrastructure apparent in this LCT.

15.4.3.11. Within the study area, some eastern parts of this extensive LCT fall within the North East Aberdeenshire Coast SLA, which indicates localised areas of increased landscape value. However, the majority of this LCT is a typical agricultural landscape containing few notable features, that is influenced locally by a variety of man-made elements including wind energy, electrical infrastructure, and the existing Peterhead Power Station. On balance, the value is judged to be **Low**.

Fragmented Rocky Coast LCT

15.4.3.12. This LCT is located along the coast strip in the southern half of the study area, south from Peterhead to Cruden Bay. The rocky coastline of this LCT which includes rugged cliffs, caves, arches and sea stacks contrast strongly with the sweeping sandy beaches of the coastline to

the north of Peterhead, although the dunes and beach at Cruden Bay interrupts this coastline. The connection to the coast and the sea is fundamental to the character of this LCT, offering expansive long ranging views to the sea and along the coast from the clifftops. There is a locally strong sense of naturalness and exposure along sections of the coastline, particularly where more remote from settlement. Land use above and inland from the cliffs is predominantly grazing and as such land cover is typically semi-improved grassland. Coastal settlements are generally limited to the small fishing village at Cruden bay and the slightly larger settlement at Boddam, with scattered farms between. Industrial and commercial development along the southern edge of Peterhead, the existing Peterhead Power Station and a quarry near Boddam strongly influence the character of the northern part of this LCT.

15.4.3.13. Parts of this LCT to the south of Boddam and Stirling Hill lie within the locally designated North East Aberdeenshire Coast SLA. Within the study area the natural heritage qualities, and perceptual aspects of this coastal LCT are influenced locally by the settlement of Peterhead and modern industrial development. Overall, the landscape value is judged to be **Medium**. However, the area north of Stirling Hill is of lower value due to the influence of a range of development, including the existing Peterhead Power Station.

Deposition Coastline with Open Views CCT

15.4.3.14. This CCT is found in stretches of the east coast of Angus and Aberdeenshire. Key characteristics of this CCT relevant to the study area are summarised as follows:

- Low-lying coast with a series of long, sweeping curved sandy beaches, often backed by dunes creating a soft linear edge to the sea;
- Long, expansive and open views along the beaches and sea-level views out over the North Sea, where shipping and movement of boats is a common feature;
- Grassland and pockets of gorse scrub and wetland behind the dunes, leading to flat, mixed or arable farmland further inland;
- Golf course to the north of Peterhead, forming a transition from the settled coast to more agricultural area further north;
- Beaches provide an important recreational resource, particularly close to settlement such as Peterhead;
- St Fergus Gas terminal is a distinct, visually prominent feature along the coast to the north of the study area; and
- Overall a dynamic character, with constantly changing seas, movement of sand and passing weather systems

15.4.3.15. This CCT is a high quality recreational and scenic landscape and is characteristic of the northern portion of the North East Aberdeenshire Coast SLA and value is judged to be **Medium**. However, the value is locally reduced where influenced by the presence of St Fergus and the settlement of Peterhead.

Rocky Coastline with Open Sea Views CCT

15.4.3.16. This CCT forms part of the extensive Seascape Unit 4: North East Coast. It is found in stretches of the north-east, including Caithness, Angus, and the Aberdeenshire coast. Key characteristics of this CCT relevant to the study area are summarised as follows:

- Rocky coastline with cliffs rising to some 30 metres in height;
- Geological differences creating variety where softer sandstone forms an indented coast with bays and inlets, arches and caves;
- Productive arable farming and grazing extending up to the cliff edge, and minimal tree cover;

- Exposed coastline with expansive and open views over the North Sea, with shipping and movement of boats a common feature;
- Infrequent, but prominent large-scale industrial development, centred around Peterhead Power Station has a locally strong influence on coastal character;
- Strong historical associations of castles and cliff top forts and cultural interest of fishing villages; and
- Strong sense of exposure along the cliffs, with inland agricultural land use and the presence of roads, settlement and development limiting the impression of wildness

15.4.3.17. This CCT is characteristic of the high-quality elements and special qualities of the North East Aberdeenshire Coast SLA and overall, the value is judged to be **Medium**. However, the area between Salthouse Head and Dundonnie is of lower value due to the influence of a range of development, including the existing Peterhead Power Station.

15.4.4 SITE LANDSCAPE ELEMENTS

15.4.4.1. The Proposed Development Site consists of an area of undulating and irregular topography, much of which has been influenced by different periods of past development. The large scale structures of the existing Peterhead Power Station are prominent and have a strong influence on the character and impression of the landscape. Vegetation includes large areas of grassland, with bands of woodland planting along the southern boundary and existing access road, and occasional pockets of scrub on grassland slopes. Security fencing surrounding the existing Peterhead Power Station and post and wire fencing defines access and field boundaries. The southern boundary woodland and existing undulating topography plays an important role in screening and providing a setting to the existing Peterhead Power Station. Despite the function of some landscape elements, they are of limited aesthetic quality therefore landscape value is assessed to be **Low**.

15.5. VISUAL BASELINE CONDITIONS

15.5.1.1. The following provides an overview of the visual baseline, highlighting key visual receptors and providing details of the viewpoint locations on which the visual assessment is based.

15.5.2 ANALYSIS OF THE ZTV

15.5.2.1. A ZTV (**Figure 15.2** EIA Report Volume 3) has been produced to identify locations within the study area with the potential to gain views of the Proposed Development. The use and limitations of ZTVs is set out in Section 15.3.4, above.

15.5.2.2. The ZTV for the Proposed Development indicates variable theoretical visibility, largely because of the undulating nature of the topography of the study area. There is an area of fairly consistent theoretical visibility inland up to approximately 4km from the Proposed Development as the topography gradually rises from the coast. It then becomes more fragmented as the topography dips slightly before rising again further west. A similar pattern is indicated to the south west, although the theoretical visibility becomes fragmented after approximately 2km in this direction. To the north, the pattern of theoretical visibility is more consistent; however, buildings in and around Peterhead would reduce visibility from some areas. Due to the location adjacent to the coast, theoretical visibility of the Proposed Development from the east is more consistent and widespread.

15.5.3 VISUAL RECEPTORS

15.5.3.1. Visual receptors are the people who would potentially be affected by changes to views or visual amenity because of the Proposed Development. Visual receptors can be static or dynamic and can be largely placed in the following groups:

- Residential Properties and Settlement – residents of isolated dwellings and settlements
- Transport routes – people in vehicles and others using main roads and local roads
- Recreation routes – people using footpaths, bridleways and tracks, cycleways, local roads designated as recreation routes, areas of land (not under cultivation but including forestry) and open water for informal recreation

15.5.4 REPRESENTATIVE VIEWPOINT SELECTION

15.5.4.1. The visual assessment is informed by a series of viewpoints which have been selected to represent a range of views and viewer types from a variety of distances, aspects, and elevations. The viewpoints represent typical views that people who live in the area, visitors to the area, and people passing through the area are likely to experience.

15.5.4.2. The representative viewpoints, detailed in Table 15-8, below, have been agreed in consultation with Aberdeenshire Council during the EIA Scoping process, and through pre-application discussions. The locations of the viewpoints are shown on **Figure 15.5** (EIA Report Volume 3), with baseline photography for each location provided in **Figures 15.6.1 to 15.6.11** (EIA Report Volume 3). Further details including the reason for selection of each of the viewpoints is provided in Table 15-8, with a description of the baseline view from each location provided further below.

Table 15-8: Representative Viewpoints

No.	Description	Easting	Northing	Reason for inclusion
1	The Street, Rora	406124	850539	Representative of residential receptors in the scattered settlement of Rora.
2	Coastline between Kirkton Head and Craigewan.	411657	849037	Representative of recreational receptors, including users of Core Path (7LD.01.18) to the north of Peterhead.
3	West Links / War Memorial, Peterhead	412673	845962	Representative of residential and recreational receptors within central Peterhead.
4	Reform Tower, Meet Hill, Peterhead	412157	844648	Representative of residential receptors in Invernettie and recreational receptors/ visitors to Reform Tower.
5	Minor road, near Blackhill	408832	843430	Representative of scattered residential receptors and users of the minor road network to the west.
6	Harbour Street, Boddam	413361	842667	Representative of residential receptors in Boddam and users of the Core Path (7LD.01.24).

No.	Description	Easting	Northing	Reason for inclusion
7	A90 / Station Road / Boddam Recreation Park	412772	842254	Representative of residential receptors in Boddam, users of Boddam Recreation Park, and road users on the A90.
8	Stirling Village / Lendrum Terrace	412361	841770	Representative of residential receptors within the small, elevated settlement.
9	Coastal Path, near Bullers of Buchan	411171	837843	Representative of recreational receptors on the coastal path (Core Path 7LD.01.25), south of Bullers of Buchan.
10	Northfield Gardens, Hatton	404679	837290	Representative of residential receptors in the west of Hatton.
11	Minor road, south of Inverugie	409697	846776	Representative of residential receptors in the south of Inverugie and more broadly the Formartine and Buchan Way (Core Path 7LD.03MP.05)

15.5.4.3. The following provides a description of the baseline views experienced from each of the representative viewpoints

Viewpoint 1: The Street, Rora

15.5.4.4. This viewpoint is representative of residential properties within the scattered settlement of Rora in the north-west of the study area. Properties tend to be orientated to the south or south-east, with broad open views over the surrounding agricultural land which falls gradually towards the distant coast. Trees and woodland provide some local containment of views which are otherwise long distance. The stack of the existing Peterhead Power Station is a distant feature, with three wind turbines at Ednie Farm to the north-east, and a series of distant overhead line towers and masts also visible. The single wind turbine at Middleton of Rora is also a notable feature in views from parts of Rora, although largely screened from the viewpoint location.

15.5.4.5. This is a relatively commonplace and typical view and as such the value of the view is **Low**.

Viewpoint 2: Coastline between Kirkton Head and Craigewan

15.5.4.6. This viewpoint is representative of recreational receptors on Core Path 7LD.01.18 and visitors to the beach. The main orientation of views is along the beach to the north and south, or eastwards across the North Sea. Views north along the coast follow the sweep of the beach towards Kirkton Head. Slightly longer distance views are available to the south, with the settlement of Peterhead in the distance and the stack of the Peterhead Power Station visible beyond. Views inland from the beach are screened by sand dunes. A path along the dunes provides slightly more elevated and open views across the landscape, including greater visibility of the Peterhead Power Station to the south and St Fergus Gas Terminal to the north.

15.5.4.7. Views along the beach and coast have an elevated scenic quality, and the value of the view is **Medium**.

Viewpoint 3: West Links / War Memorial, Peterhead

15.5.4.8. This viewpoint is located within central Peterhead overlooking Peterhead Bay and is representative of residential and recreational receptors and users of the A982 (South Road). The focus of the view is to the south-east over Peterhead Bay. The beach and in the

foreground and water beyond gives a scenic outlook, detracted slightly by industrial buildings which line the sides to the bay. The existing Peterhead Power Station is a notable feature to the south. Views in other directions tend to be medium range and limited by rising topography and/or buildings.

15.5.4.9. Views from this location are of variable scenic quality, with several detracting elements, indicating a **Low** value of the view.

Viewpoint 4: Reform Tower, Meet Hill, Peterhead

15.5.4.10. This viewpoint is located on the summit of Meet Hill and is representative of views experienced by recreational receptors/ visitors to reform tower and views from the adjacent residential properties in Invernettie. This location is slightly elevated over the surroundings and as such gains 360° panoramic views. The focus of the view is to the north-east across Peterhead Bay, the harbour and the settlement. To the south and west industrial development in the foreground and Peterhead Power Station in the midground have a strong influence. From the adjacent residential properties, views tend to be more restricted, with the industrial development to the south slightly less apparent.

15.5.4.11. Views from this location are variable, with several detracting elements. Overall, the value of the view is **Low**.

Viewpoint 5: Minor road, near Blackhill

15.5.4.12. This viewpoint is located on a minor road near Blackhill Farm and is representative of views from scattered residential properties and the local road network. The main orientation of views from nearby properties is to the south or east. Views south are across an undulating agricultural landscape, with more distant views restricted by rising landform. To the east views are longer range, across an agricultural landscape to the coast and sea beyond. Several notable structures, including overhead lines and towers, several large warehouse buildings and Peterhead Power Station are present in these views. Rising landform results in more restricted views to the north and west.

15.5.4.13. This is a relatively commonplace and typical view and as such the value of the view is **Low**.

Viewpoint 6: Harbour Street, Boddam

15.5.4.14. This viewpoint is representative of residential properties in Boddam and users of Core Path 7LD.01.24. The main orientation and focus of views from this location is the broad panorama over the North Sea to the east. To the north and north-west the existing Peterhead Power Station, smaller industrial buildings in the foreground and Peterhead prison and harbour in the background have a strong influence on the view. Views from the adjacent residential properties are more variable, often inward facing and as such more limited, with glimpse and framed views to the sea and surroundings between other buildings. The upper part of the buildings and stacks of Peterhead Power Station are often visible. Views from much of the Core Path route are dominated by the existing Peterhead Power Station.

15.5.4.15. Views from this location are variable, with several detracting elements. Overall, the value of the view is **Low**.

Viewpoint 7: A90 / Station Road / Boddam Recreation Park

15.5.4.16. This viewpoint is located towards the west of Boddam and is representative of nearby residential and recreational receptors and users of the A90. Views from the residential properties are focused to the east, across the A90 and towards Boddam, although a few properties along Station Road have open views north. Rising topography, vegetation and buildings limit more distant views in all directions. The tops of the Peterhead Power Station

buildings and stacks are notable features in the view beyond an earthwork embankment and low woodland belt. The under construction 400kV substation is also a notable feature to the north.

15.5.4.17. This is a relatively commonplace and limited view which includes a number of detracting elements and as such the value of the view is **Low**.

Viewpoint 8: Stirling Village / Lendrum Terrace

15.5.4.18. This viewpoint is representative of views from residential properties at Lendrum Terrace. The slightly elevated position gives rise to expansive open views. Properties are largely orientated towards the north with panoramic views over undulating agricultural landform, although a small number also face east towards the coast and North Sea beyond. A number of notable structures are present in the view including overhead lines, the existing and under construction substations, Peterhead Power Station and more distant industrial buildings and warehouses.

15.5.4.19. Views from this location are variable, with several detracting elements. Overall, the value of the view is **Low**.

Viewpoint 9: Coastal Path, near Bullers of Buchan

15.5.4.20. This viewpoint is located along the coastal footpath (Core Path 7LD.01.25) close to the Bullers of Buchan. Views from this location are focused along the scenic coastline, cliffs and rock formations to the north and south and out across the North Sea to the east. The stack at the Peterhead Power Station is visible in the distance along the coast to the north, with radar and communications structures on Sandford Hill also visible slightly inland.

15.5.4.21. Views along the dramatic coast have an elevated scenic quality, and the value of the view is **Medium**.

Viewpoint 10: Northfield Gardens, Hatton

15.5.4.22. This viewpoint is located on the edge of the small settlement of Hatton in the south-west of the study area and is representative of views from Hatton and the surroundings. Adjacent properties tend to be inward facing, with no consistent focus and views are generally limited, contained by vegetation and other buildings. Some glimpsed, partial and framed views between and over adjacent buildings to the surrounding rolling agricultural landscape are possible. The stack at the Peterhead power Station is a distant feature on the horizon to the north.

15.5.4.23. Views from this location are variable but generally limited in nature. Overall, the value of the view is **Low**.

Viewpoint 11: Minor road, south of Inverugie

15.5.4.24. This viewpoint is located to the south of Inverugie and is broadly representative of views from residential properties in and around the scattered settlement and from the Formartine and Buchan Way (Core Path 7LD.03MP.05). There is no clear focus or direction of views from this location with a fairly consistent composition of gently undulating agricultural landscape punctuated with groups of trees around buildings. Views south-east are slightly more distant, although include overhead line structures and the distant stacks of Peterhead Power Station. Trees and more varied landform restrict views from many of the properties in Inverugie and from the closest section of the Formartine and Buchan Way.

15.5.4.25. This is a relatively commonplace and typical view and as such the value of the view is **Low**.

Nearby Residential Receptors

15.5.4.26. In addition to the above representative viewpoints, a small number of individual residential properties are located in close proximity (within 500m) to the north and west of the Proposed

Development. These include two properties to the north at Sandford Villa and Newmill of Sandford, and the following seven properties to the west: Sandford Bungalow, Bevailey, Denend Croft, Gateside, Hjaltland, Millbank and Millbank Farm. The location of each of the properties is shown on **Figure 15.5** (EIA Report Volume 3).

15.5.4.27. The main orientation of views from these properties tends to be to the east or south. The nature of these views is variable and often limited, although with more open views from a few locations. Views north and west are also often limited by rising topography, vegetation or built form. Existing large-scale structures and electrical infrastructure, including the Peterhead Power Station, substation and overhead lines are present in views from these properties. Due to a combination of landform and vegetation screening

15.5.4.28. Overall, views from these properties are relatively commonplace and typical of the surrounding area and as such the value of the view is **Low**.

15.5.4.29. It is understood that the dwelling at Bevailey may be demolished as part of the ongoing construction works in the area. However, as the property was present at the time of assessment and reporting it has been included in the assessment.

15.5.4.30. An additional property, the Old Manse, is located immediately adjacent to the Proposed Development Site, south of the existing Peterhead Power Station access road. As a result of screening from landform and woodland receptors at this property are not anticipated to gain views of the Proposed Development and as such have not been considered further in the assessment.

15.6. FUTURE BASELINE

15.6.1 FUTURE BASELINE

15.6.1.1. The future baseline is a prediction of baseline conditions in the future, assuming the Proposed Development has not been, or is not being, constructed.

15.6.1.2. In the absence of the Proposed Development (i.e. if it was not to exist in the future baseline), it is considered that the Proposed Development Site may be used for other large-scale power developments. Several other consented and proposed energy developments within and adjacent to the Proposed Development Site have been identified and the theoretical future baseline in relation to these schemes is considered as part of the cumulative assessment in Section 15.9 of this chapter.

15.6.1.3. It is anticipated that the nature and character of the wider study area will remain largely similar to that of the existing baseline. Several large-scale power related structures and infrastructure, including the existing Peterhead Power Station, existing and under construction substations, proposed converter stations and series of overhead lines are likely to continue to influence the local landscape character and visual amenity. Other anticipated changes to the baseline of the study area include expansion of Peterhead settlement, particularly to the northwest, and commercial and industrial development south of Peterhead. These anticipated changes have been informed in part by a review of planning applications and the settlement and development strategy set out in the local development plan.

15.7. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

15.7.1 INTRODUCTION

15.7.1.1. Landscape and visual considerations, in combination with other environmental and technical requirements have informed the design of the Proposed Development. The following outlines key aspects of the design which help to reduce landscape and visual effects.

15.7.2 DESIGN

15.7.2.1. The CCGT and CCP Area and main proposed structures have been located towards the east of the Proposed Development Site, immediately adjacent to the existing Peterhead Power Station. This helps to ensure that the offset from visual receptors, including the A90 and the closest residential properties is maximised as far as possible. The finished platform level of the CCGT and CCP Area would also be lower than the existing ground level, helping to slightly reduce the impression of height and scale of the Proposed Development.

15.7.2.2. Material excavated to allow the buildings to sit at a lower level would be used to enhance the existing rolling landform between the Proposed Development and the A90. This would see the height of the existing landform being increased, helping to further reduce the impression of the height of the proposed structures. Earthworks would be carefully profiled using variable gradients and smooth transitions with existing landform to reflect more natural forms, avoiding the appearance of uniform or angular slopes and helping to tie the Proposed Development into the surrounding undulating landscape.

15.7.2.3. The Proposed Development would also see the removal of several existing structures, replacing these with lower-level buildings which would largely be screened, resulting in a beneficial change to views of that part of the Proposed Development Site, particularly from locations in close proximity to the west and south.

15.7.2.4. The approach to design has been to avoid areas of existing trees and woodland as far as possible to allow retention of existing planting and minimise direct landscape change. The woodland belts along the existing power station access and those along the northern edge of Boddam are of particular importance in reducing impacts of the existing structures on the Proposed Development Site and as such would be retained. The existing trees and woodland adjacent to Sandford Lodge would also be retained as far as possible to help provide an element of screening during construction and in the longer term. Similarly, the existing blocks of trees adjacent to the 275kV substation would be retained to ensure their existing function as a screen is not affected by the Proposed Development.

15.7.2.5. Several areas of proposed planting have also been incorporated into the design of the Proposed Development to help it integrate with the surrounding landscape character and help to reduce landscape and visual effects. The proposed planting has been designed to reflect the surrounding pattern and character of the landscape and includes several blocks and belts of woodland to strengthen existing planting and provide an additional screening element. The focus of this planting is to reduce potential visibility of the lower-level structures to provide a simplified visual composition of the upper parts of a small number of the tall buildings which cannot be screened. Small areas of scrub planting have been incorporated onto inward facing embankments to reflect the existing pattern of vegetation and support habitat and biodiversity enhancement. Woodland and scrub planting would consist of native species, tailored to the specific site conditions and coastal location. All other areas disturbed during construction and not required for operational purposes would be reinstated and seeded with a meadow grass

mix. Further details of the landscape and biodiversity strategy for the Proposed Development are provided in **Appendix 11H** (EIA Report Volume 4).

15.7.2.6. In addition to the above, it is anticipated that the following measures will either be incorporated into the detailed design of the Proposed Development or are standard construction or operational measures. These measures have therefore been considered as part of the assessment process described in this chapter:

- Suitable materials will be used, where possible, in the construction of structures to reduce reflections and to assist with breaking up the massing of the buildings and structures.
- The selection of finishes for the buildings and other infrastructure will be informed by the finishes of the adjacent developments (including Peterhead Power Station), to reduce the visual impact of the Proposed Development.

15.7.2.7. Lighting required during the construction and operation stages of the Proposed Development will be designed to reduce unnecessary light spill outside of the Proposed Development Site boundary. The external lighting scheme will be designed to provide safe working conditions in all relevant areas of the Proposed Development Site whilst reducing light pollution and the visual impact on the local environment. This is likely to be achieved using luminaires that eliminate the upward escape of light.

15.8. LIKELY IMPACTS AND EFFECTS

15.8.1 POTENTIAL SOURCES OF EFFECTS

15.8.1.1. The Proposed Development has the potential to result in significant landscape and visual effects during the construction and operational phases. The Proposed Development would introduce several new large-scale elements into the landscape. The potential effects relate to the loss of features and the visibility of new features and includes the effect on perceptual associations of landscape and visual amenity. **Chapter 4 Proposed Development** (EIA Report Volume 2) details the Proposed Development components. For the purposes of the LVIA it is important to understand the maximum parameters of key features as set out in Section 15.3.4 and Table 15.7, above. The source of effects includes the following:

Potential Construction Effects

- Site clearance, removal of vegetation, temporary earthworks
- Demolition of a number of existing buildings and structures
- Movement of large-scale plant and vehicles across the Proposed Development Site
- Temporary construction and laydown areas and the maintenance and improvement of the existing paved haulage routes running between the construction laydown areas
- Presence of temporary security fencing and lighting;
- Construction activity associated with the diversion of the Den of Boddam Burn;
- Temporary diversion of core path ECPP-202-03
- Construction of access roads, utilities and below ground infrastructure.

Potential Operational Effects

- Prescence of new large-scale features including turbine halls, other buildings and tall stacks
- Earthworks reprofiling, security fencing and additional site lighting where required for operational safety
- Potential visibility of plumes from the Proposed Development in certain weather conditions

- Permanent diversion of the Den of Boddam Burn
- Movement of maintenance vehicles and plant
- Landscape, planting and biodiversity enhancement measures.

Potential Decommissioning Effects

15.8.1.2. Decommissioning activities are anticipated to commence after 2052. Potential decommissioning effects are considered to be similar to those anticipated at construction and therefore are not discussed further in this assessment.

15.8.2 EFFECTS ON SITE LANDSCAPE ELEMENTS

15.8.2.1. Physical effects would occur on the Proposed Development Site, where existing landscape elements would be removed or altered by the Proposed Development.

Sensitivity

15.8.2.2. The value of the Proposed Development Site landscape elements is low. The land within the Proposed Development Site has been modified over decades and is a brownfield, former industrial site adjacent to the existing Peterhead Power Station. The character of the Proposed Development Site is tolerant of a large degree of change, and therefore susceptibility is Low. Overall landscape sensitivity is **Low**.

Construction

15.8.2.3. The scale and intensity of construction operations including vegetation clearance, earthworks, land profiling temporary laydown areas would result in extensive change across the Proposed Development Site. The alteration of existing landform, diversion of the Den of Boddam Burn and the intensity of construction activity would be pronounced and open up views into the site from the surrounding landscape. Two core paths would be temporarily diverted during the construction phase. Where possible some boundary vegetation would be retained along the southern boundary of the Proposed Development Site. Taking the above into account, the magnitude of change on the site landscape elements is **High**. The magnitude of change assessed alongside the sensitivity, would result in a **Moderate adverse** effect which is considered to be significant.

Operation

15.8.2.4. At opening (year 1 of operation) and at year 15, the Proposed Development would result in a substantial change to the Proposed Development Site landscape elements. The sources of change result from the mass and scale of new buildings, structures, access roads, hardstanding, the permanent diversion of the Den of Boddam Burn and the loss of vegetation including shrub and grassland habitat. Former laydown areas would be reprofiled and new landscaping would be incorporated within the boundary, replacing the planting lost during construction as far as possible. The new Proposed Development components would sit alongside the existing Peterhead Power Station and further increase the geographical extent of industrial development within the site. Taking all of this into account, the magnitude of change is **High**. The magnitude of change assessed alongside the sensitivity, would result in a **Moderate adverse** effect which is considered to be significant.

15.8.3 EFFECTS ON LANDSCAPE DESIGNATIONS

15.8.3.1. This section presents the assessment of effects on landscape designations during the construction and operational phases of the Proposed Development.

North East Aberdeenshire Coast SLA

Sensitivity

15.8.3.2. Landscape value is medium. Parts of this SLA are large scale, relatively simple and uniform in character where change could be accommodated. However, many parts including the coastline are more intricate and therefore largely intolerant of change of the type proposed. On balance, the susceptibility to change and the sensitivity of this SLA is **Medium**.

Construction

15.8.3.3. The Proposed Development would be outside of this SLA and as such potential change would be indirect. At a distance of over 4km potential change on the northern part of this SLA would be very limited. The ZTV indicates potential for localised indirect change on parts of the southern area of this SLA. However, existing development within Boddam and the existing context of the Peterhead Power Station will mostly limit any temporary impression of change to the movement of the tallest plant required for construction. Overall, the construction phase would result in little perceptible change to the characteristics of this SLA, therefore, the magnitude of change is **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Operation

15.8.3.4. At opening and year 15 of operation, the Proposed Development would result in little discernible change to this SLA. The presence of the tallest stacks would appear on the north-western setting of the southern portion of this SLA and against the backdrop of the existing Peterhead Power Station. As a result of screening by landform and buildings in Peterhead, the separation distance and the context of the existing Peterhead Power Station, the Proposed Development would have very little, if any, influence on the northern portion of the SLA. Taking the above into account, the magnitude of change is **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect at opening and year 15 of operation.

15.8.4 EFFECTS ON LANDSCAPE AND SEASCAPE CHARACTER

15.8.4.1. This section presents the assessment of effects on the landscape and seascape character of the study area during the construction and operational phases of the Proposed Development.

Beaches, Dunes and Links – Aberdeenshire LCT

Sensitivity

15.8.4.2. Landscape value is Medium. To the north this is a relatively large scale, simple and uniform, and to the south it is largely influenced by settlement and development. However, closer to the coast the landscape becomes more intricate and less tolerant of change of the type proposed. On balance, the susceptibility to change and the sensitivity of this LCT is **Medium**.

Construction

15.8.4.3. The Proposed Development would be outside of this LCT and as such potential change would be indirect. During construction, due to distance and the context of Peterhead settlement the northern more rural section of the LCT would experience little or no impression of change. Construction activity would be close to the southern part of this LCT. Earthworks and levelling for temporary laydown areas and the movement of large-scale plant would slightly affect the sense of naturalness from southern coastal areas of Peterhead, although experienced in the context of industrial development within this LCT and the existing Peterhead Power Station in the adjacent LCT. Taking the above into account, the magnitude of change is **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Operation

15.8.4.4. At opening, the Proposed Development would result in localised change to the southern setting of this LCT because of increased industrial development adjacent to the coast. This indirect change would be tempered by the context of industrial development which characterises the southern edge of this LCT, and the presence of the existing Peterhead Power Station. It is anticipated that earthwork reprofiling would slightly reduce the impression of change, helping to fit the Proposed Development into the landscape. Potential change on the northern part of this LCT would be limited to distant views of the tops of the stacks with little or no influence on the impression of this landscape. Taking the above into account, the magnitude of change **Very Low.** The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

15.8.4.5. At year 15 of operation, proposed mitigation planting would have established helping to further improve the landscape fit, although the overall level of magnitude and effect would remain as at opening, **Very Low** and **Negligible adverse**.

Coastal Agricultural Plain – Aberdeenshire LCT

Sensitivity

15.8.4.6. Landscape value is Low. This is a large-scale open and relatively uniform agriculture landscape with a context of development along parts of the eastern fringes and as such is considered tolerant of change of the type proposed. The susceptibility to change and the overall sensitivity of this LCT is **Low**.

Construction

15.8.4.7. The Proposed Development would be outside of this SLA and as such potential change would be indirect. During construction, operations would be immediately east of this LCT within the central part of the study area and within the immediate context of the existing Peterhead Power Station. The movement or plant, earthworks and levelling operation to accommodate temporary compounds increase the impression of large-scale construction, in variance with the rural character of much of this LCT. Indirect change resulting from low level construction activities would be limited to a relatively small part of this LCT, with construction activity associated with the taller structure slightly more widespread. Overall, most of the key characteristics of this LCT would remain unaffected. Taking the above into account, the magnitude of change **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

Operation

15.8.4.8. At opening, the Proposed Development would result in a localised change on the eastern setting of this LCT. The scale and mass of buildings and stacks would be noticeable features on the coastline across the eastern backdrop from parts of this LCT. The tallest stacks would be located alongside the existing stacks and result in an intensification of industrial infrastructure experienced from those parts of this LCT within 2-3km of the Proposed Development. The impression of change would quickly reduce with distance where the Proposed Development would be experienced within a broader context of existing industrial development and as such the majority of this LCT would be largely unaffected. Taking the above into account, the magnitude of change **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

15.8.4.9. At year 15 of operation, proposed mitigation planting would have established and would provide localised screening of lower-level structures. However, the overall magnitude of change experienced within the Coastal Agricultural Plain LCT is likely to remain **Low** and the level of effect **Minor adverse**.

Fragmented Rocky Coast LCT

Sensitivity

15.8.4.10. Landscape value is medium. Parts of this LCT are heavily influenced by existing industrial development and electrical infrastructure and as such is tolerant of additional similar change. However, much of this LCT is smaller in scale, particularly along the intricate coast, and therefore is less tolerant of change. On balance, the susceptibility to change and the sensitivity of this SLA is **Medium**.

15.8.4.11. The Proposed Development would be located within this LCT, therefore resulting in direct and indirect change. Direct change on the landscape of the Proposed Development Site is considered in Section 15.8.2, above, and as such this section focuses on potential indirect change.

Construction

15.8.4.12. During construction, operations would be concentrated within the northern part of this LCA adjacent to the existing Peterhead Power Station. Potential indirect change would largely be focused on the northernmost part of this LCT within approximately 2km of the Proposed Development. Localised parts of this LCT beyond this area may experience visibility of construction activity associated with the tallest structures. However, this would have little or no influence on the character of this LCT. In closer proximity, north of Stirling Hill, the movement of plant and temporary earthworks, laydown areas, compounds etc. would be a localised but noticeable addition within this landscape. The greatest level of change would be experienced from parts of this LCT that are of lower value and sensitivity, with more sensitive areas and the most valued aspects unaffected. Taking the above into account, the magnitude of change is **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

Operation

15.8.4.13. At opening, indirect change would be largely limited to the northern part of this LCT, with areas south of Stirling Hill largely unaffected where only the tops of the stacks would be visible. Within the northern area the Proposed Development would result in the intensification of large industrial buildings in a localised part of this LCT, already influenced by the existing Peterhead Power Station and other electrical infrastructure and industrial development. Reinstatement of areas temporarily affected by construction would help to reduce the extent of apparent change and proposed earthworks would provide localised containment of lower structures. Overall, the Proposed Development would result in slight and localised deterioration in landscape characteristics. However, most of the higher quality features and characteristics would remain intact and unaffected. Taking the above into account, the magnitude of change **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

15.8.4.14. At year 15 of operation, proposed mitigation planting would have established and would provide localised screening of lower-level elements and help strengthen the separation between the Proposed Development and the landscape to the south. The overall magnitude of indirect change on this LCT is likely to remain **Low** and the level of effect **Minor adverse** at year 15.

Deposition Coastline with Open Views CCT

Sensitivity

15.8.4.15. Coastal landscape value is medium. This is a variable landscape, with the southern extent influenced by settlements and development, and the remainder more natural comprising a

series of sandy beaches and dunes. Overall, the susceptibility to change and the sensitivity of this CCT is **Medium**.

Construction

15.8.4.16. During construction, there would very little intervisibility between this CCT and operations within the Proposed Development Site. Potential change would be limited to relatively distant views of only the tallest plant such as cranes required to construct stacks and other structures. Given the distance and context of other built development within closer proximity to this CCT the temporary construction activity associated with the Proposed Development would have little or no influence on the coastal character or seascape. The magnitude of change would therefore be **Very low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Operation

15.8.4.17. At opening and year 15 of operation, the Proposed Development would result in a limited change to the impression of character and perceptual associations with this CCT. Potential change is limited to the presence of the stacks on the southern backdrop of the coastline, clustered alongside the existing Peterhead Power Station. The Proposed Development would slightly increase the presence of distant industrial infrastructure to the south, with little or no influence on the impression of this CCT. The magnitude of change would therefore be **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Rocky Coastline with Open Sea Views CCT

Sensitivity

15.8.4.18. Coastal landscape value is medium. Much of this CCT is characterised by an intricate scenic coast of dramatic cliffs and is somewhat vulnerable to large-scale changes. However, the northernmost section of this CCT is already heavily influenced by industrial development and as such it is locally tolerant of change. On balance, the overall susceptibility to change and sensitivity of this CCT is **Medium**.

Construction

15.8.4.19. During construction, there would be an increase in activity and movement immediate adjacent to the northern part of this CCT where it borders the Proposed Development Site. The movement of large-scale plant, activity associated with earthworks operations and the appearance of new temporary structures and storage compounds would be apparent across part of this coastline north of Boddam. Potential change would be focused on the area adjacent to the existing Peterhead Power Station, with the majority of this CCT, including the more sensitive parts and most valued aspects experiencing little or no change. On balance, the magnitude of change on this CCT would be **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

Operation

15.8.4.20. At opening and year 15 of operation, indirect change would be largely limited to the northern part of this CCT, with areas south of Boddam largely unaffected where only the tops of the stacks would be visible. The Proposed Development would represent an intensification of large industrial buildings adjacent to a localised part of this CCT, already influenced by the existing Peterhead Power Station. Overall, the Proposed Development would result in slight and localised deterioration in landscape characteristics. However, most of the higher quality features and characteristics would remain intact and unaffected. Taking the above into account, the magnitude of change **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

15.8.5 EFFECTS ON VISUAL AMENITY

15.8.5.1. This section presents the findings of the assessment on visual effects during the construction and operational phases of the Project. Annotated baseline photography from each location and visualisations from select viewpoints are provided in **Figures 15.6.1** to **15.6.11** (EIA Report Volume 3).

Visible Plumes

15.8.5.2. The Air Quality assessment (**Appendix 8B** EIA Report Volume 4) has identified the potential for the emissions from the proposed absorber stack to result in a visible plume. Based on the anticipated initial water content of the emission and an assumed release temperature of 48°C the average plume length is predicted to be 203m based on 2020 meteorological data. The plume is predicted to be visible for up to 86% of the time, with the plume predicted to be longer than the average value for 37% of the time. Meteorological data indicates that the prevailing south westerly wind would push the plume from the Proposed Development offshore.

15.8.5.3. When visible, the additional plume would often be seen in the context of existing lower-level visible plumes from the existing Peterhead Power Station, particularly in closer range views.

Viewpoint 1: The Street, Rora

Sensitivity

15.8.5.4. Value of the view is Low. Views from residential properties are generally considered to be important and therefore susceptibility is High. Considering the value of the view and susceptibility, overall sensitivity is **Medium**.

Construction

15.8.5.5. During construction, activity and the majority of the temporary structures on the Proposed Development Site would be screened by intervening landform. The extent of visual impact would be limited to the movement of cranes and taller plant across a small part of the background skyline at a distance of approximately 9km. These components would present a short-term and limited change to the composition of the view. Therefore, the magnitude of change is judged to be **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Operation

15.8.5.6. At opening and year 15 of operation, the Proposed Development would occupy a small horizontal extent of the view on the distant skyline. Most of the mass of buildings would be screened by intervening landform, whilst the stacks and single absorber would appear alongside the existing stack at Peterhead Power Station. The plume associated with the proposed absorber stack would also be visible from this location. The Proposed Development would break the distant skyline but most of the view would remain unchanged. Taking the above into account, the magnitude of change would be **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Viewpoint 2: Coastline between Kirkton Head and Craigewan.

Sensitivity

15.8.5.7. Value of the view is Medium. This is a well recreated beach where coastal and seaward views are an important part of the experience, resulting in a High visual susceptibility to change. Considering the value of the view and susceptibility, overall sensitivity is **High**.

Construction

15.8.5.8. During construction, the majority of activity and temporary structures on the Proposed Development Site would be screened by intervening topography. The operation of cranes and the construction of the taller structures would be perceptible on the distant skyline across a very small part of the view. Construction activity would have limited influence on the composition and balance of features within the view. Seaward views would remain unaffected. Taking the above into account, the magnitude of change would be **Very low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Operation

15.8.5.9. At opening and year 15 of operation, many of the proposed structures would be screened, with only the taller elements of the Proposed Development visible. The proposed absorber stack and associated plume would be visible on a very small part of the skyline in the distance to the south in the same context as the existing Peterhead Power Station. Slightly greater visibility, including of the upper parts of the HRSG building and stack and the absorber building would be possible from the dunes and localised, and more distant, parts of the beach. Taking the above into account, the magnitude of change is judged to be **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

Viewpoint 3: West Links / War Memorial, Peterhead

Sensitivity

15.8.5.10. Value of the view is Low. This viewpoint is representative of a range of receptors types, including residents at nearby properties. Taking the receptor type for which views are of greatest importance, the susceptibility is considered to be High. Considering the value of the view and susceptibility, overall sensitivity is **Medium**.

Construction

15.8.5.11. During construction, low level activity, laydown and storage areas and temporary compounds will be screened from this location by topography and built form at Invernettie. Activity associated with construction of the taller buildings and structures would be apparent, although occupying a small part of the view and not detracting from the existing focus or influencing the overall impression of the view. Taking the above into account, the magnitude of change would be **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Operation

15.8.5.12. At opening and year 15 of operation, the lower-level buildings and infrastructure of the Proposed Development would be screened from this location. The upper parts of the taller buildings and stacks and the plume would be visible, seen adjacent to the existing Peterhead Power Station buildings, although the structures would be at a lower level than the existing stack. This would lead to an increased concentration of large structures in the background of the view but would occupy a small part of the wider panorama already influenced by large industrial buildings. Taking the above into account, the magnitude of change is judged to be **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect

Viewpoint 4: Reform Tower, Meet Hill, Peterhead

Sensitivity

15.8.5.13. Value of the view is Low. Views from residential properties are generally considered to be important and therefore susceptibility is High. Considering the value of the view and susceptibility, overall sensitivity is **Medium**.

Construction

15.8.5.14. During construction, movement of vehicles and machinery, temporary laydown areas, compounds and materials storage areas across the majority of the Proposed Development Site would be visible. A small portion of the lower-level activity, within the main CCGT and CCP area, would be partially screened by intervening buildings. Construction activity would appear to cover a relatively large area within the mid-ground, although representing a small part of the 360° views available for recreational receptors at the viewpoint location. Views north, which are typically the focus, would be unaffected. From many of the nearby residential properties views of construction activity would generally by more limited, principally including activity associated with construction of the taller buildings and stacks with lower-level activity screened by other buildings and/or vegetation. However, there would be greater visibility from a small number of properties adjacent to Burnhaven School where more open views south are possible. Taking the above into account, the magnitude of change is considered to be **Medium**. The magnitude of change assessed alongside the sensitivity, would result in a **Moderate adverse** effect.

Operation

15.8.5.15. At opening, the level of movement and activity on site would be reduced and the temporary laydown areas and compounds removed and reinstated, helping to limit the extent of the view affected. The Proposed Development, including the plume from the absorber stack, would be seen in the context of the existing Peterhead Power Station and would represent a local intensification of large structures in part of the view, bringing them slightly closer to this location. The Proposed Development, and particularly the stacks, would be noticeable new features, although occupying a relatively small portion of the broad views. From many of the nearby residential properties, views would be slightly more limited but would include the taller buildings and stacks adjacent to the those of the existing Peterhead Power Station. As with construction there would be greater visibility of the Proposed Development from a small number of properties adjacent to Burnhaven School. Taking the above into account the magnitude of change is judged to be **Medium**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

15.8.5.16. At year 15 of operation, proposed mitigation planting would have established helping to soften the appearance of the Proposed Development, and partially screening some of the lower structures. Although the magnitude of change is likely to be slightly reduced it would remain within the **Medium** threshold and the level of effect would remain **Moderate adverse**.

Viewpoint 5: Unclassified road, near Blackhill

Sensitivity

15.8.5.17. Value of the view is Low. Views from residential properties are generally considered to be important and therefore susceptibility is High. Considering the value of the view and susceptibility, overall sensitivity is **Medium**.

Construction

15.8.5.18. During construction, much of the lower-level activity on the Proposed Development Site would be screened by intervening topography and buildings. Construction activity associated with the main buildings, especially the taller structures and stacks would be apparent, although relatively distant. Construction related change would be seen in a relatively small part of the wider panorama adjacent to the existing Peterhead Power Station. Taking the above into account the magnitude of change would be **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

Operation

15.8.5.19. At opening and year 15 of operation, the lower-level buildings and infrastructure of the Proposed Development would be screened by intervening topography and buildings. However, the taller buildings and stacks and associated plume would be notable new features in views south towards the coast. The Proposed Development would be seen adjacent to the existing Peterhead Power Station and would represent a local intensification of large structures in part of the view, adding to the context of electrical infrastructure and industrial buildings. The Proposed Development would occupy a small, although central, part of the broad views to the east. Taking the above into account the magnitude of change would be **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

Viewpoint 6: Harbour Street, Boddam

Sensitivity

15.8.5.20. Value of the view is Low. Views from residential properties are generally considered to be important and therefore susceptibility is High. Considering the value of the view and susceptibility, overall sensitivity is **Medium**.

Construction

15.8.5.21. Most of the construction activity on the Proposed Development Site would be screened in views from the viewpoint location by intervening buildings, including most notably the existing Peterhead Power Station. Activity associated with construction of the taller buildings and stacks would be visible, although oblique to the main panorama which is focused towards the sea and occupying a small part of the overall view. There are likely to be slightly less restricted views of construction activity, particularly of the taller structures, from nearby residential properties. An existing earthworks bund and planting would offer a degree of screening, limiting the impression of change. Taking all of this into account the magnitude of change experienced by receptors in Boddam is judged to be **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

15.8.5.22. There would be more open views of construction activity from the northern half of the core path, beyond the existing Peterhead Power Station which dominates views from much of the route. Construction activity would be visible close to parts of this route resulting in a **Medium** magnitude of change and a **Moderate adverse** effect, which is considered to be significant.

Operation

15.8.5.23. At opening, the upper sections of taller buildings and stacks would be notable new features, although seen in the context of, and behind, the existing Peterhead Power Station. The tallest proposed stack (130m AOD) would be lower than the existing stack but would add to the concentration of large structures and visible plumes in the same part of the view. Overall, the Proposed Development would occupy a small part of the broad view and would not distract from the focus which is towards the sea. From nearby residential properties a slightly greater proportion of the Proposed Development may be visible, where it is seen adjacent to, rather than behind existing structures. In many of these views the Proposed Development would also see the removal of one of the existing structures bringing some beneficial change. Taking all of this into account, the magnitude of change on views from Boddam is judged to be **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect. As with construction, users of the core path would experience more open and close-range views of the Proposed Development, resulting in a **Medium** magnitude of change and **Moderate adverse** effect, which is considered to be significant.

15.8.5.24. At year 15 of operation, proposed mitigation planting would have established helping to partially screen some of the existing Peterhead Power Station structures and elements of the Proposed

Development. Although the magnitude of change is likely to be slightly reduced for receptors in Boddam it would remain within the Low threshold and the level of effect would remain **Minor adverse**. The level of effects experienced from the core path at year 15 would remain **Moderate adverse**, which is considered to be significant.

Viewpoint 7: A90 / Station Road / Boddam Recreation Park

Sensitivity

15.8.5.25. Value of the view is Low. This viewpoint is representative of a range of receptors types, including residents at nearby properties. Taking the receptor type for which views are of greatest importance, the susceptibility is considered to be High. Considering of the value of the view and susceptibility, overall sensitivity is **Medium**. The susceptibility and resultant sensitivity of users of the A90 would be lower as views tend to be incidental and less important.

Construction

15.8.5.26. During construction, the lower-level activity on much of the Proposed Development Site would be screened by intervening topography and vegetation. However, movement of vehicles and storage of materials within the southernmost laydown area and that associated with formation of new earthworks may be partially visible beyond the low woodland and landform in the foreground. Users of the A90 north of the viewpoint location would experience increased visibility of construction activity. Activity associated with construction of the taller buildings and stacks would be notable in views orientated to the north, although would be seen in the context of the existing Peterhead Power Station. Taking all of this into account the magnitude of change is judged to be **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

Operation

15.8.5.27. At opening and year 15 of operation, the majority of the Proposed Development would be screened by intervening landform and vegetation. However, the upper portions of the taller buildings and the stacks would be seen above the landform, appearing as additional tall and notable structures in the view adjacent to the existing Peterhead Power Station. The plume associated with the proposed absorber stack would also be visible from this location. Users of the A90 would experience greater visibility of the Proposed Development from a short section of the route north of Boddam, although this would be moderated by reprofiled landform locally reducing the visibility of existing structures. The Proposed Development would not appear as tall as the existing stack, although would represent an increase in the concentration of tall structures within the view. Taking all of this into account the magnitude of change would be **Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Minor adverse** effect.

Viewpoint 8: Stirling Village / Lendrum Terrace

Sensitivity

15.8.5.28. Value of the view is Low. Views from residential properties are generally considered to be important and therefore susceptibility is High. Considering the value of the view and susceptibility, overall sensitivity is **Medium**.

Construction

15.8.5.29. The slightly elevated position of this viewpoint results in receptors gaining an overview of the Proposed Development Site and as such most of the construction activity and temporary structures etc would be visible. Construction activity would appear to cover a relatively large area within the mid-ground of the view in the immediate foreground of the existing Peterhead Power Station. From north facing properties construction activity would be seen within a small proportion of the main view, and from east facing properties would be oblique to the main

direction of the view. Change is likely to be noticeable, although temporary and of short to medium duration. Taking all of this into account the magnitude of change is judged to be **Medium**. The magnitude of change assessed alongside the sensitivity, would result in a **Moderate adverse** effect which is considered to be significant.

Operation

15.8.5.30. At opening, the level of activity on the Proposed Development Site would be reduced. The restoration and reinstatement of temporary construction laydown and working areas would be completed, reducing the apparent extent of change within the Proposed Development Site. However, the majority of the Proposed Development, including the absorber stack plume, would be visible from this location, adding further large structures into the view in the immediate context of the Peterhead Power Station. This would lead to an increased concentration and extension of power infrastructure in the view, representing a noticeable change. The Proposed Development would see the removal of some of the existing structures which would slightly moderate the scale of change. Taking the above into account, the magnitude of change would be **Medium**. The magnitude of change assessed alongside the sensitivity, would result in a **Moderate adverse** effect which is considered to be significant.

15.8.5.31. At year 15 of operation, proposed mitigation planting would have established helping to soften the appearance of the Proposed Development, and partially screening some of the lower structures. As a result of this viewpoint being elevated above the Proposed Development Site the magnitude of change is at year 15 would remain within the **Medium** threshold and the level of effect would remain **Moderate adverse** which is considered to be significant.

Viewpoint 9: Coastal Path, near Bullers of Buchan

Sensitivity

15.8.5.32. Value of the view is Medium. This viewpoint is representative of recreational receptors on the coastal path where coastal and seaward views are an important part of the experience, resulting in a High visual susceptibility to change. Considering the value of the view and susceptibility, overall sensitivity is **High**.

Construction

15.8.5.33. During construction, most of the activity and temporary structures on the Proposed Development Site would be screened by intervening topography. The operation of cranes and the construction of the taller structures may be perceptible on the distant skyline across a very small part of the view and would have little influence on the composition and balance of features or appreciation of the cliffs and rock formations. Taking all of this into account the magnitude of change would be **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Operation

15.8.5.34. At opening and year 15 of operation, intervening landform would screen most of the proposed structures, with only the upper portion of the absorber stack and associated plume potentially visible. The proposed absorber stack would occupy a very small part of the view north, seen in the same context as the existing Peterhead Power Station. Although visible to the north, the Proposed Development would have little influence on the impression of the view or appreciation of the cliffs and rock formations. Taking all of this into account the magnitude of change **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Viewpoint 10: Northfield Gardens, Hatton

Sensitivity

15.8.5.35. Value of the view is Low. Views from residential properties are generally considered to be important and therefore susceptibility is High. Considering the value of the view and susceptibility, overall sensitivity is **Medium**.

Construction

15.8.5.36. During construction, intervening topography would screen activity and most of the temporary structures on the Proposed Development Site. The operation of cranes and the construction of the taller structures would be perceptible on the distant skyline across a very small part of the view, with little influence on the visual composition. Taking the above into account, the magnitude of change would be **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Operation

15.8.5.37. At opening and year 15 of operation, intervening landform would screen the majority of the proposed structures, with only the upper portion of the tallest elements of the Proposed Development and the plume visible. The proposed absorber and stacks would occupy a very small part of the view north, seen at a distance of approximately 9 km and in the same context as the existing Peterhead Power Station stack. Taking the above into account, the magnitude of change would be **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Viewpoint 11: Minor road, south of Inverugie

Sensitivity

15.8.5.38. Value of the view is Low. Views from residential properties are generally considered to be important and therefore susceptibility is high. Considering the value of the view and susceptibility, overall sensitivity is **Medium**.

Construction

15.8.5.39. During construction, most of the activity and temporary structures on the Proposed Development Site would be screened by intervening topography and vegetation. The operation of cranes and the construction of the taller structures would be perceptible on the distant skyline across a very small part of the view. Visibility of construction of the Proposed Development from many of the residential properties in and around Inverugie and from the Formartine and Buchan Way would be more restricted than from the viewpoint location. Taking the above into account, the magnitude of change would be **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Operation

15.8.5.40. At opening and year 15 of operation, most of the proposed structures would be screened by intervening landform and vegetation, with only the tallest elements of the Proposed Development and the associated plume visible. The proposed absorber and stacks would be visible on a very small part of the skyline in the distance and would be seen adjacent to the existing Peterhead Power Station and in the context of other existing electrical infrastructure. Taking all of this into account the magnitude of change would be **Very Low**. The magnitude of change assessed alongside the sensitivity, would result in a **Negligible adverse** effect.

Nearby Residential Properties

Sensitivity

15.8.5.41. Value of the view is Low. These are residential receptors and as such the susceptibility is considered to be High. Taking into account the value of the view and susceptibility, overall sensitivity is **Medium**.

Construction

15.8.5.42. During construction, movement of vehicles and machinery, temporary laydown areas, compounds and materials storage areas across much of the Proposed Development Site would be visible from Sandford Villa, Newmill of Sandford, Sandford Bungalow, Bevailey, Millbank and Milbank Farm. Construction activity would appear to cover a relatively large area within the foreground or mid-ground of the view resulting in a noticeable change, although temporary in nature and of short to medium duration. Taking all of this into account the magnitude of change for these properties is judged to be **Medium**. The magnitude of change assessed alongside the sensitivity, would result in a **Moderate adverse** effect which is considered to be significant.

15.8.5.43. Receptors at the remaining properties (Denend Croft, Gateside and Hjaltland) would experience more restricted visibility of construction activity because of screening by foreground vegetation, landform and/or other structures. The magnitude of change experienced from these properties during construction is anticipated to be **Low** and the level of effect **Minor adverse**.

Operation

15.8.5.44. At opening the level of activity on the Proposed Development Site would be reduced. However, the main structures of the Proposed Development and associated plume would be visible from Sandford Villa, Newmill of Sandford, Sandford Bungalow and Millbank Farm. This would add several large structures into the view, seen in the immediate context of the Peterhead Power Station, and representing a noticeable change. The magnitude of change would be **Medium** and the level of effect **Moderate adverse** which is considered to be significant.

15.8.5.45. Residential receptors at the remaining properties (Bevailey, Denend Croft, Gateside, Hjaltland and Millbank) would experience more limited visibility of the Proposed Development as a result of screening by foreground vegetation, landform and/or other structures. The magnitude of change experienced from these properties at opening is anticipated to be **Low** and the level of effect **Minor adverse**.

15.8.5.46. At year 15 of operation proposed mitigation planting would have established helping to screen some elements of the Proposed Development and parts of the existing Peterhead Power Station from several the residential properties. These measures would result in a slightly reduced sense of change at year 15. However, the overall level of effects would remain within the same threshold as at opening; **Minor adverse** from Bevailey, Denend Croft, Gateside, Hjaltland and Millbank, and **Moderate adverse**, which is considered significant, from Sandford Villa, Newmill of Sandford, Sandford Bungalow and Millbank Farm.

15.9. MITIGATION, MONITORING AND ENHANCEMENT MEASURES

15.9.1 OVERVIEW

15.9.1.1. An iterative approach to design of the Proposed Development has been adopted, with initial landscape and visual survey and appraisal informing design development to avoid or minimise potential adverse effects, where possible. Therefore, the principal landscape and visual mitigation measures are embedded into the design of the Proposed Development. These embedded mitigation measures are set out in Section 0, above. Reference should also be

made to the Outline Landscape and Biodiversity Strategy (**Appendix 11H** EIA Report Volume 4), which provides further details of potential landscape and ecological mitigation and enhancement measures.

15.10. CUMULATIVE EFFECTS

15.10.1 INTRODUCTION

15.10.1.1. The following section provides an assessment of potential cumulative landscape and visual effects. The approach and methodology for the cumulative landscape and visual assessment is detailed in Section 15.3.3.

15.10.1.2. The initial step of the cumulative assessment is to establish the existing cumulative baseline context through identification of existing and proposed developments of a similar nature (i.e. electrical and energy development) and scale to the Proposed Development. To ensure a targeted and proportionate approach to cumulative assessment, only those schemes considered to have the potential to result in significant cumulative effects in association with the Proposed Development are included. The list of identified cumulative schemes includes those which are operational, under construction, consented and at the application stage awaiting determination. Developments at the scoping or pre-application stage are not considered in the cumulative assessment due to the indicative nature of these schemes and the lack of certainty they will progress to the application stage. Details of the identified cumulative schemes with an indication of which have been scoped in or scoped out, as agreed in consultation with Aberdeenshire Council, are provided in Table 15-9, below. The locations of the identified cumulative scheme are shown on **Figure 2.1** (EIA Report Volume 2).

Table 15-9: Identified Cumulative Schemes and Assessment Scope

Cumulative Scheme	Status (as of 31st December 2021)	Included in Cumulative Assessment?
Peterhead Power Station	Existing	Yes. Existing feature also included in LVIA baseline
Peterhead 275/132 kV Substation	Existing	Yes. Existing feature also included in LVIA baseline
Peterhead 400 kV Substation (APP/2019/0982)	Under Construction	Yes. Partially constructed feature also included in LVIA baseline
North East 400 kV Reinforcement (APP/2019/0506)	Under Construction	No. Little change in appearance to the existing 275 kV OHL which is already present in the baseline
Peterhead Power Station Auxiliary Generation Facility (APP/2021/0538)	Consented	No. The location of this scheme coincides with part of the Proposed Development and therefore the two developments would not coexist and as such there is no potential for cumulative effects.
NorthConnect Converter Station (APP/2015/1121)	Consented	Yes. Located in relatively close proximity to the Proposed Development Site.

Cumulative Scheme	Status (as of 31st December 2021)	Included in Cumulative Assessment?
NorthConnect HVDC Cable Infrastructure (APP/2018/1831)	Consented	No. This scheme primarily involves underground cables with no visible above ground infrastructure.
Eastern HVDC Converter Station (APP/2021/2681)	Application	Yes. Located adjacent to the Proposed Development Site.
Peterhead Synchronous Condenser (APP/2021/2392)	Application	Yes. Located in close proximity to the Proposed Development Site.
Kirkton Solar PV and Energy Storage Facility (APP/2021/1712)	Application	No. The separation distance of over 6km would limit potential for significant cumulative effects.

15.10.1.3. Potential effects of the addition of the Proposed Development in the context of the existing Peterhead Power Station and existing Peterhead 275/132kV substation and the under-construction Peterhead 400kV substation are described in the assessment above. The following assessment of cumulative effects therefore focuses on the addition of the Proposed Development to a theoretical cumulative baseline which includes the identified consented and application stage schemes.

15.10.2 CUMULATIVE LANDSCAPE EFFECTS

Landscape Designations

15.10.2.1. The identified cumulative schemes are south of Peterhead and form a broad cluster around the existing Peterhead Power Station and substations. NorthConnect Converter Station is a slight outlier being located further south on Stirling Hill. There would be little or no appreciation of the consented and application stage schemes from the North East Aberdeenshire Coast SLA and as such the level of cumulative effect would be the same as the non-cumulative operational stage effects reported in Section 15.8.3, above.

Landscape and Seascape Character

15.10.2.2. The identified cumulative schemes are located at the transition between the Fragmented Rocky Coast and the Coastal Agricultural Plain LCTs, with the existing and under construction schemes located within the Fragmented Rocky Coast LCT and the consented and application stage schemes in the Coastal Agricultural Plain LCT. The addition of the NorthConnect Converter Station, Eastern HVDC Converter Station and the Peterhead Synchronous Condenser to the cumulative baseline would reinforce large scale energy development as a feature within the landscapes and seascape to the south of Peterhead and extend their influence over a slightly larger area.

15.10.2.3. Considering the above, the level of cumulative change arising from the addition of the Proposed Development to the cumulative baseline scenario would be slightly reduced in comparison to that experienced when measured against the existing baseline. However, on balance the level of effect experienced from each LCT and CCT would remain within the same categories as those reported for the non-cumulative operational stage effects in Section 15.8.4, above.

15.10.3 CUMULATIVE VISUAL EFFECTS

15.10.3.1. There would be very limited or no visibility of the identified cumulative schemes, except for Peterhead Power Station, which is present in the existing baseline, from most of the viewpoint locations. Potential cumulative effects from these locations would therefore be the same as the non-cumulative reported in Section 15.8.5, above.

15.10.3.2. From the remaining viewpoint locations (VP4: Reform Tower, Peterhead, VP5: Minor road, near Blackhill, VP7: A90/Station Road/ Boddam Recreation Park, and VP8: Stirling Village/ Lendrum Terrace) and the nearby residential receptors the consented and application stage schemes (NorthConnect Converter Station, Synchronous and Eastern HVDC Converter Station) would see the introduction of further large-scale industrial developments into the view. The Eastern HVDC Converter Station and Peterhead Synchronous Condenser would generally appear as part of a cluster of energy developments in combination with the existing Peterhead Power Station, 275kV substation and the under construction 400kV substation and more broadly with a number of industrial and warehouse buildings on the southern edge of Peterhead. This would reinforce and increase the impression of this type of development within the view. NorthConnect Converter Station would often appear slightly separate from these other existing, consented and proposed schemes, extending the influence over a greater part of the views.

15.10.3.3. The cumulative baseline is one of increased influence of large scale industrial and energy developments. The impression of cumulative change resulting from the addition of the Proposed Development to the cumulative baseline scenario would therefore be marginally lower than that of the non-cumulative scenario. However, on balance the magnitude of cumulative change and level of effect experienced from each viewpoint would remain within the same categories as those concluded for the non-cumulative assessment.

Sequential Effects – A90

15.10.3.4. As people travel through the study area there is potential to experience sequential cumulative effects resulting from visibility of the Proposed Development and the identified cumulative schemes. Users of the A90 which passes close to the identified cumulative schemes are the principal receptors with the potential to experience sequential cumulative effects.

15.10.3.5. The Peterhead Power Station, existing 275kV substation and under construction 400kV substation are existing features of views from parts of the A90, particularly between Boddam and the Invernettie Roundabout. Other existing industrial and commercial development along the A90 on the southern edge of Peterhead also influence the existing baseline views. The identified consented and application stage cumulative schemes would add further large-scale development to these views, increasing their presence and influence.

15.10.3.6. The Proposed Development would be visible from similar sections of the A90 to the existing Peterhead Power Station and although it would add a further element into these views, it would not extend visibility of such development to new sections of the A90. On balance it is considered that the cumulative magnitude of change on users of the A90 would be **Low**, resulting in a **Minor adverse** cumulative effect, consistent with the findings of the non-cumulative assessment.

15.11. LIMITATIONS OR DIFFICULTIES

15.11.1 SUMMARY

15.11.1.1. Assessment of visual impact through the use of representative viewpoints has been restricted by the limits of public access. Land outside of the control of the Applicant was accessed from points of public access (roads and public rights of way) only. This is considered good practice and therefore has not affected the appropriateness of the viewpoints selected nor the robustness of the assessment.

15.11.1.2. The viewpoints that have been included within the assessment were based on representative views from where the receptor was considered the most sensitive (based on professional judgement).

15.11.1.3. Views of the Proposed Development other than those assessed are acknowledged to exist. The viewpoints are not intended to provide an exhaustive or fully comprehensive catalogue of views of the Proposed Development Site; rather they provide a representative sample for the purpose of the landscape and visual amenity assessment, using viewpoints agreed with Aberdeenshire Council.

15.11.1.4. The external lighting scheme for the Proposed Development will be designed as part of the detailed design phase and as such has not informed the landscape and visual assessment. It is anticipated that the external lighting scheme will be designed in accordance with relevant standards in order to provide safe working conditions whilst reducing light pollution and the visual impact on the local environment. This is likely to be achieved using luminaires that eliminate the upward escape of light. The lighting scheme is anticipated to be secured through condition and as such will be submitted to the local planning authority for approval before being installed.

15.12. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

15.12.1 SUMMARY

15.12.1.1. The existing Peterhead Power Station and a series of other electrical, industrial and commercial developments provide a context to the Proposed Development, somewhat reducing the impression of change. The assessment has determined that most of the identified landscape and visual receptors would experience **minor or negligible**, and therefore not significant, effects during construction and operation of the Proposed Development.

15.12.1.2. However, it is anticipated that the Proposed Development is likely to result in significant adverse effects on the landscape of the Proposed Development Site and on views experienced by receptors at Meet Hill and adjacent residential properties (as represented by Viewpoint 4), users of the coastal path between Boddam and Invernettie (Core Path 7LD.01.24) and residents at Lendrum Terrace (as represented by Viewpoint 8) and on a small number of nearby residential receptors (Sandford Villa, Newmill of Sandford, Sandford Bungalow, Bevailey, Millbank and Milbank Farm). These significant effects are anticipated to occur during construction and at operation, including for both the non-cumulative and cumulative scenarios, except for receptors at Bevailey and Millbank where significant effects are limited to the construction stage.

15.12.1.3. Landscape and visual mitigation measures, including earthworks reprofiling and woodland planting, would help tie the Proposed Development into the landscape and limit visibility of

lower-level elements. Although these measures would help to slightly reduce the extent or impression of change for many receptors, the overall levels of residual effects would generally remain unchanged. The exceptions to this are for residential receptors at Bevailey and Millbank where earthworks design would contribute to a reduction in operational effects from Moderate adverse (significant) to Minor adverse (not significant).

Table 15-10: Summary of Residual Effects

Receptor	Sensitivity	Construction Magnitude	Construction Significance of Effect	Operational Magnitude of Change	Operational Significance of Effect	Cumulative Magnitude of Change	Cumulative Significance of Effect
Site Landscape Elements	Low	High	Moderate	High	Moderate	-	-
North East Aberdeenshire Coast SLA	Medium	Very Low	Negligible	Very Low	Negligible	Very Low	Negligible
Beaches, Dunes and Links – Aberdeenshire LCT	Medium	Very Low	Negligible	Very Low	Negligible	Very Low	Negligible
Coastal Agricultural Plain – Aberdeenshire LCT	Low	Low	Minor	Low	Minor	Low	Minor
Fragmented Rocky Coast LCT	Medium	Low	Minor	Low	Minor	Low	Minor
Deposition Coastline with Open Views CCT	Medium	Very Low	Negligible	Very Low	Negligible	Very Low	Negligible
Rocky Coastline with Open Sea Views CCT	Medium	Low	Minor	Low	Minor	Low	Minor

Receptor	Sensitivity	Construction Magnitude	Construction Significance of Effect	Operational Magnitude of Change	Operational Significance of Effect	Cumulative Magnitude of Change	Cumulative Significance of Effect
Viewpoint 1: The Street, Rora	Medium	Very Low	Negligible	Very Low	Negligible	Very Low	Negligible
Viewpoint 2: Coastline between Kirkton Head and Craigewan.	High	Very Low	Negligible	Low	Minor	Low	Minor
Viewpoint 3: West Links / War Memorial, Peterhead	Medium	Very Low	Negligible	Low	Minor	Low	Minor
Viewpoint 4: Reform Tower, Meet Hill, Peterhead	Medium	Medium	Moderate	Medium	Moderate	Medium	Moderate
Viewpoint 5: Unclassified road, near Blackhill	Medium	Low	Minor	Low	Minor	Low	Minor
Viewpoint 6: Harbour Street, Boddam	Medium	Low Medium (Core Path users)	Minor Moderate (Core Path users)	Low Medium (Core Path users)	Minor Moderate (Core Path users)	Low Medium (Core Path users)	Minor Moderate (Core Path users)
Viewpoint 7: A90 / Station Road /	Medium	Low	Minor	Low	Minor	Low	Minor

Receptor	Sensitivity	Construction Magnitude	Construction Significance of Effect	Operational Magnitude of Change	Operational Significance of Effect	Cumulative Magnitude of Change	Cumulative Significance of Effect
Boddam Recreation Park							
Viewpoint 8: Stirling Village / Lendrum Terrace	Medium	Medium	Moderate	Medium	Moderate	Medium	Moderate
Viewpoint 9: Coastal Path, near Bullers of Buchan	High	Very Low	Negligible	Very Low	Negligible	Very Low	Negligible
Viewpoint 10: Northfield Gardens, Hatton	Medium	Very Low	Negligible	Very Low	Negligible	Very Low	Negligible
Viewpoint 11: Minor road, south of Inverugie	Medium	Very Low	Negligible	Very Low	Negligible	Very Low	Negligible
Residential receptors at Sandford Villa, Newmill of Sandford, Sandford Bungalow and Millbank Farm	Medium	Medium	Moderate	Medium	Moderate	Medium	Moderate

Receptor	Sensitivity	Construction Magnitude	Construction Significance of Effect	Operational Magnitude of Change	Operational Significance of Effect	Cumulative Magnitude of Change	Cumulative Significance of Effect
Residential receptors at Bevailey and Millbank	Medium	Medium	Moderate	Low	Minor	Low	Minor
Residential receptors at Denend Croft, Gateside and Hjaltland	Medium	Low	Minor	Low	Minor	Low	Minor

15.13. REFERENCES

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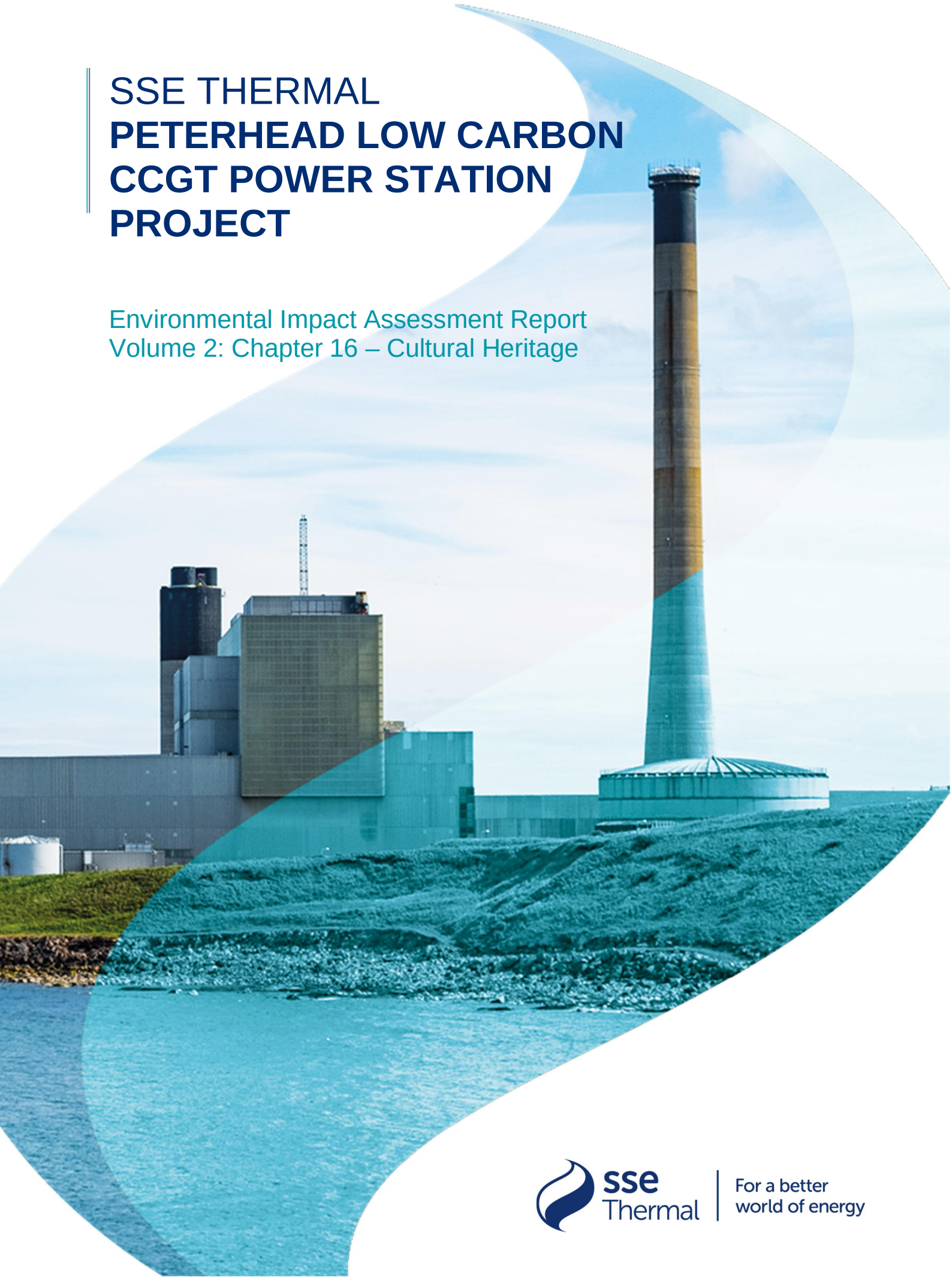
PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 16 – Cultural Heritage



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CONTENTS

TABLES

16. Cultural Heritage

16.1. INTRODUCTION

16.1.1 INTRODUCTION

16.1.1.1. This chapter of the Environmental Impact Assessment Report (EIA Report) presents the findings of an assessment of temporary and permanent impacts on cultural heritage during construction, operation (including maintenance) and decommissioning phases of the Proposed Development. This chapter considers potential impacts on the following:

- Designated heritage assets, including Scheduled Monuments, listed buildings, and conservation areas; and
- Non-designated heritage assets, including below ground archaeological remains, historic buildings and the historic landscape.

16.1.1.2. Cultural heritage comprises all aspects of the environment resulting from the interaction and relationships between people and places through time. The above aspects are referred to as heritage assets: buildings, monuments, sites, places, areas or landscapes identified as having a degree of significance due to their heritage interest that merit consideration in planning decisions. Cultural heritage influences how people relate to places and cultures and can provide a sense of place and stability to a community.

16.1.1.3. This chapter considers:

- Key legislative and policy requirements and how the Proposed Development has considered them;
- How information on the existing and future environment has been collected (through desk-based studies, survey work and stakeholder consultation);
- The existing and future environment, based on the baseline information;
- Any further information to be obtained through further consultation, desk-based studies, or surveys;
- The potential effects of the Proposed Development on cultural heritage; and
- Potential mitigation measures.

16.1.1.4. Detailed baseline information is provided in **Appendix 16A: Cultural Heritage Desk Based Assessment** (EIA Report Volume 4). This chapter is accompanied by **Figure 16.1: Locations of Designated Heritage Assets**, **Figure 16.2: Locations of Non-designated Heritage Assets** and **Figure 16.3: Historic Land Use within the Study Area** (EIA Report Volume 3).

16.1.1.5. An assessment of cumulative effects on cultural heritage assets associated with the Proposed Development and other committed developments in the vicinity are described in Section 16.7 and summarised in **Chapter 19: Cumulative and Combined Effects** (EIA Report Volume 2).

16.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

16.2.1 INTRODUCTION

16.2.1.1. An overview of the legislative and policy context that is relevant to the Proposed Development is provided within **Chapter 7: Legislative Context and Planning Policy** (EIA Report Volume 2).

16.2.1.2. Legislation, planning policy and guidance of most relevance to cultural heritage and pertinent to the Proposed Development is described in **Appendix 16A** (EIA Report Volume 4). The assessment was conducted within the context of the legislative and planning framework designed to protect and conserve heritage resources. There are several statutory instruments and policies governing the approach to cultural heritage. The main pieces of legislation are:

- Town and Country Planning (Scotland) Act 1997 (Scottish Government. 1997a);
- The Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013 (Scottish Government, 2013);
- Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 (Scottish Government, 1997b);
- Ancient Monuments and Archaeological Areas Act 1979 (UK Government, 1979);
- Planning (Scotland) Act 2019 (Scottish Government, 2019);
- Historic Environment Scotland Act 2014 (Historic Environment Scotland, 2014); and
- Historic Environment (Amendment) (Scotland) Act 2011 (Scottish Government, 2011).

16.2.2 NATIONAL POLICY AND GUIDANCE

16.2.2.1. The principal elements of national policy and guidance comprise:

- Scottish National Planning Framework 3 (Scottish Government, 2014b);
- Scottish Planning Policy (SPP) Paragraphs 135-151: Valuing the Historic Environment, 2014 (Scottish Government 2014a);
- Historic Environment Policy for Scotland (HEPS) (HES 2019);
- Our Place in Time - The Historic Environment Strategy for Scotland, 2014 (Scottish Government 2014c);
- Planning Advice Note 2 / 2011 – Planning and Archaeology (Scottish Government 2011);
- Planning Advice Note 71 – Conservation Area Management (Scottish Government 2004); and
- The 'Managing Change in the Historic Environment' series of guidance notes (Historic Environment Scotland (HES), particularly *Managing Change in the Historic Environment: Setting* (2016).

16.2.3 REGIONAL AND LOCAL POLICY AND GUIDANCE

16.2.3.1. The relevant policies from the Aberdeenshire Local Development Plan (2017) to this chapter of the EIA Report are:

- Policy HE1 Protecting Historic Buildings, Sites, and Monuments states that the local authority will protect all listed buildings, archaeological sites and scheduled monuments and resist development that would have a negative effect. It states that "*it is the developer's responsibility to provide information on the nature and location of the archaeological features prior to determination of the planning application and either mitigate impacts or, where preservation of the site in its original location is not possible, arrange for the full excavation and recording of the site in advance of development*"; and
- Policy HE2 Protecting Historic and Cultural Areas states that the local authority will not allow development that would not preserve or enhance the character or appearance of a conservation area. This applies both to developments within the conservation area and proposals that would affect its setting.

16.2.3.2. The relevant policy from the Aberdeen City and Shire Strategic Development Plan (2020) is:

- Objective: To make sure new development safeguards and, where appropriate, enhances the City Region's historic, natural and cultural assets and is within the capacity of the environment.

16.2.3.3. Aberdeenshire Council is in the process of determination of a new Aberdeenshire Local Development Plan 2022. Section 11 of this emerging Local Development Plan (Aberdeenshire Council, forthcoming) contains policies of relevance to cultural heritage assets, however, as they currently stand in draft form, they do not represent a significant change to those in the existing Aberdeenshire Local Development Plan 2017.

16.3. ASSESSMENT METHODOLOGY

16.3.1 INTRODUCTION

16.3.1.1. A desk-based assessment **(Appendix 16A** EIA Report Volume 4) has been undertaken to identify the known cultural heritage resource within defined study areas and the potential for as yet unknown archaeological remains to be present at the Proposed Development Site.

16.3.1.2. The assessment of impacts due to change to the setting of heritage assets focuses on known designated and non-designated assets identified by Historic Environment Scotland and recorded in the Aberdeenshire Historic Environment Record. A review of the Ordnance Survey first edition 6" map of 1872 was undertaken to identify any additional non-designated standing buildings within the 1km study area that require assessment; however, no such buildings requiring assessment were identified.

16.3.1.3. This section presents the following:

- Identification of the information sources that have been consulted throughout preparation of this chapter;
- The methodology behind the baseline assessment including the definition of an appropriate study area; and
- The methodology and terminology used in the assessment of effects.

16.3.2 CONSULTATION

16.3.2.1. The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal Scoping Opinion, and other pre-application engagement is summarised in Table 16.1.

Table 16-1: Summary of consultation and actions taken

Consultee Approached	Date and Nature of Consultation	Summary of Response	How comments have addressed in this chapter
Aberdeenshire Council	Scoping Response 13 July 2021	Agrees with the scope of the assessment and the proposed study areas and methodology	N/A
		Suggest the use of a photomontage looking towards the proposed development from the rear of Sandford Lodge and its walled garden would be beneficial to consider the full impact and determine what, if any, specific mitigation measures are required.	A viewpoint and photomontage from the rear of Sandford Lodge and its walled garden can be viewed as **Figure 16.4** (EIA Report Volume 3).
		It is reminded that there may be a requirement for archaeological mitigation in the form of watching briefs and/or fencing off assets for the duration of the work.	Further consultation with the Aberdeenshire County Archaeologist has been undertaken to discuss the site's archaeological potential and appropriate mitigation, resulting in no requirement for further archaeological work at the Proposed Development Site.
		Discussion with the Council regarding the requested photomontage from Sandford Lodge and other built heritage matters during the pre-application stage is welcomed and encouraged.	Further consultation has been undertaken with the Conservation Officer for Aberdeenshire Council in the pre-determination phase as detailed below.
Historic Environment Scotland	Scoping Response 17 June 2021	Welcome cultural heritage effects are scoped into the assessment and welcome that the operational effects of the proposal on the setting of Boddam Castle and Boddam Den scheduled monuments will be assessed.	Baseline information on all assets is provided in the baseline **Appendix 16A: Cultural Heritage Desk Based Assessment** (EIA Report Volume 4). This also sets out the rationale for selecting assets for further assessment within this chapter. Potential for impact was identified at Boddam Castle and it therefore assessed in Section 16.6 of

Consultee Approached	Date and Nature of Consultation	Summary of Response	How comments have addressed in this chapter
			this chapter. No potential was identified for the Proposed Development to impact the heritage value of Boddam Den. It was therefore scoped out of further assessed in the baseline and is not included in this chapter.
		Recommend the use of Historic Environment Scotland's 'Managing Change in the Historic Environment' series of guidance notes (Historic Environment Scotland (HES), particularly Managing Change in the Historic Environment: Setting (2016).	The assessment has been carried out in accordance with this and other guidance as detailed in Section 16.2 of this chapter.
Historic Environment Scotland	Gatecheck Response 11 Nov. 2021	Welcome that the guidance document Managing Change in the Historic Environment: Setting (2016) will be used to assess the impact of the scheme on the setting of heritage assets and for consideration of appropriate mitigation where required.	N/A
Aberdeenshire Council (Archaeology)	Email 2nd Dec. 2021	A draft of the **Appendix 16A: Cultural Heritage Desk Based Assessment** (EIA Report Volume 4) was shared for comment. The consultee is satisfied that the desk-based assessment has adequately considered the archaeological potential of the Site. No further archaeological work is required within the Site either to support the application, or as mitigation of the Proposed Development.	As a result of the desk-based assessment and consultation, it is agreed that no further archaeological work is required at the Proposed Development Site.
Aberdeenshire Council (Conservation)	Virtual Meeting 10 Dec. 2021	Discussion focused on principal impacts identified to built heritage assets including Sandford Lodge, Boddam Conservation Area and the Reform Tower at Meethill. The key concern is intervisibility between the	Sandford Lodge is assessed as an asset of high value. A viewpoint and photomontage from the rear of Sandford Lodge and its walled garden has been prepared and this

Consultee Approached	Date and Nature of Consultation	Summary of Response	How comments have addressed in this chapter
		assets and the Proposed Development Site. Welcomed the inclusion of a photomontage from the rear of Sandford Lodge. Sandford Lodge should be assessed as an asset of high value despite the damage caused to the structure through fire. If it were to be assessed as a medium value asset this would need to be confirmed by HES through a formal resurvey of the building and reduction of its listing category.	is presented as **Figure 16.4** (EIA Report Volume 3).

16.3.3 SOURCES OF INFORMATION

16.3.3.1. The following sources of information have been reviewed and form the basis of the assessment of likely significant effects on cultural heritage:

- Aberdeenshire Historic Environment Record (HER) (report dated 30 March 2021);
- Historic Environment Scotland (HES) online datasets for designated heritage assets datasets (https://portal.historicenvironment.scot/downloads);
- National Library of Scotland (NLS) for historic Ordnance Survey mapping (https://maps.nls.uk/);
- Available LiDAR data;
- Archaeology Data Service (https://archaeologydataservice.ac.uk) for information on previous cultural heritage assessments and fieldwork surveys;
- British Geological Survey (BGS) online (https://www.bgs.ac.uk/geoindex/);
- Results of previous archaeological assessment and investigations (reported herein);
- Results of previous geotechnical investigations (reported herein);
- Local authority data including conservation area appraisals; and
- Aerial photographs viewed online via the National Collection for Aerial Photographs (NCAP) (http://www.ncap.org.uk/) and Britain From Above (https://www.britainfromabove.org.uk).

16.3.3.2. Designated heritage assets within this assessment are identified with their HES reference number. Known non-designated heritage assets are identified with their HER reference number. Non-designated assets identified in this assessment and not listed within the HER have been provided with an AECOM reference number. Assets are referenced within the text with the relevant number in square brackets. These can be cross-referenced to the gazetteer in Annex A of the Desk-Based Assessment **Appendix 16A** (EIA Report Volume 5) and located on **Figures 16.1-16.3** (EIA Report Volume 3).

16.3.3.3. The information gathered from the data sources listed above has been supplemented by information gathered from a site walkover survey of the Proposed Development Site and study area. The site walkover survey was undertaken on 8 August 2021 in order to:

- Identify known archaeological sites within the Proposed Development Site;
- Identify historic buildings and related assets including listed buildings, conservation areas and locally listed buildings within the Proposed Development Site and its surrounding study area;
- Identify areas with the potential to contain any previously unidentified archaeological or historical remains;
- Identify and assess the setting of heritage assets within the study area; and
- Identify the location, extent and severity of modern ground disturbance and previous construction impacts.

16.3.4 STUDY AREA

16.3.4.1. For designated assets (World Heritage Sites, Scheduled Monuments, Category A-C listed buildings, conservation areas, inventory gardens and designed landscapes, inventory battlefields) a study area around the Proposed Development Site of 3km has been applied, with an extension to 5km for designated assets of the highest value (namely, World Heritage Sites, Scheduled Monuments, Category A listed buildings and conservation areas containing Category A listed buildings).

16.3.4.2. A study area of 1km from the Proposed Development Site was used for non-designated assets to obtain data from the HER. This study area has been determined using professional judgement to provide the context of, and potential for, surviving archaeological remains within the Proposed Development Site given the nature of the Proposed Development and its location.

16.3.4.3. The study areas were determined using professional judgement to assess the archaeological potential of the Proposed Development Site, and to identify key constraints in the surrounding landscape. The study areas place the Proposed Development Site within its wider heritage context, and were agreed with HES and Aberdeenshire County Council (ACC).

16.3.4.4. The study areas are illustrated on **Figure 16.1: Location of Designated Heritage Assets and Figure 16.2: Location of Non-Designated Heritage Assets** (EIA Report Volume 3).

16.3.5 IMPACT ASSESSMENT METHODOLOGY

16.3.5.1. The significance (heritage value) of a heritage asset is determined by professional judgement, guided but not limited to any designated status the asset may hold. The value of an asset is also judged upon several different factors including the special characteristics the assets might hold which can include evidential, historical, aesthetic, communal, archaeological, artistic and architectural values. This value of a heritage asset is assessed primarily in accordance with the guidance set out in Scottish Planning Policy (SPP, 2020) and the Historic Environment Policy for Scotland (HEPS, 2019). The significance of a place is defined by the sum of its heritage values. Taking these criteria into account, each identified heritage asset can be assigned a level of heritage value (significance) in accordance with professional judgement but based upon a three-point scale as set in Table 16.2.

Table 16-2: Criteria for determining the significance (heritage value) of heritage assets

Heritage value (Significance)	Criteria
High	Assets of inscribed international importance, such as World Heritage Sites, Category A and B listed buildings, Landscapes on the Inventory of Gardens and Designed Landscapes, Inventory of Historic Battlefields, Scheduled monuments, Non-designated archaeological assets of schedulable quality and importance
Medium	Category C listed buildings, Conservation Areas, Locally listed buildings included within a conservation area Non-designated heritage assets of a regional resource value.
Low	Non-designated heritage assets of a local resource value as identified through consultation, Locally listed buildings, Non-designated heritage assets whose heritage values are compromised by poor preservation or damaged so that too little remains to justify inclusion into a higher grade

16.3.5.2. Having identified the value of the heritage asset, the next stage in the assessment is to identify the level and degree of impact to an asset arising from the Proposed Development. Potential impacts are defined as a change resulting from the Proposed Development which affects a heritage asset. Impacts may arise during construction, operation or decommissioning and can be temporary or permanent. Impacts can occur to the physical fabric of the asset or affect its setting.

16.3.5.3. The level and degree of impact (impact rating) is assigned by reference to a four-point scale as set out in Table 16.3 below. The level of impact considers mitigation measures which have been embedded within the Proposed Development as part of the design development process (embedded mitigation).

Table 16-3: Criteria for determining the magnitude of impact on heritage assets.

Magnitude of impact	Description of Impact
High	Change such that the significance of the asset is totally altered or destroyed. Comprehensive change to setting affecting significance, resulting in a serious loss in our ability to understand and appreciate the asset.
Medium	Change such that the significance of the asset is significantly altered or modified. Changes such that the setting of the asset is noticeably different, affecting significance

Magnitude of impact	Description of Impact
	and resulting in changes in our ability to understand and appreciate the heritage value of the asset.
Low	Change such that the significance of the asset is slightly affected. Slight change to setting affecting significance resulting in a change in our ability to understand and appreciate the asset.
Negligible	Changes to the asset that hardly affect significance. Minimal change to the setting of an asset that have little effect on significance resulting in no real change in our ability to understand and appreciate the asset.

16.3.5.4. An assessment of the level of significant effect, having taken into consideration any embedded mitigation, is determined by using the matrix at Table 16.4 which takes account of the value of the asset (Table 16.2) and the magnitude of impact (Table 16.3). Effects can be neutral, adverse or beneficial.

Table 16-4: Criteria for determining the significance of effect

Heritage value (Significance)	Magnitude of Impact				
	High	**Medium**	**Low**	**Negligible**	**No Impact**
High	Major	Major	Moderate	Minor	Neutral
Medium	Major	Moderate	Minor	Minor	Neutral
Low	Moderate	Minor	Minor	Negligible	Neutral

16.3.5.5. This chapter considers that major or moderate effects are significant for the purposes of the EIA Regulations, in accordance with standard EIA practice. Once the effect has been identified, additional mitigation can be used to offset, reduce or compensate for any significant adverse effects. Reassessing the significance of the effect after applying additional mitigation allows the level of residual effect to be assessed.

16.3.6 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

16.3.6.1. The Proposed Development is described in detail in **Chapter 4: The Proposed** Development (EIA Report Volume 2). Flexibility in the design needs to be retained for some components of the Proposed Development, such as building dimensions and placement, and as such, this EIA chapter presents a reasonable worst-case assessment of the potential impacts of the Proposed Development on cultural heritage assets, based on the three indicative layouts and the design envelope presented in **Chapter 4: The Proposed Development** (EIA Report Volume 2).

16.3.6.2. It is assumed that the majority of the Proposed Development Site **(refer to Figure 3.3** in EIA Report Volume 3), with the exception of areas of vegetation that are to be retained and

protected, would be cleared and subject to some below ground disturbance during construction, no matter what the final sizing and layout of the buildings and structures is. The design parameters and the associated three indicative Proposed Development Site layouts (i.e. the maximum parameters for the Proposed Development and in particular its main buildings and structures) therefore do not affect the construction phase assessment of impacts on below ground heritage assets.

16.3.6.3. The construction phase assessment considers the impacts of the Proposed Development's buildings and structures on the setting of heritage assets. A reasonable worst-case is assessed in terms of building/ structure dimensions and stack heights, taking into account the design parameters set out in **Table 4.1 of Chapter 4: The Proposed Development** (EIA Report Volume 2).

16.3.6.4. The pre-Front End Engineering Design (FEED) phase and early-stage design development has resulted in three indicative designs (**Figures 4.1-4.3** in EIA Report Volume 3) within the same overall development footprint shown in **Figure 3.3** (EIA Report Volume 3). To retain flexibility, these three differing layout options have been considered; Option 1 has been selected as representing a reasonable worst-case scenario with regards to the potential for impacts to cultural heritage assets. This selection has been made using professional judgement and considers in particular the impact of the Proposed Development upon the setting and significance of Sandford Lodge Category B listed building and its Category C listed wall garden as designated heritage assets located within the Site and closest to the Proposed Development. This chapter therefore assesses the Option 1 design layout, although it should be noted that it is not considered likely that there would be a material difference in the magnitude of impact or significance of effect should Options 2 or 3 be taken forward.

16.3.6.5. The following general assumptions have been used to assess impacts to heritage assets:

- The assessment is based upon the largest possible dimensions for the Proposed Development, and a worst-case stack height of up to 130m AOD as these are considered most likely to result in significant visual effects and represent the worst-case scenario for setting purposes. The maximum dimensions are based upon the widest building footprint and tallest potential height as detailed in **Table 4.1 of Chapter 4: The Proposed Development** (EIA Report Volume 2).
- The preparation of Construction Laydown Areas (CLA) will comprise levelling the ground to provide an even surface.

16.3.6.6. The Air Quality assessment (**Appendix 8B** EIA Report Volume 4) has identified the potential for the emissions from the proposed absorber stack to result in a visible plume. Based on the anticipated initial water content of the emission and an assumed release temperature of 48°C the average plume length is predicted to be 203m based on 2020 meteorological data. The plume is predicted to be visible for up to 86% of the time, with the plume predicted to be longer than the average value for 37% of the time. Meteorological data indicates that the prevailing south westerly wind would push the plume from the Proposed Development offshore.

16.4. BASELINE CONDITIONS

16.4.1 INTRODUCTION

16.4.1.1. The desk-based assessment for the Proposed Development provided in **Appendix 16A** (EIA Report Volume 5) identified the designated and non-designated assets within the defined study area (shown on **Figures 16.1 - 16.3** (EIA Report Volume 3).

16.4.2 DESIGNATED ASSETS

16.4.2.1. There are two designated heritage assets within the Proposed Development Site, namely Sandford Lodge Category B listed building [LB16364] and the Sandford Lodge Walled Garden Category C listed building [LB16365]. The Aberdeenshire HER also records the non-designated extent of the gardens [NK14SW0073], which extend south from the lodge further into the Proposed Development Site. There are no other designated assets within the Proposed Development Site.

16.4.2.2. Within the 3km study area there are 265 designated heritage assets (see **Figure 16.1** EIA Report Volume 3). These include three Scheduled Monuments (Boddam Castle [SM3252], Boddam Den [SM6137] and St Peter's Church in Peterhead [SM5661]), three conservation areas (Boddam [CA428], Peterhead Central [CA427] and Peterhead Roanheads [CA426]) and 260 listed buildings, the majority of which are listed at Category B and C. Two buildings are Category A listed, namely Buchanness Lighthouse [LB16376] and Peterhead Old Parish Church [LB39671].

16.4.2.3. Within the wider 5km study area for designated assets of the highest value (World Heritage Sites, Scheduled Monuments, and Category A listed Buildings) there are four highly designated assets (see **Figure 16.1** EIA Report Volume 3). These are all Scheduled Monuments (Corbie Knap Cairn [SM3251], Cairn Catto long cairn [SM3276], Mount Pleasant Enclosure [SM3999] and Inverugie Castle [SM98]). Two further conservation areas are located in the extended study area, however neither contain Category A listed buildings so they do not meet the threshold set out in the scoping report for inclusion in this assessment.

16.4.2.4. There are two Scheduled Monuments located just beyond the northern limit of the 5km study area, close to Inverugie Castle [SM98]. These are Castle Hill Motte at Hallmoss Farm [SM3259], and Ravenscraig Castle [SM2496]. These assets were also included in the site visit to assess any potential for impact through change to their settings.

16.4.2.5. There are no designated World Heritage Sites, Inventory Gardens and Designed Landscapes, Inventory Battlefields, or Historic Marine Protected Areas within the study area.

16.4.3 NON-DESIGNATED ASSETS

16.4.3.1. A total of 176 non-designated heritage assets were recorded on the Aberdeenshire HER within the 1km study area, with a further six assets identified through a review of historic mapping, which are described in **Appendix 16A** (EIA Report Volume 4). The assessment identifies known assets within the study area in order to establish the potential for as yet unknown archaeological remains to be present within the Proposed Development Site and their potential significance.

16.4.3.2. The majority of the assets relate to the post-medieval and modern land use of the Proposed Development Site before the existing power station was constructed, although the power station is also classed as a heritage asset [NK14SW0237]. A number of these are linked to

agriculture and include several former farmsteads [NK14SW0079, NK14SW0081, NK14SW0080, and NK14SW0078], all of which are now demolished. The remaining non-designated assets within the Site include the Burn of Boddam/Den of Boddam watercourse which has now been culverted [AECOM001], two wells [AECOM005 and AECOM006], and an earthwork bank also known as the Den of Boddam which was built to accommodate a railway line to transport prisoners from Peterhead Prison to the north to the stone quarries to the south of the Proposed Development Site [NK14SW0061]. While there is little clear evidence for activity within the Proposed Development Site prior to the 18th century, a bronze spearhead is reported to have been found near the south-eastern limits of the Proposed Development Site suggesting some earlier activity in the area [NK14SW0013].

16.4.3.3. Archaeological monitoring undertaken during construction of St Fergus Pipeline, which continues into the Proposed Development Site did reveal some earlier activity, including prehistoric pits and flints, although these were all identified outside the Proposed Development Site [NK04NE0083].

16.4.3.4. The following presents a summary of the archaeological narrative of the study area. Detailed information is provided in **Appendix 16A** (EIA Report Volume 4).

16.4.3.5. Several non-designated assets have also been recorded outside the Site on the Aberdeenshire HER, most of which date to the post-medieval period, with prehistoric assets limited to finds of lithics [NK14SW0098], and stone hammer [NK14SW0005], and possible stone anvils [NK14SW0004]. A major source of chalk flint has been identified to the north-west of the Site [NK14SW0017], and it seems likely that the area would have been exploited from the prehistoric period onwards, although traces of activity are limited.

16.4.3.6. Medieval activity is also limited, with the site of Boddam Castle to the south being the main asset dating to this period [SM3252]. Dating to the 14th century, the castle was the house of the Keith, and surveys from the 17th century suggest that Boddam, or *Bottom*, was larger than Peterhead to the north (Smith 2001, 104).

16.4.3.7. The Statistical Account of Scotland notes that fishing was a major source of employment in the local area (Moir 1799, 372-377), although it notes that much improvement had taken place in the last 40 years with land improved for agriculture (ibid 1799, 392-396), with quarrying also taking place (ibid 1799, 383-384).

16.4.3.8. Cartographic sources from the 17th century do not show the study area, or the Proposed Development Site, in enough detail to suggest how the land was used during this period, however, the Roy survey of 1747-1752 supports this model of land use, with the coastal villages of Peterhead and Boddom to the north and south of the Site respectively, and the Site shown as agricultural land. This is also supported by the non-designated assets recorded on the Aberdeenshire HER with fisherman's cottages recorded in Boddam [NK14SW0170 and NK14SW0171] as well as further farms and agriculture remains throughout the wider study area [including NK14SW0023, NK14SW0030, and NK14SW0086]. Quarries have also been recorded including Stirling Hill Quarry [NK14SW0072] as well as an unnamed quarry which is recorded as having been backfilled [NK14SW0089].

16.4.3.9. The fishing industry declined throughout the second half of the 20th century leaving the harbour at Boddam somewhat redundant and only used by a small fleet of lobster boats until the discovery of North Sea oil in the 1970s when the village became a supply base for oil rigs (Smith 2001, 105). The current power station was built as an oil-fired power station between 1974-78, with gas turbines installed between 1990-92 (ibid 2001, 105).

16.4.4 HISTORIC LANDSCAPE

16.4.4.1. The historic landscape character within the Site includes three main types of land use within the Site. The majority of the land is recorded as 'Agriculture and Settlement', with large areas noted as 'Energy, Extraction, and Waste'. The remaining type of land use is focused on the Sandford Lodge area which is recorded as 'Designated Landscape', and this land use type includes Sandford Lodge and the associated walled garden and formal garden to the south. These land use types also represent the current land use across the Site.

16.4.5 FUTURE BASELINE

16.4.5.1. The baseline cultural heritage details as presented above are not anticipated to change in the absence of the Proposed Development.

16.5. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

16.5.1 OVERVIEW

16.5.1.1. The Proposed Development is located adjacent to the existing Peterhead Power Station. This means that it will share some of the existing infrastructure used for the construction and operation of the existing power station, reducing the impact of the Proposed Development and reducing the requirement for new infrastructure into the surrounding landscape and the potential effects on below ground archaeology and setting of built heritage assets. Visually, whilst locating the Proposed Development adjacent to existing development results in a concentration of this type of development in one place, it also focuses impacts in that one place. This limits the potential for new impacts through change to the setting of heritage assets in the local area that may currently be unaffected by the existing Peterhead Power Station. The finished platform level of the CCGT and CCP Area would also be lower than the existing ground level, helping to slightly reduce the impression of height and scale of the Proposed Development.

16.5.1.2. Mitigation through avoidance has been used in the development of the scheme design layouts and the proposed locations of Construction Laydown Areas to avoid physical impacts to the Category B listed Sandford Lodge [LB16364] and its Category C listed walled garden [LB16365] and non-designated designed garden [NK14SW0073] and farmstead during construction and operation of the Proposed Development. Limited works to the junction and access track to Sandford Lodge are proposed to facilitate the use of the access for construction and as an emergency egress during operation.

16.5.1.3. The construction of the Proposed Development requires the removal of an existing earthwork bund to the south of Sandford Lodge which currently assists in screening views of the existing Peterhead Power Station from within the asset's setting. The bund will be reinstated before the end of the construction period to mitigate the effects of the removal of the existing bund and the introduction of the Proposed Development into the setting of Sandford Lodge. **Figure 11H.1** the Outline Landscape and Biodiversity Strategy (EIA Report Volume 3) includes the addition of native woodland planting on the reinstated bund to further augment its capacity to screen the Proposed Development from views within the Sandford Lodge asset grouping, once matured.

16.6. LIKELY IMPACTS AND EFFECTS

16.6.1 CONSTRUCTION

16.6.1.1. Construction of the Proposed Development has the potential to affect heritage assets in the following ways:

- Partial or total removal of heritage assets;
- Compaction of archaeological remains by construction traffic and structures;
- Changes to local hydrology that could affect preservation levels of heritage assets;
- Vibration effects during construction and/ or operation of the Proposed Development; and
- Adverse effects on the setting of heritage assets resulting from, for example, visual intrusion, noise, severance, access and amenity.

16.6.1.2. The baseline assessment presented in **Appendix 16A** (EIA Report Volume 4) has noted that while a number of non-designated heritage assets have been identified within the Proposed Development Site, the extensive disturbance linked to the construction of the existing power station has probably removed all remains. Assets where all remains are assumed to have been removed are the former farmsteads and agricultural structures [AECOM002-AECOM004], and the two wells [AECOM005 and AECOM006].

16.6.1.3. The earthwork known as the Den of Buddon (now known as 'Boddom') which carried the railway line from the Stirling Hill quarries and Peterhead Prison partially survived within the western extension of the Proposed Development Site [NK14SW0061]. Large sections of the earthwork have been removed because of agriculture and later land use, and the asset is well documented on later 19th and early 20th century mapping. The section that survives within the Proposed Development Site is a cutting rather than embankment. The remains have some archaeological significance as the study of the remains could provide information regarding the construction of the line. The asset also has historical significance due to the role it played in the development of granite quarrying and the penal system in the area. The asset is considered to have low value. Construction works have the potential to result in the loss of a small section of the railway cutting which would result in a low magnitude of impact. On assets of low sensitivity, this equates to a **minor adverse** significance of effect.

16.6.1.4. The former watercourse running through the Proposed Development Site known as both the Burn of Buddon (now known as 'Boddom') and the Den of Buddon (now known as 'Boddom') was culverted as part of the power station construction in the 1970s [AECOM001]. Mapping would suggest that the watercourse may have been used as a mill race or leat for at least some of its life although all traces have been buried. The asset has some limited archaeological significance as a study of any remains that survive buried/culverted might provide details about its former use, and it also has limited historical significance linked to the history and development of land use and the use of water in industrial activities. It is considered to have low value as it is assumed most of the feature was lost when culverted. The Proposed Development will result in culvert improvements and as a result there will be a low magnitude of impact. On assets of low value, this equates to a **minor adverse** significance of effect.

16.6.1.5. There is the potential for previously unrecorded archaeological sites to be identified during excavation of supporting works such as construction compounds and laydown areas, although the potential is considered to be low as a result of the Proposed Development Site being heavily disturbed during the construction of the existing power station, and the Site being used for agriculture since at least the post-medieval period. This potential is likely to be limited to evidence of prehistoric and later agriculture and therefore the value of such remains is

considered to be low. The magnitude of impact is judged to be high as any features present would likely be removed in their entirety, which would result in a **moderate adverse** significance of effect.

16.6.1.6. The baseline study presented in **Appendix 16A** (EIA Report Volume 4) has identified the potential for impacts to designated and non-designated built heritage assets within the study area, because of change to their settings during construction. These impacts derive from construction-related activities such as noise, lighting and vehicle movements, together with the presence of the Proposed Development within an asset's setting.

16.6.1.7. Several assets were scoped out of further assessment in the baseline study due to the lack of potential for impacts resulting from the Proposed Development. The following 16 designated and non-designated assets are those where it is considered that there is the potential for impact, and these are discussed further below. Some assets have shared settings and have been grouped for assessment.

- Group of three assets comprising Sandford Lodge [LB16364] (category B); the Walled Garden North of Sandford Lodge [LB16365] (category C) and the former designed garden at Sandford Lodge NK14SW0073 (non-designated);
- Boddam Conservation Area and two assets within its boundary; Boddam Parish Church [LB16314] (category C) and Buchanness Lighthouse [LB16367] (category A);
- Peterhead Central Conservation Area, two assets within its boundary comprising the Old Parish Church [LB39671] (category A) and Town House [LB39674] (category B), and two assets within its setting comprising St Peters Church [SM5661] (scheduled monument) and Old St Peters Churchyard [LB39669] (category B);
- Boddam Castle [SM3252] (scheduled monument);
- Peterhead Harbours [LB39733] (category B);
- Dales House [LB16392] (category B);
- Buchanness Cottage [LB16366] (category B);
- Reform Tower, Meethill [LB16362] (category B);
- Former Free Church Manse [NK14SW0085] (non-designated);
- Millbank [NK14SW0083] (non-designated); and
- Newmill of Sandford [NK14SW0074].

16.6.1.8. **Sandford Lodge [LB16364]** is Category B listed building of high value, however since it was designated, the building has suffered significant fire damage that has removed its roof, windows, internal wall finishes and probably also its staircase. This damage has altered the building's architectural interest. The associated walled garden is a Category C listed building [LB16365], of medium value. The house and walled garden are located within a non-designated designed garden [NK14SW0073] which is an asset of low value. All three assets are located within the Proposed Development Site; however, the Proposed Development scheme includes embedding mitigation through design, as detailed in Section 16.5, to avoid physical impact to the listed buildings and their surrounding non-designated garden. **Figure 11H.1** the Outline Landscape and Biodiversity Strategy (EIA Report Volume 3) also includes the addition of native woodland planting along the eastern edge of the non-designated garden next to the access track, this has been designed with reference to the appearance of the garden on 19th century OS maps and it will therefore return an aspect of the garden's former design and character, once matured. The only source of physical impact will be in the upgrade of the access lane for the use of construction traffic, but this is not considered to impact on the heritage value of the assets. The source of impact to the asset grouping at Sandford Lodge is therefore related to views of the Proposed Development from within the assets' settings. The

garden defines the extent of the designed setting of the house and walled garden. It was noted during the site visit that views of the existing stacks at Peterhead Power Station are available from within the garden and in views from the house, although its principal elevation faces away from the power station. A substantial earthwork bund is present between the garden and the existing Peterhead Power Station and this assists in screening views of some of the detracting infrastructure in this area. The existing power station is a detracting feature of the assets' settings as it is visually out of scale and character with the group of assets and impacts on the appreciation of their aesthetic qualities which were a deliberate aspect of their design, forming part of their heritage value.

16.6.1.9. The Proposed Development will result in temporary and permanent impacts on the assets through change within their settings. The presence of the Proposed Development introduces further views of power station infrastructure, particularly the proposed Absorber Stack, within the assets' settings. This will be seen in combination with the existing stack of Peterhead Power Station and it will be closer in the view. The worst-case height parameter for the proposed Absorber Stack is, however, at least 40m shorter than the tallest of the existing power station stacks. During the construction period, the existing bund to the south of Sandford Lodge is required to be removed to facilitate the construction of the Proposed Development. It will subsequently be reinstated to its existing height, but with a slope gradient sufficient to allow for augmented landscape planting to be added to the new bund. During the period from when the existing bund is removed, up to the completion the new reinstated bund, a worst-case assessment is that open views would be possible from within the garden of Sandford Lodge and from its windows featuring more expansive views of the existing Peterhead Power Station in combination with the Proposed Development. Such views would be out of scale and character with the domestic scale of the house and designed garden. A viewpoint and photomontage has been produced to demonstrate the effects of this scenario on the rear of the house and garden and it is presented as **Figure 16.4b** (EIA Report Volume 3). This would result in further erosion of the assets' heritage values as a designed house and garden and the magnitude of impact is judged to be medium. This would result in a **major adverse** significance of effect of temporary duration to the Category B listed Sandford Lodge, and a **moderate adverse** significance of effect of temporary duration to the Category C listed walled garden and non-designated garden during the construction period.

16.6.1.10. The permanent addition of further detracting infrastructure into these views in and around Sandford Lodge, even with the reinstated bund, will increase the detrimental effects of the existing power station, resulting in further erosion of the assets' heritage values. The magnitude of impact is therefore judged to be low and the significance of effect is judged to be **moderate adverse** and permanent to the Category B listed Sandford Lodge, and **minor adverse** and permanent to the Category C listed walled garden and non-designated garden.

16.6.1.11. **Boddam Conservation Area** is an asset of medium value. Impacts to individual listed buildings within the conservation area were scoped out of the further assessment in **Appendix 16A** (EIA Report Volume 4) as their individual heritage value would not be impacted by the Proposed Development, however it was noted that the scheme had the potential to impact upon the character of the conservation area, and the setting and heritage value of the Category A listed Buchanness Lighthouse [LB16367] within its boundary. Buchanness Lighthouse is an asset of high value. The site visit confirmed that from the majority of places within the conservation area views of the existing Peterhead Power Station do not detract from the character and appearance of the place. The exception to this is views from Manse Terrace within the conservation area and in views within its setting where the stacks and other power station buildings are visible. These structures are demonstrably out of character with the

domestic scale and materials of the settlement and detract from its aesthetic qualities as well as from the understanding of its former remoteness as a small fishing settlement. The existing power station also detracts from the prominence of the lighthouse in views from land and sea affecting the understanding of its function as a beacon and the most prominent feature of Boddam settlement. The Proposed Development will introduce further views of power station infrastructure, particularly the proposed Absorber Stack, within these assets' settings. This will be seen in combination with the existing stacks, although the new power station will sit behind the existing power station in these views and the worst-case height parameter for the Absorber Stack is at least 40m shorter than the existing tallest stack. A viewpoint and photomontage has been produced to demonstrate the effects of the Proposed Development from within Boddam settlement and it is presented as **Figure 15.6.6** (EIA Report Volume 3). The addition of further detracting infrastructure into these views will slightly increase the detrimental effects of the existing power station, resulting in further erosion of the assets' heritage value. The magnitude of impact is therefore judged to be negligible and the significance of effect is judged to be **minor adverse** on this group of two assets.

16.6.1.12. **Peterhead Central Conservation Area** is an asset of medium value. Impacts to individual listed buildings within the conservation were largely scoped out of further assessment in **Appendix 16A** (EIA Report Volume 4) as their individual heritage value would not be impacted by the Proposed Development. The exceptions to this were the Category A Old Parish Church [LB39671], of high value, and Category B listed Town House [LB39674], of medium value. The potential for impact was identified due to the extension of their setting beyond the bounds of Peterhead through their vertically, piercing the skyline of the settlement and being the most visible buildings on the skyline from outside the conservation area. Two further assets, considered within the setting of Peterhead Central Conservation Area, are St Peters Church Scheduled Monument [SM5661], an asset of high value, and the Category B listed Old St Peters Churchyard [LB39669], of medium value. The potential for impact was identified due to the assets appearing in a key view of Peterhead from the south, and due to the verticality of the 18th century bell tower within the complex. Impacts to the conservation area and the selected listed buildings would be through the position of the Proposed Development within a key view of the assets from the south, where the Proposed Development would be visible in sweeping views along the coast, sitting adjacent to the existing Peterhead Power Station. The setting assessment indicated that the existing power station is prominent in these views, but also not entirely incongruous due to the character and scale of other developments in the harbour and bay that are of similar proportion. The addition of the Proposed Development will therefore alter the view, but this is not considered likely to alter the heritage value of the assets. The worst-case height parameter for the proposed Absorber Stack is approximately 40m shorter than the existing tallest stack, it will therefore not compete with the verticality of the selected buildings within Peterhead more than the existing stack. Similarly, the addition of the Proposed Development immediately adjacent to the existing power station will appear as an extension to the existing infrastructure and at a scale that is subservient to the existing power station in this view. No impact is therefore identified to the group of three assets, resulting in a **neutral** significance of effect.

16.6.1.13. **Boddam Castle [SM3252]** is a Scheduled Monument of high value. The setting assessment of the castle noted its relationship with the surrounding topography which provides understanding of its defensive architecture and its aesthetic qualities. The assessment also noted the residential development to the north as a detracting feature of its setting, which is over sailed by views of the stack of the existing Peterhead Power Station from the asset, reducing understanding of its original landscape context and relationship with Boddam settlement. The Proposed Development will introduce views of the proposed Absorber Stack within the asset's

setting. This will be seen in combination with the existing stack, although the new power station will sit behind the existing power station in these views and the worst-case height parameter for the Absorber Stack is at least 40m shorter than the tallest existing stack. The addition of further detracting infrastructure into this view will slightly increase the detrimental effects of the existing power station, resulting in further erosion of the assets' heritage value. The magnitude of impact is therefore judged to be negligible and the significance of effect is judged to be **minor adverse**.

16.6.1.14. **Peterhead Harbours [LB39733]** is a Category B listed building of high value. The setting assessment noted that the existing Peterhead Power Station features in sweeping views of the coastline from the south of the harbours and in views of the harbours from the sea. The existing power station was noted to be prominent in these views, but also not entirely incongruous due to the character and scale of other developments in the harbour and bay. The addition of the Proposed Development will therefore alter the view, but this is not considered likely to alter the heritage value of the assets. The worst-case height parameter for the proposed Absorber Stack is approximately 40m shorter than the existing stack and the addition of the Proposed Development immediately adjacent to the existing power station will appear as an extension to the existing infrastructure and at a scale that is subservient to the existing power station in these views. No impact is therefore identified, resulting in a **neutral** significance of effect.

16.6.1.15. **Dales House [LB16392]** is a Category B listed building of high value. The setting assessment noted that a distant view of the stack of the existing Peterhead Power Station is present in views within the asset's setting and forms the only view of modern infrastructure from the house's principal elevation and over its relict parkland garden. Whilst the contribution that the parkland makes to the asset's heritage value was not deemed to be significant, due to later alterations and a loss of appreciable connection between the two, the presence of the stack in these views was nonetheless assessed as a detracting feature of the asset's setting. The Proposed Development will introduce distant views of the proposed Absorber Stack. This will be seen in combination with the existing stack, although the worst-case height parameter for the Absorber Stack is at least 40m shorter than the existing. The addition of further detracting infrastructure into this view will slightly increase the detrimental effect of the existing power station, resulting in further erosion of the assets' heritage value. The magnitude of impact is therefore judged to be negligible and the significance of effect is judged to be **minor adverse**.

16.6.1.16. **Buchanness Cottage [LB16366]** is a Category B listed building of high value. The setting assessment of the cottage noted its relationship with the surrounding topography and the settlement of Boddam. The assessment also noted that in views of Boddam from the asset, the domestic scale architecture is over sailed by views of the existing Peterhead Power Station and its stack. This was identified as a detracting feature of the asset's setting, diminishing the visual importance of the settlement in the view, as well as impacting on the aesthetic qualities of the view from this place of retreat. The Proposed Development will introduce views of the proposed Absorber Stack within the asset's setting. This will be seen in combination with the existing stack, although the new power station will sit behind the existing power station in these views and the worst-case height parameter for the Absorber Stack is at least 40m shorter than the existing. The addition of further detracting infrastructure into this view will slightly increase the detrimental effects of the existing power station, resulting in further erosion of the asset's' heritage value. The magnitude of impact is therefore judged to be negligible and the significance of effect is judged to be **minor adverse**.

16.6.1.17. **The Reform Tower, Meethill [LB16362],** is a Category B listed building of high value. The setting assessment noted that views of the asset from the surrounding landscape are a key aspect of its designed setting that contribute to its historic and architectural value as a

landmark feature. Views from the asset were deemed to be of lesser importance in terms of its heritage value, despite the asset being located on localised high ground. The assessment also noted that views of the tower in combination with the stack of the existing Peterhead Power Station detract from the prominence of the tower and affect its heritage value. The Proposed Development will introduce views of another tall structure, the proposed Absorber Stack, within the asset's setting. In the surrounding landscape and in views from the asset, this will be seen in combination with the existing stack and closer in the view, although the worst-case height parameter for the Absorber Stack is at least 40m shorter than the existing. A viewpoint and photomontage has been produced to demonstrate the effects of the Proposed Development in views from the asset and it is presented as **Figure 15.6.4** (EIA Report Volume 3). The addition of another tall structure into the landscape around the asset and in combination with the existing stack at Peterhead Power Station will increase the detrimental effects of the existing power station, resulting in further erosion of the assets' heritage value. It should be noted, however, that the detracting infrastructure will be focused in one location, as opposed to spread through the landscape. The magnitude of change is therefore judged to be negligible and the significance of effect is judged to be **minor adverse**.

16.6.1.18. **The former Free Church Manse [NK14SW0085]** is a non-designated asset of low value. The setting assessment concluded that the asset's setting does not contribute notably to its heritage value, however the proximity of the existing Peterhead Power Station was assessed as a detracting aspect of the asset's setting due to its scale which dwarfs the building. The presence of a large earthwork bund to the rear of the building was also noted as providing successful screening of a large part of the existing power station from the asset's rear windows and garden, and in views of the asset from the road. The bund at the rear of the building will be used for further Permanent Materials Storage as part of the Proposed Development and **Figure 11H.1 Outline Landscape and Biodiversity Strategy** (EIA Report Volume 4) includes additional native woodland planting to the rear of the building. The bund will therefore continue to perform it function in screening, augmented by additional planting. The main element of the Proposed Development Site that will be visible in views of the asset from the road is the Absorber Stack, although views of some of the other elements of the Proposed Development may also be possible. This will be seen in combination with the existing stack which will appear adjacent to it in the view. The worst-case height parameter for the Absorber Stack is at least 40m shorter than the existing. The addition of further detracting infrastructure into these views will increase the detrimental effects of the existing power station, resulting in further erosion of the assets' heritage value. The magnitude of impact is therefore judged to be negligible and the significance of effect is judged to be **negligible adverse**.

16.6.1.19. **Millbank [NK14SW0083]** is a non-designated farmstead of low value. The setting assessment noted the asset's relationship with surrounding fields as informing understanding of the asset as a small farmstead. It also noted that the farmhouse's principal elevation is oriented away from the Proposed Development Site. The existing Peterhead Power Station is visible, largely unscreened, in views from the asset's enclosed garden and farmstead as an out of scale and character intrusion that erodes its rural context. The Proposed Development will introduce further out of character development into the view, however, the Permanent Materials Storage area for the Proposed Development is located along the western boundary of the Site between it and the asset. Whilst the final finished levels have not been determined at this stage, the stored material may create a bund of material that acts to screen both the majority of the Proposed Development (except the tallest elements e.g. Absorber Stack) and parts of the existing Peterhead Power Station in these views. **Figure 11H.1** (EIA Report Volume 4) includes additional planting on the Permanent Materials Storage area and this will augment its capacity to screen the Proposed Development from views within the asset, once matured. The

magnitude of impact is therefore judged to be negligible and the significance of effect is judged to be **negligible beneficial**.

16.6.1.20. **Newmill of Sandford [NK14SW0074]** is a non-designated farmstead of low value. The setting assessment noted the asset's relationship with surrounding fields as informing understanding of the asset as a small farmstead. Fields to the north are now a golf course, whilst those to the east and south remain, although no longer worked from this asset. Views of the asset feature the existing Peterhead Power Station, but it was deemed to be sufficiently distant, and separated by green fields, so as to not to be over dominant in the building's setting. The Proposed Development includes the use of the field immediately to the south of the asset as a temporary Construction Laydown Area. This will temporarily diminish understanding of the asset as a former farmstead. It will also introduce the Proposed Development into views of and from the asset, where it will appear as an extension to the existing power station although slightly closer in the view. This latter change is not considered to impact upon the asset's heritage value. The magnitude of impact is therefore judged to be low and the significance of effect is judged to be **minor adverse** and temporary during construction.

16.6.2 OPERATION

16.6.2.1. During operation of the Proposed Development, there will be no additional physical impacts to below ground archaeological remains that could result in effects beyond those that have been assessed for construction impacts.

16.6.2.2. Potential impacts related to operation of the Proposed Development could include operational noise, lighting, and vehicle movements for staff access, however these are not considered to result in any change to the assessed levels of impact resulting from construction of the Proposed Development and its physical presence within the setting of heritage assets.

16.6.2.3. Another potential source of impact is the additional visible plume from the proposed Absorber Stack that would often be seen in the context of existing lower-level visible plumes from the existing Peterhead Power Station, particularly in closer range views. This has the potential to increase the levels of impact reported through the presence of the Proposed Development within the setting of heritage assets, as it adds further visual intrusion into those asset's settings and further views of a development type that is out of character with the heritage asset. This is considered to be applicable in the case of impacts reported to the Category B listed **Sandford Lodge [LB16364]** and its Category C listed **walled garden [LB16365]**, **Boddam Conservation Area** and the Category A listed **Buchanness Lighthouse [LB16367]** within its boundary, the scheduled monument at **Boddam Castle [SM3252]**, the Category B listed **Reform Tower at Meethill [LB16362]** and the non-designated **former Free Church Manse [NK14SW0085]**. In the case of each of these assets, however, the addition of the visible plume during operation is not considered to raise the assessed magnitude of impact reported through the presence of the Proposed Development within their settings. The reported significance of the effect therefore remains as reported in the construction phase assessment in Section 16.6.1 of this chapter.

16.6.2.4. Other impacts are potentially beneficial and related to the maturation of landscape planting (estimated 15 years) during the period of operation and its effects in screening views of the Proposed Development from heritage assets and from within their settings. **Figure 11H.1** (EIA Report Volume 4) detailed the proposed landscape planting including areas of Proposed native woodland.

16.6.2.5. In relation to the Category B listed **Sandford Lodge [LB16364]** there are two areas of native woodland planting proposed within the extent of its **non-designated designed garden [NK14SW0073]**. Once matured (estimated 15 years) the proposed native woodland along the eastern boundary of the garden, to the south of the lodge, will return an element of the garden's design and appearance as shown on 19th century OS maps where a band of woodland is present along this same alignment. This will make a positive contribution to the aesthetic qualities of the garden as the designed setting of the Category B listed lodge, enhancing understanding of the asset's formal setting. This is judged as a negligible impact on the Category B listed Sandford Lodge (an asset of high value) and a low impact on the non-designated garden (an asset of medium value) resulting in a **minor beneficial** significance of effect to both assets. It is judged to be a minor impact on the non-designated designed garden of low value, resulting in a minor beneficial significance of effect. This effect must, however, be seen alongside the permanent adverse effects of the presence of the Proposed Development within the asset's setting reported in the construction phase assessment in Section 16.6.1. The second area of proposed native woodland planting is on the reinstated bund to the south of Sandford Lodge. The maturation of this vegetation is considered to have the capacity to further reduce view of out of character infrastructure from within the asset's setting, however it does not have the capacity to eradicate these views altogether. A viewpoint and photomontage have been produced to demonstrate the appearance of the planted at 15 years from the rear of the house and garden and it is presented as **Figure 16.4c** (EIA Report Volume 3). Whilst the maturation of the planting does result in a slight reduction of the impact, it is not considered to result in a reduction of the stated magnitude of impact at construction, and the assessment of the impact of the presence of the Proposed Development within the asset's setting therefore remains as reported in Section 16.6.1.

16.6.3 DECOMMISSIONING

16.6.3.1. It is envisaged that the Proposed Development would have an operational life of at least 25 years or more, therefore decommissioning activities are currently anticipated to commence after 2053. Likely decommissioning activities are described in **Chapter 4: The Proposed Development** (EIA Report Volume 2), including removal or dismantling of plant and equipment to ground level and leaving hard standing and sealed concrete areas in-situ. Any areas of the Proposed Development Site that are below ground level would be backfilled to ground level to leave a levelled area. The reinstated bund to the south of Sandford Lodge would remain in situ.

16.6.3.2. There would be no additional physical impacts to buried archaeological remains during decommissioning of the Proposed Development, as any impact upon archaeological remains would have been mitigated at the construction phase.

16.6.3.3. There would be temporary impacts to the setting of designated assets in the wider study area during decommissioning, resulting from the use of machinery to dismantle the plant. Decommissioning is likely to affect the setting of those heritage assets described for the construction phase above. However, impacts would be no greater than those assessed during construction and operation, and in the case of the Category B listed Sandford Lodge [LB16364], would be substantially less through retention of the bund. The effects on designated and non-designated heritage assets through change to their settings would therefore not be significant.

16.7. MITIGATION, MONITORING AND ENHANCEMENT MEASURES

16.7.1 SUMMARY

16.7.1.1. The impacts of the Proposed Development on the setting of heritage assets, and in particular, the layout and design of permanent buildings and structures on the Proposed Development Site will be mitigated as much as practicable through detailed design. Matters including siting, layout, scale and external appearance, including the colour, materials and surface finishes of all new permanent buildings and structures are proposed to be secured by planning condition. It is therefore considered that design mitigation measures will be devised to limit impacts to heritage assets through development within their settings, although it is not envisaged that this will reduce the assessed effects from those presented in this chapter.

16.7.1.2. No monitoring is required in relation to effects arising from changes to the setting of heritage assets.

16.7.1.3. Consultation undertaken with the Aberdeenshire County Archaeologist (see Section 16.3.1) has confirmed that no archaeological mitigation works are required at the Proposed Development Site due to the degree of previous ground disturbance noted through this assessment and in **Appendix 16A** (EIA Report Volume 4) and the consequently low potential for as yet unrecorded archaeological remains to be present. No archaeological mitigation or monitoring is therefore proposed.

16.8. CUMULATIVE EFFECTS

16.8.1 INTRODUCTION

16.8.1.1. This section assesses the potential effects of the Site in combination with the potential effects of other development schemes (referred to as 'cumulative developments') within the surrounding area, as listed within **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4).

16.8.2 CUMULATIVE EFFECTS DURING CONSTRUCTION

16.8.2.1. The assessment of archaeological potential in this chapter and in **Appendix 16A** (EIA Report Volume 4) has demonstrated that the majority of the Proposed Development Site has been previously disturbed and any archaeological remains that were once present have been removed. Consequently, there is no potential for cumulative and combined effects to below ground archaeological assets within the Proposed Development Site.

16.8.2.2. The committed developments listed in **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4) have been reviewed and assessed for any cumulative effects on the setting of designated and non-designated heritage assets, taking into consideration the effects from the Proposed Development and the nature of the assets identified. No potential for significant cumulative effects has been identified.

16.9. LIMITATIONS OR DIFFICULTIES

16.9.1 SUMMARY

16.9.1.1. The desk-based assessment and identification of the cultural heritage baseline is based on information available at the time of writing. Due to the ongoing Covid-19 pandemic, it has not been possible to visit local archives centres to gather further historic and archaeological information that would support the baseline assessment. Online information sources, as listed in Section 16.3.2, have been used in combination with the Aberdeenshire HER, to provide a robust baseline for assessment in **Appendix 16A** (EIA Report Volume 4).

16.10. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

16.10.1 SUMMARY

16.10.1.1. As no additional mitigation of effects to buried archaeological remains are proposed (through agreement with the County Archaeologist and due to the low potential for surviving remains at the site) a residual significant effect of **moderate adverse** remains in relation to the low potential for removal of previously unrecorded archaeological remains of prehistoric and later agriculture of low value that may exist within the site. The magnitude of impact is judged to be high as any features present would likely be removed in their entirety, which would result in a moderate adverse significance of effect.

16.10.1.2. Due to the scale of the Proposed Development, it is envisaged that opportunities to provide effective landscape screening, over and above that already embedded in the design, will be limited. Therefore, the residual effects of the Proposed Development in relation to impacts resulting from change to the setting of designated and non-designated heritage assets will be the same as those reported under construction phase effects for built heritage assets. There is therefore a residual significant effect of **moderate adverse** in relation to the Category B listed building at Sandford Lodge [LB16364] through change to its setting.

16.11. REFERENCES

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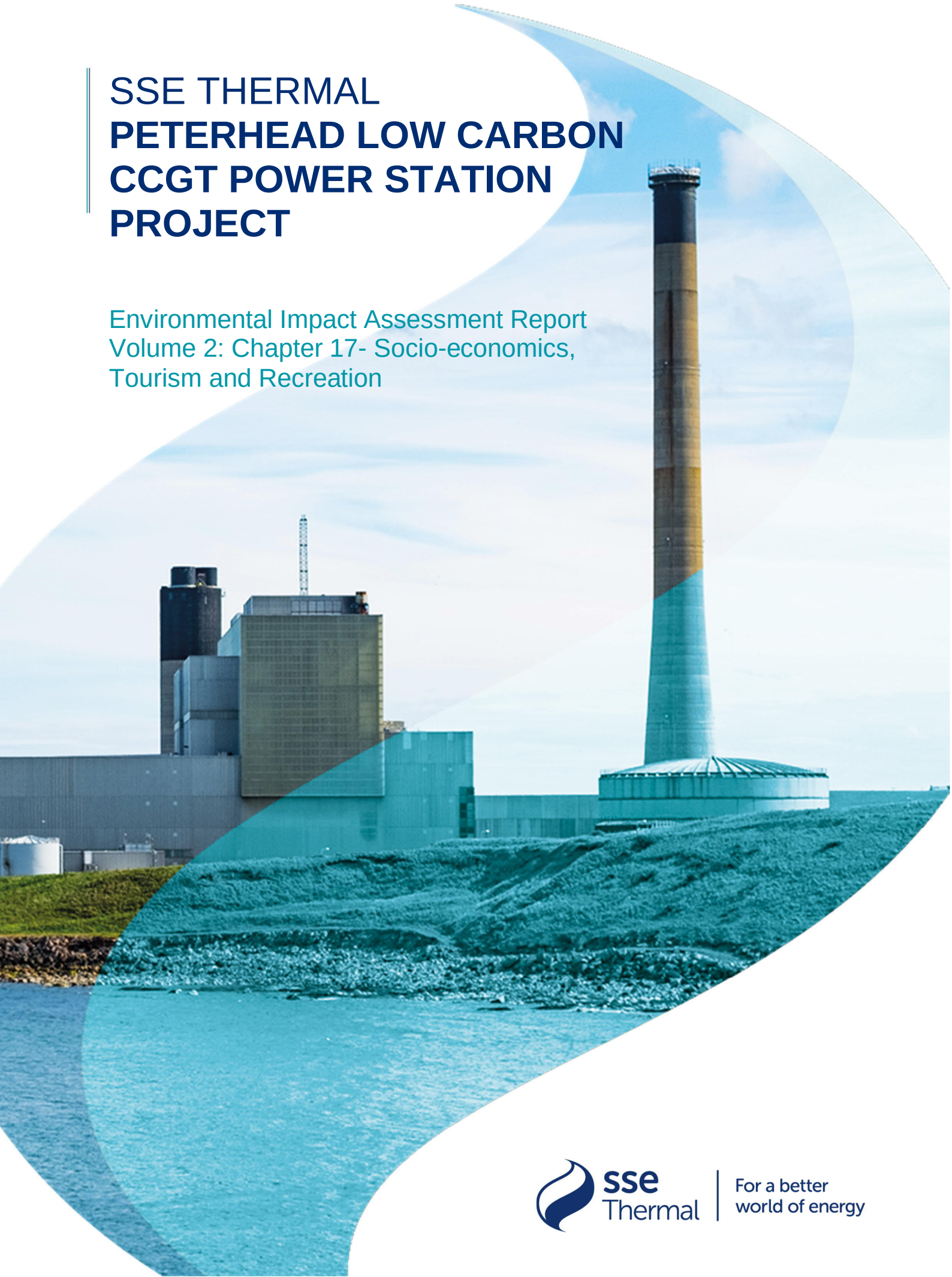
PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 17- Socio-economics, Tourism and Recreation



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17. Socio-economics, Recreation and Tourism

17.1. INTRODUCTION

17.1.1 INTRODUCTION

17.1.1.1. This chapter of the Environmental Impact Assessment Report (EIA Report) addresses the potential effects of the construction, operation and decommissioning of the Proposed Development on the local economy, recreation and tourism. The assessment considers:

- The present-day and future baseline socio-economic, recreation and tourism conditions during construction and at opening of the Proposed Development;
- The potential effects of the Proposed Development (including from workers accommodation) on employment, recreation and tourism during the construction phase;
- The potential effects of the Proposed Development on employment, recreation and tourism during the operational phase; and
- The potential effects of the decommissioning of the Proposed Development.

17.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

17.2.1 INTRODUCTION

17.2.1.1. A summary of the legislation and planning policy of most relevance to socio-economics, recreation and tourism is provided in this section.

17.2.1.2. As the Proposed Development will comprise an electricity generating plant with a gross electrical output in excess of 50MW, consent to construct and operate will be required from the Scottish Ministers under Section 36 of the Electricity Act 1989 (the Act). The Section 36 application will be prepared in accordance with the requirement of the Act and submitted to the Energy Consents Unit (ECU) of the Scottish Government. The Scottish Ministers will also be requested to give a direction for planning permission to be deemed granted under Section 57(2) of the Town and Country Planning (Scotland) Act 1997.

17.2.1.3. The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 apply to applications under section 36 of the Act. The Proposed Development is a Schedule 1 development under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

17.2.2 NATIONAL PLANNING POLICY

National Planning Framework 3 (2014)

17.2.2.1. The National Planning Framework (NPF3) (Local Government and Communities Directorate, 2014) sets out the planning framework to guide development and infrastructure investment in Scotland to deliver economic and sustainable growth. NPF3 requires local authorities to set out a clear economic vision and strategy for their area which encourages sustainable economic growth. It states that planning policies should help create the conditions in which businesses can invest, expand and adapt.

National Planning Framework 4 (2021)

17.2.2.2. The latest version of the National Planning Framework, NPF4, intends to combine the SPP and the NPF3 into a single document. A draft of NPF4 was laid before the Scottish Parliament in autumn 2021, with the view of producing a final version for adoption in spring 2022.

17.2.2.3. Part 1 of draft NPF4 states that the spatial strategy is a shared vision that will guide future development in a way that reflects several overarching spatial principles, including achieving:

- Compact growth;
- Local living;
- Balanced development;
- Conserving and recycling assets;
- Urban and rural synergy; and
- Just transition.

17.2.2.4. Page 55 confirms the need for such development to meet the targets for emissions reduction and states that it will also support a just transition by creating new jobs in emerging technologies and significant economic opportunities for lower carbon industry. It will also help to decarbonise other sectors, sites and regions, paving the way for increasing demand to be completed by the production of further hydrogen in the future. It also sets out the classes of development that are covered by the designation.

Scottish Planning Policy (2014)

17.2.2.5. The Scottish Planning Policy is considered in detail in **Chapter 7: Legislative Context and Planning Policy** (EIA Report Volume 2).

17.2.2.6. From a Socio-economics perspective, Scottish Planning Policy highlights that sustainable economic growth is the key to unlocking Scotland's potential and including creating a supportive business environment, achieving a low carbon economy, tackling health and social problems, maintaining a high-quality environment and passing on a sustainable legacy for future generations. Planning decisions respond to economic issues, challenges and opportunities, such as for energy infrastructure projects, to help transition to a low carbon economy.

17.2.2.7. Proposals for energy infrastructure development should also take into account net economic impact, including local and community socio-economic benefits such as employment, and consider impact on tourism and recreation.

17.2.3 REGIONAL AND LOCAL PLANNING POLICY

Regional Economic Growth Plan (2015)

17.2.3.1. Aberdeenshire Council launched the Regional Economic Growth Plan in 2015, setting out plans to create new jobs and growing the regional economy in the period to 2035. It outlines the area being the 'Energy Capital of Europe'. The Plan states that *"The North East of Scotland has tremendous capacity for renewable energy generation but is constrained by energy storage issues and grid capacity"*, which is something that the Proposed Development can contribute to.

17.2.3.2. Tourism is a key sector of the local economy and the North East is home to around one in ten of Scottish tourism jobs. The Strategy notes that the Aberdeen City and Shire Tourism Partnership Strategy aims to increase visitor spend to present a market to build on historic, arts and cultural venues, outdoor activities, and sports. The Strategy notes that "significant opportunities exist to grow the sector including converting business visitors to leisure visitors,

extending overnight stays and capitalising on the direct flights to the rest of the UK and Europe". In addition, under the 'Inclusive Economic Growth' intervention of the Strategy, the objective of significantly enhancing leisure and recreation facilities is discussed, which would aim to ensure a vibrant rural economy.

17.2.3.3. The Strategy also refers to various socio-economic policy to support the growth of the region. It states that whilst high wages in the energy sectors have attracted people to the region, there has been recruitment challenges in other sectors and lack of affordable housing and income inequality have led to people living away from key employment centres. To solve this, the Strategy sets out aims to "develop the people and skills necessary to deliver the economic development of the region and as a result to support diversification of businesses and economy; and to invest in our workforce, particularly our young people, develop our future workforce and ensure all of our people benefit from economic activity".

Aberdeen City and Shire Strategic Development Plan (2020)

17.2.3.4. The Aberdeen City and Shire Strategic Development Plan (SDP) was prepared by the Aberdeen City and Shire Strategic Development Planning Authority and approved by Scottish Ministers on 12 August 2020. It sets out the strategic framework for investment in jobs, homes and infrastructure. It covers the local authority areas of Aberdeen City and Aberdeenshire, except that part of Aberdeenshire that is within the Cairngorms National Park.

17.2.3.5. The Aberdeen City and Shire Strategic Development Plan is considered in further detail in **Chapter 7: Legislative Context and Planning Policy** (EIA Report Volume 2), with specific reference to the Aberdeen to Peterhead Strategic Growth Area, sustainable economic growth for the City Region, and commitments to carbon capture and storage (including specific reference to opportunities provided by the Acorn Project.

17.2.3.6. The Strategic Growth Area of Aberdeen to Peterhead is discussed as an area with significant potential for development. The focus for this Strategic Growth Area is on developing and diversifying the economy with a strong focus on the quality of development and placemaking. This includes realising its economic potential by "embracing opportunities for tourism". This growth area, and others highlighted in the Plan, aim to provide areas of "high environmental quality, specialist employment areas, as well as significant opportunities for tourism and outdoor recreation".

17.2.3.7. Sustainable economic growth is also key to the Plan and it aims to provide opportunities to the area which encourage this and create new employment in a range of areas and industries. The Strategy states that the northern end of the Aberdeen to Peterhead Strategic Growth Area can play an important role in the economic future of the City Region by offering renewable energy opportunities such as at Peterhead Port and providing opportunities for local businesses to work together and improve the economic viability of Peterhead Town Centre.

Aberdeenshire Local Development Plan (2017)

17.2.3.8. The Aberdeenshire Local Development Plan (LDP) was adopted by Aberdeenshire Council on 17 April 2017 and sets out the detailed planning policies that will be used for assessing planning applications as well as identifying development opportunities across Aberdeenshire.

17.2.3.9. The Aberdeenshire LDP is considered in further detail in **Chapter 7: Legislative Context and Planning Policy** (EIA Report Volume 2) with specific reference to the Aberdeen to Peterhead Strategic Growth Area, the location of the Proposed Development Site in the Regeneration Priority Area and the Energetica corridor, and the protection of existing and potential public access routes (including core paths).

17.2.4 OTHER GUIDANCE

17.2.4.1. Whilst there is no dedicated UK legislation that details the content required for a socio-economic assessment as part of an Environmental Impact Assessment (EIA), the socio-economic assessment presented in this chapter is based upon a range of relevant guidance. This includes:

- Research to Improve the Assessment of Additionality (Department for Business, Innovation and Skills, 2009);
- Green Book: Central Government Guidance on Appraisal and Evaluation (HM Treasury, 2020);
- Magenta Book: Central Government guidance on evaluation (HM Treasury, 2020); and
- Additionality Guide (Fourth Edition) (Homes and Communities Agency, 2014).

17.3. ASSESSMENT METHODOLOGY

17.3.1 CONSULTATION

17.3.1.1. The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal Scoping Opinion and in response to the formal consultation and other pre-application engagement is summarised in Table 17.1. No other relevant feedback was received through engagement of public consultation.

Table 17-1: Scoping Opinion

Consultee or Organisation	Date and nature of consultation	Summary of Response	How comments have been addressed in this Chapter
Scottish Government – Energy Consents Unit	July 2021 (Scoping Opinion)	Infrastructure Services (Environment – Natural Heritage) acknowledges the identification of the core paths and coastal path adjacent to the proposed development site within the Scoping Report. It is clarified however, the coastal path to the east of the site is not closed due to weather damage. While there are issues affecting the safety of the coastal path elsewhere, this particular stretch between Boddam and Peterhead is not affected and remains open. While the coastal path is not being promoted, access is unrestricted to the majority of the route. The coastal route should also be noted as a Right of Way between Boddam and Peterhead.	This has been included in the chapter.
Scottish Government – Energy Consents Unit	July 2021 (Scoping Opinion)	It is understood no embedded mitigation is highlighted at this stage. It is recommended that the development design considers the impacts upon recreational routes, particularly on the coastal area, and avoid extended disruption during the construction phase where possible.	This has been included in the chapter.

17.3.2 STUDY AREA

17.3.2.1. The Direct Impact Areas comprises the Longside and Rattray (03) area output area (the smallest geography used in the 2011 Census) in Aberdeenshire that the Proposed Development Site falls into. The Wider Impact Area comprises the Local Authority area the Proposed Development Site is located in (Aberdeenshire County Council area).

17.3.2.2. The study area used for the tourism and recreation assessment is 5km from the Site.

17.3.3 IMPACT ASSESSMENT METHODOLOGY

Assessment Methods

17.3.3.1. There are no recognised standards or methodologies for assessing the socio-economic, recreation and tourism effects of energy projects. Where relevant standards do not exist, professional experience and expert judgement have been applied.

17.3.3.2. The Proposed Development has the potential to result in both adverse and beneficial impacts on a wide range of recreational infrastructure, tourism assets and economic activities. The assessment determines the:

- Sensitivity of receptors;
- Magnitude of impacts; and
- The consequent significance of effects.

Assessment of Value (Sensitivity)

17.3.3.3. The sensitivity of socio-economic, recreation and tourism receptors are assessed as high, medium, low, or very low.

17.3.3.4. The socio-economic receptors include those who will potentially benefit from employment generation, either directly, indirectly or induced (through secondary impacts, for example due to construction workers spending money at local businesses). The sensitivity of these receptors is considered to be high due to the likely lack of availability of labour and skills in the local area required for the Proposed Development based on the criteria and definitions presented in Table 17.2.

Table 17-2: Criteria for assessing socio-economic, recreation and tourism receptor sensitivity

Level of Sensitivity	Description
High	There are limited/no comparable and accessible alternatives that exist within the relevant catchment area; and/or receptors have limited ability to absorb the change; and/or receptors are generally travelling from greater distances (nationally) to use the facility; and/or there are higher numbers utilising the facility; and/or identified as a high priority in published policy and strategy.
Medium	There are limited comparable and accessible alternatives within the relevant catchment area; and/or receptors have limited ability to absorb the change; and/or receptors are generally travelling from relatively far distances (regionally) to use the facility; and/or there are moderate numbers utilising the facility; and/or identified at a sub-regional and/or local level as policy/strategy priorities.
Low	Receptors are able to relatively easily absorb the change; and/or there are some comparable and accessible alternatives that exist within the relevant catchment area; and/or receptors are mainly travelling from nearby (local/within the study area) to use the facility; and/or there are low numbers utilising the facility; and/or referenced in policy and strategy but do not accord a high priority.

Level of Sensitivity	Description
Very Low	Receptors are able to relatively easily absorb the change; and/or there are many comparable and accessible alternatives that exist within the relevant catchment area; and/or receptors are travelling from nearby (local/within the study area) to use the facility; and/or there are low numbers utilising the facility.

Magnitude of Impacts

17.3.3.5. The magnitude of the impacts of the Proposed Development is assessed as being high, medium, low, or very low as shown in Table 17.3. This is determined by:

- Extent of change – the absolute number of people affected and the size of area in which effects will be experienced (i.e. the level of change to baseline conditions including the proportion of the existing workforce).
- Scale of the impact – more weight is given to permanent changes than to short-term, temporary ones, where temporary and short-term impacts are considered to be those associated with the construction works (up to four years), and medium to long-term impacts are those associated with the operation of the Proposed Development (estimated at 25 years).

Table 17-3: Criteria for Assessing Impact Magnitude

Magnitude	Description
High	A major adverse/ beneficial impact on employment creation and/ or constitutes a long-term change to baseline conditions (i.e. it would be likely to continue and effectively be permanent and irreversible). Loss or major alteration of iconic tourist asset of national significance, resulting in increase / reduction in national tourism numbers
Medium	A moderate adverse/ beneficial impact on employment creation and/ or constitutes a medium-term change to baseline conditions. Substantial change to regional tourism numbers. Region considered less / more attractive place to visit.
Low	A minor adverse/ beneficial impact on employment creation constitutes a short-term change to baseline conditions. A small and temporary change to regional tourism numbers.
Very Low	A slight or no adverse/ beneficial impact on employment creation or tourism and/ or constitutes a very short-term/ temporary change to baseline conditions.

Classification of Effects

17.3.3.6. The scale, permanence and significance of identified effects has been assessed relative to the baseline scenario. The assessment covers relevant direct, indirect, and induced impacts of the construction, operation and decommissioning of the Proposed Development.

17.3.3.7. The effects of the Proposed Development are defined as either:

- Beneficial – an advantageous or beneficial effect on an impact area or receptor;

- Negligible – an imperceptible effect on an impact area or receptor; or
- Adverse – a disadvantageous or negative effect on an impact area or receptor.

Table 17-4: Classification of Effects on Socio-Economics, tourism and recreation

Magnitude of Impact	Sensitivity of receptor			
	High	**Medium**	**Low**	**Very Low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

17.3.3.8. Where an effect is assessed as being beneficial or adverse, the effect has been classified as minor, moderate, major, or negligible. The assessment of significance is informed by the sensitivity of the receptor and the magnitude of impact as set out in Table 17.4. For the purposes of this assessment, 'significant' effects are those identified as being moderate or major (adverse or beneficial). Effects identified as being negligible or minor are 'not significant.'

17.3.4 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

17.3.4.1. The socio-economic assessment is based on the available data at the time of writing and has been based on a desk-based study. The need for site surveys were considered for the EIA Report, but were not considered to be required.

17.4. BASELINE CONDITIONS

17.4.1 INTRODUCTION

17.4.1.1. This section outlines the socio-economic context of the area and makes comparisons to the whole of Scotland. Key indicators include population and labour force; skills and unemployment; industry and the economy.

17.4.1.2. This section outlines the socio-economic baseline conditions in the Direct Impact Area, Wider Impact Area and Scotland. The Direct Impact Areas comprises the Longside and Rattray (03) output area (the smallest geography used in the 2011 Census) in Aberdeenshire that the Proposed Development Site falls into. The Wider Impact Area comprises the Local Authority area the Proposed Development Site is in (Aberdeenshire County Council area).

17.4.1.3. The local population and labour market in the Wider Impact Area are the main receptors in the assessment for employment effects. The baseline conditions help to determine the impact of employment generated by the Proposed Development, and the impact of the Proposed

Development on tourism, amenity, and other local businesses. The impact is mostly influenced by the size of the labour market and whether it has the relevant skills, occupations, and sector strengths to access employment opportunities.

17.4.1.4. The following Office for National Statistics (ONS) datasets have been reviewed to inform the assessment:

- Business Register and Employment Survey (BRES) (2020);
- Annual Population Survey (2020);
- Jobseeker's Allowance by Occupation (2021);
- Census of Population (2011); and
- Population Projections (2020).

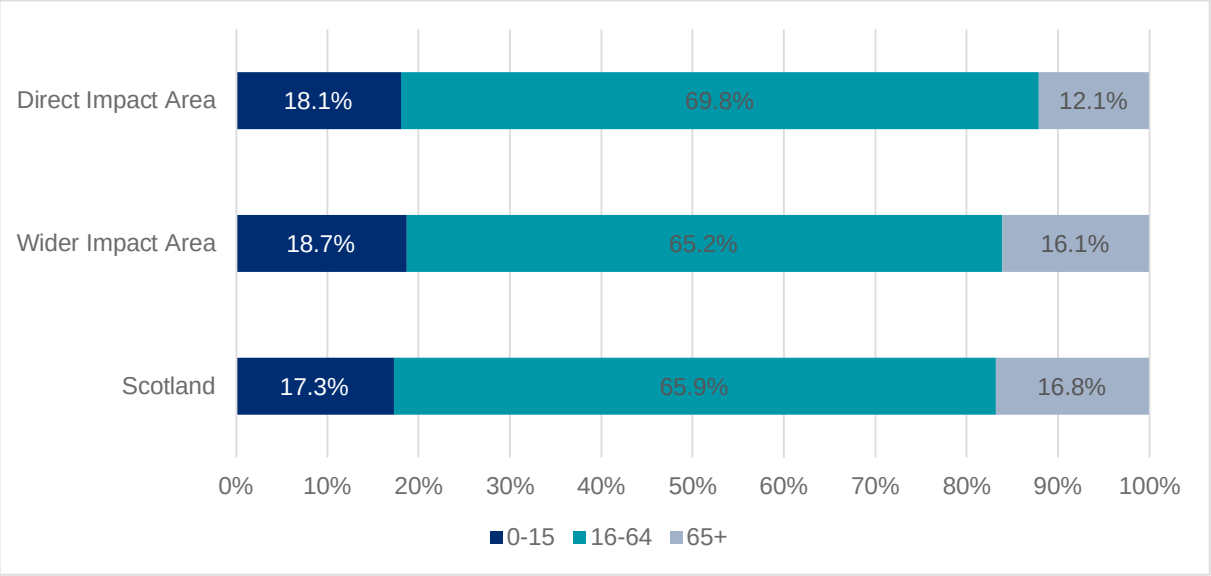
17.4.1.5. For tourism and recreation elements:

- Transport Scotland annual data;
- Visit Scotland Research; and
- Consultation with Aberdeenshire Council.

17.4.2 DEMOGRAPHIC PROFILE

17.4.2.1. The Census 2011 data shows that the Direct Impact Area (Longside and Rattray (03)) had an estimated population of 199, while the Wider Impact Area (Aberdeenshire) had a population of 187,492. Plate 16.1 shows that the Direct Impact Area had a slightly smaller proportion of young people (18.1% aged 0 to 15) than the Wider Impact Area (18.7%), but greater than Scotland (17.3%). The Direct Impact Area had a higher proportion of working age population (69.8% aged 16 to 64) compared to the Wider Impact Area (65.2%) and Scotland (65.9%). The Direct Impact Area had a lower proportion of older residents 12.1% of residents than the Wider Impact Area (16.1%) and Scotland (16.8%).

Plate 17-1: Age Breakdown of Population



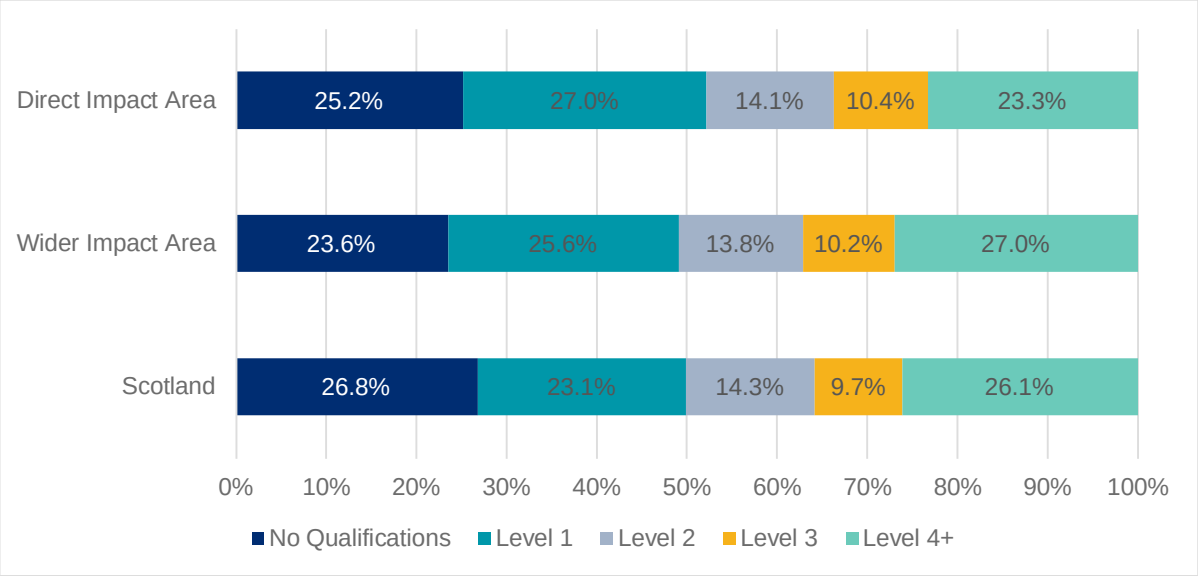
Source: Scottish Census 2011

17.4.3 QUALIFICATIONS

17.4.3.1. Qualifications levels differ noticeably between each of the geographies (see Plate 16.2). In the Direct Impact Area, 27.0% of residents were qualified to Level 1 (the lowest level of qualification), this is higher than both the Wider Impact Area (25.6%) and Scotland (23.1%).

17.4.3.2. Just over a quarter (25.2%) of residents in the Direct Impact Area had no qualifications. This is higher than the Wider Impact Area (23.6%) but lower than Scotland (26.8%). Similarly, there is a slightly higher level of those residents qualified to Level 2 in the Direct Impact Area (14.1%) compared to the Wider Impact Area (13.8%) and Scotland (14.3%). The proportion with Level 4 qualifications and above is 23.3% in the Direct Impact Area, rising to 27.0% in the Wider Impact Area, compared to 26.1% in Scotland.

Plate 17-2: Qualifications



Source: Scottish Census, 2011

17.4.4 ECONOMIC ACTIVITY

17.4.4.1. There are 78.4% of residents in the Direct Impact Area who are economically active. This is less than the Wider Impact Area (74.9%) but greater than Scotland (69.0%). The unemployment rate at the time of the 2011 Census was 3.3% in the Direct Impact Area, greater than the Wider Impact Area (2.5%) but less than Scotland (4.8%). The Direct Impact Area has a low rate of economic inactivity amongst its residents, with only 21.6%, compared to 25.1% in the Wider Impact Area and 31.0% in Scotland.

Table 17-5: Economic Activity

	Direct Impact Area	Wider Impact Area	Scotland
Economically active	78.4%	74.9%	69.0%
Employees - part-time	17.0%	15.2%	13.3%
Employees - full-time	43.1%	44.1%	39.6%
Self-employed	13.1%	10.2%	7.5%
Unemployed	3.3%	2.5%	4.8%
Full-time Student	2.0%	2.9%	3.7%
Economically inactive	21.6%	25.1%	31.0%

Source: Scottish Census 2011

17.4.5 OCCUPATION

17.4.5.1. The most common occupation level in the Direct Impact Area is 'skill trades occupations' (20.9%). This is also the highest level in Aberdeenshire (17.3%) but lower in Scotland as a whole (12.5%). The next largest in the Direct Impact Area is 'process, plant and machine operatives' with 14.8% of the workforce – higher than the wider impact area (8.7%) and Scotland (7.7%).

Table 17-6: Occupation

Occupation	Direct Impact Area	Wider Impact Area	Scotland
Managers, directors and senior officials	6.1%	9.0%	8.4%
Professional occupations	12.2%	16.2%	16.8%
Associate professional and technical occupations	10.4%	12.5%	12.6%
Administrative and secretarial occupations	13.9%	10.7%	11.4%
Skilled trades occupations	20.9%	17.3%	12.5%
Caring, leisure and other service occupations	9.6%	8.5%	9.7%
Sales and customer service occupations	5.2%	6.7%	9.3%

Occupation	Direct Impact Area	Wider Impact Area	Scotland
Process, plant and machine operatives	14.8%	8.7%	7.7%
Elementary occupations	7.0%	10.3%	11.6%

Source: Scottish Census 2011

17.4.6 EMPLOYMENT BY SECTOR

17.4.6.1. Most employment in the Direct Impact area is in the 'Professional, scientific and technical activities' sector, with 13.9%. This is much larger than the same industry in Aberdeenshire (8.3%) and Scotland (5.2%). The second largest industry by employment is 'Wholesale and retail trade', which accounts for 13.0% of employment in the Direct Impact Area, slightly lower than Aberdeenshire (14.4%) and Scotland (15.0%) – in both these geographies this sector accounts for the most jobs. The next largest sector is Human health and social work activities with 11.3%, comparable to Aberdeenshire (11.8%), but lower than Scotland (15.0%).

Table 17-7: Employment by Sector

Sector	Direct Impact Area	Wider Impact Area	Scotland
Agriculture, forestry and fishing	7.0%	4.4%	1.7%
Mining and quarrying	7.0%	7.4%	1.4%
Manufacturing	9.6%	10.2%	8.0%
Electricity, gas, steam and air conditioning supply	1.7%	0.5%	0.8%
Water supply; sewage, waste management and remediation activities	2.6%	0.6%	0.8%
Construction	4.3%	8.8%	8.0%
Wholesale and retail trade; repair of motor vehicles and motorcycles	13.0%	14.4%	15.0%
Transport and storage	6.1%	5.1%	5.0%
Accommodation and food service activities	7.0%	4.8%	6.3%
Information and communication	0.9%	1.6%	2.7%
Financial and insurance activities	0.0%	1.3%	4.5%
Real estate activities	0.9%	1.0%	1.2%

Sector	Direct Impact Area	Wider Impact Area	Scotland
Professional scientific and technical activities	13.9%	8.3%	5.2%
Administrative and support service activities	1.7%	3.7%	4.3%
Public administration and defence; compulsory social security	3.5%	4.3%	7.0%
Education	7.0%	8.1%	8.4%
Human health and social work activities	11.3%	11.8%	15.0%
Other	2.6%	3.8%	4.9%

Source: Scottish Census 2011

17.4.7 RECREATION AND TOURISM

17.4.7.1. The Proposed Development Site is located within the Grampian Region of Scotland. In 2019, this region attracted 8% of all overnight visits and 11% of all-day trips in Scotland, representing 5% and 9% of tourism expenditure respectively (Visit Scotland, 2019).

17.4.7.2. The town of Peterhead and the village of Boddam are located north and south of the Proposed Development respectively. Due to their location along the coast, they provide a variety of visitor attractions and amenities. Key local visitor attractions and community facilities in the vicinity of the Proposed Development are set out within Table 17.8 below.

Table 17-8: Visitor Attractions and Amenities

Receptor	Location	Approximate Distance to the Proposed Development Site
Hotels within Boddam	Boddam	170m south-east
Misty Sea Angling / Boat Trips	Boddam	340m south-east
Loopty Lou's Soft Play centre	Boddam	350m south
Buchanness Lighthouse Holidays	Boddam	700m south-east
Boddam Castle	Boddam	800m south
Peterhead Prison Museum	Peterhead	1.1km north
Reform Tower	Peterhead	1.2km north
Peterhead Sailing Club	Peterhead	1.5km north

Receptor	Location	Approximate Distance to the Proposed Development Site
Peterhead Bay Marina Holiday Park	Peterhead	1.8km north
Old St Peter's Church	Peterhead	2.6km north
Longhaven Cliffs Nature Reserve	Longhaven	2.7km south-west
Keith Inch Castle	Peterhead	2.7km north-east
Hotels and guest house accommodation within Peterhead	Peterhead	2.7km – 4.7km north and north-east
The Peterhead Trail	Peterhead	2.8km north-east
Abruthnot Museum	Peterhead	3km north-east
Balmoor Stadium	Peterhead	3.3km north
Buchanhaven Heritage Centre	Peterhead	3.6km north
Peterhead Golf Club	Peterhead	4km north
Bullers of Buchan Geological Features	Located along coast line north of Cruden Bay	4.6km south-west
Cairn Catto	Near Longside	5km west
Inverugie Castle	Inverugie	5.2km north-west

Note: The above receptors have been identified from a review of available online mapping only. Other similar receptors, e.g. holiday lodges, may be present within the general area and would be assumed to be impacted on a similar scale as to the nearest identified similar receptor. All distances are approximate, as the crow flies and from the nearest point of the Proposed Development Site boundary.

17.4.8 RECREATIONAL PATHS

17.4.8.1. Several core paths have been identified in the area surrounding the Proposed Development Site, these are listed in Table 17.9 below and shown in **Figure 17.1** (EIA Report Volume 3). There are no National Cycle Routes within the vicinity of the Proposed Development Site.

Table 17-9: Recreational Paths

Path Code / Right of Way (RoW) Code	Description	Approximate Distance from the Proposed Development Site
Aberdeenshire Coastal Path (ECPP-7LD-01-24)	Path running the length of Aberdeenshire. The relevant stretch is between Peterhead and Boddam.	Within the Proposed Development Site

Path Code / Right of Way (RoW) Code	Description	Approximate Distance from the Proposed Development Site
ECPP – 202-30	450m path located along the track leading to Sandford Lodge	Within the Proposed Development Site
ECPP -215-04	3.11km path located along the A90	Within the Proposed development Site
ECPP – 215-02	4.8km path located along A90 north-east of the Proposed Development Site	670km north-west
ECPP – 202-01	2.6km path located in Stirling Village	1km south
ECPP – 202-02	580m path located in Stirling Village	1.2km south
ECPP- 215-03	590m path located in Peterhead along Damhead Way	1.4km north

17.5. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

17.5.1 OVERVIEW

17.5.1.1. The scheme design has been drawn to minimise the impacts on receptors where possible. This includes avoiding the closure of Core Paths in the first instance wherever possible, followed by Core Path diversions.

17.5.1.2. The Applicant has committed to maximising the use of local companies to support the development of the Project, as far as reasonably practicable. As the Proposed Development is further developed, the Applicant will engage with the local supply chain through activities such as 'Meet the Buyer' events.

17.6. LIKELY IMPACTS AND EFFECTS

17.6.1 CONSTRUCTION

Employment

17.6.1.1. The Proposed Development will create employment during the construction phase, expected to last approximately 4 years and expected to commence in Q4 2023 at the earliest. Based on previous experience, it is anticipated there would be beneficial effects for employment through the creation of temporary jobs during this period.

17.6.1.2. As set out in Section 17.5 above, the Applicant has committed to maximising the use of local companies to support the development of the Project, as far as reasonably practicable. As the Proposed Development is further developed, the Applicant will engage with the local supply chain through activities such as 'Meet the Buyer' events.

17.6.1.3. The average gross number of construction workers over the preliminary and indicative 42-month construction period have been calculated at 776. There is expected to be a peak of 1,300 in months 23 and 24 of construction, and the average number of construction workers is 776 workers per month. This is based on the Construction Worker Profile for comparable developments.

17.6.1.4. Additionality values are used to calculate the net benefits of the employment created from the gross benefits mentioned above. These are the leakage, displacement and multipliers as considered below.

17.6.1.5. **Leakage** – Leakage effects refer to the proportion of jobs within an Impact Area that are filled by residents living outside the Impact Area (i.e. outside the Wider Impact Area). It is anticipated that there will be a high level of employment leakage with a large proportion of jobs (and benefits) going to residents outside of the local area, due to the size of the workforce and the specialist skills required and the number of potential workers available in the area. Based on additionality guidance, a 'ready reckoner' used to estimate the level is 75% when 'high' leakage is anticipated.

17.6.1.6. A high leakage figure has therefore been considered appropriate to account for the construction phase. HM Treasury Additionality Guidance suggests a high rate of leakage of 75%, which would represent a likely worst case scenario, where a small number of local workers were to be employed in the construction phase. Therefore a 75% discount is applied to the estimated 776 gross jobs created per year and as such it is conservatively estimated that 582 people from outside the Wider Impact Area and 194 from within will benefit from working at the Proposed Development each year during the construction period.

17.6.1.7. **Displacement** – Displacement measures the extent to which the benefits of a project are offset by reductions of output or employment elsewhere. Any additional demand for labour cannot simply be treated as a net benefit, it removes workers from other posts, such as other construction projects, and the net benefit is reduced to the extent that this occurs.

17.6.1.8. Overall, it is assumed that due to the flexibility of a typical construction workforce (i.e. it is possible for workers to move from project to project) displacement effects are considered to be low. As considered in the Cumulative Effects section of this chapter (see Section 17.8), there is a chance that other schemes may come forward and overlap with the Proposed Development, though this would be anticipated to have limited impact on the availability of construction workers. The Homes and Communities Agency (HCA) Additionality Guide (Homes and Communities Agency, 2014) suggests using 25% as a 'ready reckoner' for low levels of displacement, for example when there are expected to be some displacement effects, although only to a limited extent. Applying this low level of displacement to total gross direct employment results in 195 jobs displaced. This results in net direct employment of 581 jobs per year.

17.6.1.9. **Multiplier** – In addition to the direct construction employment generated by the Proposed Development itself there will be an increase in local employment arising from indirect and induced effects of the construction activity. Employment growth is anticipated to arise locally through manufacturing services and suppliers to the construction process (indirect or supply linkage multipliers). Additionally, part of the income of the construction workers and suppliers will be spent in the Wider Impact Area, generating further employment (induced or income multipliers).

17.6.1.10. A multiplier of 1.86[1] is used for construction to estimate the multiplier effect of the construction impact. This indicates that for every job directly created at the site, there will be an additional 0.86 jobs created indirectly as a result of the scheme. This could include supply chain benefits or other wider impacts beyond the direct employment at the site.

17.6.1.11. Applying this multiplier of 1.86 generates an additional 247 indirect and induced jobs in the Wider Impact Area arising from the Proposed Development during the construction period. As well as the jobs taken by residents outside of the Wider Impact Area, there will be a total net indirect employment of 494 construction workers.

Net Construction Employment

17.6.1.12. Based on the gross number of construction workers required for the Proposed Development and the additionality factors outlined above, 1,081 net construction jobs would be generated, of which 270 are expected to be from the Wider Impact Area.

Table 17-10: Net Construction Employment in the Wider Impact Area (average no. of workers onsite per year of construction)

	Wider Impact Area	Outside of Wider Impact Area	Total
Gross Direct Employment	194	582	776
Displacement	49	146	195
Net Direct Employment	145	436	581
Net Indirect/Induced Employment	125	375	500
Total Net Employment	270	811	1,081

Source: AECOM calculation (2021)

17.6.1.13. Table 17-1017.11 presents the short-term employment created by the Proposed Development taking leakage, displacement and multiplier effects into account.

17.6.1.14. The sensitivity of impact is expected to be medium. The magnitude of impacts is considered to be high, being able to respond to creation of new job opportunities. Based on BRES data for 2020 (ONS, 2020), Aberdeenshire has 7,000 employees in the Construction sector. Even with the estimated 'very high' inflow of construction workers expected for the Proposed Development, there is the potential to utilise some of the local construction employees in the project.

17.6.1.15. For example, the gross direct employment required during the construction phase of the Proposed Development would account for around 10% of the existing construction workforce in the area. Though with an anticipated 'very high' inflow to the area, the local job market should be able to provide the estimated level of roles for local residents (estimated at 25%). As considered in the Cumulative Effects section of this chapter (see Section 17.8), there is a chance that other schemes may come forward and overlap with the Proposed Development, though this would be anticipated to have limited impact on the availability of construction

[1] Input-Output Tables 1998-2018 - Leontief Type 2 Table, Scottish Government. Type II employment multiplier for the construction industry (2021). Standard practice for multiplier for construction industry

workers. Therefore, the direct, indirect and induced employment created by the construction phase of the Proposed Development is likely to have a **major beneficial short-term** (significant) effect on the Wider Impact Area's economy.

Core Paths

17.6.1.16. Construction activities may also have a temporary adverse impact on certain local receptors such as walkers and users of recreational routes.

17.6.1.17. There are three core paths that are in proximity to the Proposed Development Site. There is a core path (ECPP-215.04) that follows the A90 road, to the west of the current power station site. This interacts with the Proposed Development where the boundary extends across the A90 to include the existing electricity sub-station and also at the Sandford Lodge access track junction with the A90 (shown in **Figure 17.1** EIA Report Volume 3). However, the road and neighbouring core path is anticipated to remain open for the construction period, therefore this core path is not expected to be impacted by the Proposed Development.

17.6.1.18. Another core path is the Aberdeenshire Coastal Path (ECPP-7LD-01-24) which follows the coastline to the north-east of the development. The core path does enter the Proposed Development Site Boundary at the western and north-edge of the boundary. The core path is expected to remain accessible for the construction period, but there is the need for short-term disruption at the power station cooling water outfall to facilitate works to the outfall structure. The proposed diversion route is shown on **Figure 4.5** (EIA Report Volume 3). It is anticipated that a temporary diversion would be required at this location for the duration of the works to the outfall to ensure pedestrian safety and allow for the continued use of the core path.

17.6.1.19. The final section of core path that is within the Proposed Development Site is the stretch between the A90 and the Scottish Coastal Way (ECPP-202-30), which passes by Sandford Lodge Cottage. During the construction of the Proposed Development, the core path will be temporarily diverted to the north of its current route to the northern boundary of the Proposed Development Site, maintaining a route between the A90 and Aberdeenshire Coastal Way shown in **Figure 4.4** (EIA Report Volume 3). This is expected to increase the journey length of users of the core path by approximately 150m.

17.6.1.20. Sensitivity of core path users is considered to be medium. Impact magnitude is expected to be low (negative) due to the limited disruption users would experience due to provision of suitable diversions. Overall, the effect on core path users is therefore assessed as **Negligible** (not significant).

Worker accommodation

17.6.1.21. There is anticipated to be a number of construction workers temporarily relocating from outside the area to work on the Proposed Development. They will require places to reside during the construction phase. This could either be satisfied through dedicated temporary worker accommodation or using available accommodation within a commutable distance to the Proposed Development Site (which is considered to be a 60-minute drive).

17.6.1.22. It is anticipated that the demand for worker accommodation could be met with hotel accommodation within a 60-minute drive of the Proposed Development Site. This is due to Aberdeen City having a large amount of hotel bedspaces and falling within a 60-minute drive of the Proposed Development. An assessment of hotel bed spaces within a 60-minute drive of the Proposed Development has been undertaken (**Appendix 17A** EIA Report Volume 4). From this it is estimated there are 8,772 available bedspaces within 60 minutes of the Proposed Development Site, the peak construction workforce would be approximately 1,300 people and from this 75% are anticipated to come from outside of the local area. This would take up 35.2%

of the rooms not typically used by tourists or other hotel users at peak construction during the summer months when hotel demand is at its peak. The review of available data suggests that the workforce requiring accommodation can be accommodated by existing providers and therefore dedicated workforce accommodation is not considered necessary. If there are any large construction schemes that are developed at the same time (as considered in Section 17.8 below), cumulative effects would need to be considered when their respective planning application is developed to understand if this could affect the availability of worker accommodation.

17.6.1.23. This uptake in construction workers spending on accommodation could lead to a boost to the local economy, with workers using otherwise vacant accommodation. It is anticipated this would lead to a **minor beneficial** effect (not significant).

Tourism and Recreation

17.6.1.24. Visitor attractions (identified in Table 17.8) are not predicted to be directly impacted as a result of construction activities. There are no visitor attractions or amenities located within the Proposed Development Site boundary. There is the potential for in-direct effects on these attractions and amenities through the construction period due to increased construction traffic, however these effects will be temporary. The impact on visitor attractions and amenities is anticipated to be **minor adverse** (not significant) during the construction period.

17.6.1.25. A reduction in tourist accommodation availability due to use by construction workers could result in an effect on visitor numbers at local tourist attractions and facilities. A review of local accommodation was performed, estimating the available capacity of bedspaces within the study area, and the demands of the workforce during the construction period (**Appendix 17A** EIA Report Volume 4). As described above in the worker accommodation section it is anticipated there is enough space within with hotel accommodation within a 60 minute drive of the Proposed Development Site to accommodate a peak construction workforce of 1,300 with 75% of construction workers anticipated to come from outside of the local area. It is anticipated that at the peak construction, the construction workforce coming from outside of the local area would occupy 35.2% of the unused bedspace hotel at that time during the summer months, when hotel demand is at its peak. Therefore, this indicates there is indeed capacity within the hotel accommodation within 60 minutes of the Proposed Development Site for the likely level of construction workers requiring bedspace. Due to this it is anticipated that the Proposed Development would have a **negligible** (not significant) effect on hotel bedspaces available to tourists during construction.

17.6.2 OPERATION

Employment

17.6.2.1. The Proposed Development will create long-term employment during the operational phase, for the operation and maintenance of the facility. The Proposed Development is expected to operate for at least 25 years. The level of significance would depend on the number of operation and maintenance jobs being created by the Proposed Development.

17.6.2.2. The following analysis estimates gross operational employment arising from the Proposed Development and takes into account leakage, displacement and multiplier effects (to assess indirect and induced employment) to assess net impacts in the wider impact area and beyond.

17.6.2.3. During the operational period of the Proposed Development (expected to be 25 years), employment would be generated in operative, management and maintenance roles. It is

estimated that there would be approximately 50 full-time equivalent (FTE) gross direct jobs per annum during the Operation and Maintenance phase.

17.6.2.4. Leakage has been assumed to be low with the majority of jobs anticipated to be filled by local residents. Therefore, a leakage figure of 10% has been used for the operational stage (the 'low' ready reckoner by the HCA for leakage of jobs to outside residents), displacement of 25% (the 'low' ready reckoner by the HCA) and a composite multiplier of 1.5 (consistent with previous CCGT projects), it is estimated that the total net employment for the Proposed Development is up to 57 employees. Of these, 51 are anticipated to be from the Wider Impact Area, and 6 outside the Wider Impact Area, as presented in Table 17-1117.11.

Table 17-11: Net employment of the Proposed Development in Operation

	Wider Impact Area	Outside the Wider Impact Area	Total
Gross direct employment	45	5	50
Displacement	11	1	12
Net direct employment	34	4	38
Net indirect/induced employment	17	2	19
Total net employment	51	6	57

Source: AECOM calculations based on development information and assumptions (2020)

17.6.2.5. The magnitude of impact is considered to be medium during the operational phase due to the beneficial impact of this job creation for the local area. The sensitivity is assessed as low, therefore, the direct, indirect and induced employment created by the operational phase of the Proposed Development is likely to have a **minor beneficial long-term** (not significant) impact.

Core Paths

17.6.2.6. The core paths impacted during the construction phase are anticipated to return to use during the operational phase. There is anticipated to be **no direct impact** for users of the core paths during the operational phase of the scheme.

Tourism and Recreation

17.6.2.7. No direct impacts are anticipated on tourism and recreation resources once the Proposed Development is operational.

Decommissioning

17.6.2.8. At the end of its operating life, the most likely scenario is that the Proposed Development would be shut down and all above ground structures removed from the Proposed Development Site. The Proposed Development Site would then be suitably remediated as required to facilitate re-use. The decommissioning phase will generate temporary employment which could be comparable to but less than the employment created during the construction phase. The workforce employed to decommission the Proposed Development would have a positive effect on the economy in the same way as those employed during construction and operation. It is envisaged that the Proposed Development would have an operational life of up to approximately 25 years, therefore decommissioning activities are currently anticipated to

commence after 2052 at the earliest. At this stage the significance of the employment effects is uncertain due to limited information available regarding decommissioning methods, timescales and associated staffing requirements.

17.7. MITIGATION, MONITORING AND ENHANCEMENT MEASURES

17.7.1 OVERVIEW

17.7.1.1. Temporary core path diversions will be required during construction to maintain safe access for pedestrians and will be agreed with the Local Planning Authority prior to the commencement of the Proposed Development.

17.7.1.2. No significant adverse effects are predicted during the construction, maintenance, operation and decommissioning of the Proposed Development, and as such no specific mitigation is required.

17.7.1.3. No other additional mitigation measures, over and above that stated in the other technical chapters of this EIA Report, are required to avoid or minimise the socio-economic effects identified in this chapter.

17.7.1.4. The Applicant is committed to maximising the use of local companies to support the Proposed Development as far as possible and will engage with the local supply chain through activities such as 'Meet the Buyer' type events. The Applicant will also identify measures to support education, skills and the local community.

17.7.1.5. The requirement for monitoring has not been identified as part of this assessment.

17.8. CUMULATIVE EFFECTS

17.8.1 INTRODUCTION

17.8.1.1. This section of the chapter assesses the potential effects of the Proposed Development in combination with the potential effects of other development schemes (referred to as 'cumulative developments') within the surrounding area, as listed within **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4). Of those developments listed, the following are considered to have potential for cumulative effects with regard to socio-economics, tourism and recreation, by potentially generating a need for employment roles in their construction:

- APP/2019/0982 - Application for Erection of Electricity Substation Comprising Platform Area, Control Building, Associated Plant and Infrastructure, Ancillary Facilities, Landscape Works and Road Alterations and Improvement Works to be undertaken north of the electricity substation at the eastern extent of the Proposed Development Site boundary. Construction started in February 2021 and will take up to 30 months (therefore completion would be expected by August 2023), and so there could be some temporal overlap during construction. It is expected that any construction overlap would be limited, with the Proposed Development expected to commence construction in Q4 2023. It is therefore unlikely to place significant pressure on labour supply in the construction sector.
- APP/2018/1831 - Application for Installation of Underground HVDC Cables, Landing At Shoreline At Land To The South Of Boddam, Peterhead, Travelling To Site At Four Fields, Boddam, Peterhead. Construction is planned to commence between 2021 and 2024, and last 30 months, and so there is likely to be temporal overlap during construction. It is

expected that any construction overlap would be limited, with the Proposed Development expected to commence construction in Q4 2023. It is therefore unlikely to place significant pressure on labour supply in the construction sector.

- ENQ/2021/1139 - Residential Mixed Use Development Comprising Circa 800 Residential Homes, a Local Neighbourhood Centre, Land reserved for Employment Purposes, a Primary School and a Possible Future Rail Halt, Associated Roads and Drainage Infrastructure, New Landscaping and Open Spaces and a Local Nature Reserve. A formal planning application for the scheme is yet to be submitted and no construction information is currently available. The scheme is a large-scale mixed-use masterplan development and is located 3.4 km away from the Proposed Development. With the construction period of the scheme being unknown it is uncertain whether this could have an impact on availability of construction employment, nor how intensive the construction timeline could be (i.e. if a large construction workforce is required over an intensive short period, or development could be phased over a much longer timeframe). Construction workforce for this mixed-use development is also expected to be mainly from within the local area (owing to less need for some specialist construction skills) compared to the Proposed Development, so there is likely to be sufficient construction workers available for both schemes.
- ENQ/2021/1036 & ENQ/2020/0931 - Acorn Project which involves the Construction and Operation of a Carbon Capture Compression and Conditioning Plant with Associated Infrastructure and CO_2 Export Pipeline and Connection. This scheme is located adjacent to the Site boundary and extends up to 10km away from the Proposed Development and is awaiting a decision on the initial Proposal of Application Notice (POAN). The construction timeline is unclear, but there is the potential for the Acorn Project to undergo construction at the same time as the Proposed Development. However, it was deemed by Aberdeenshire County Council that an EIA for the scheme was unlikely to be required (Aberdeenshire Council, 2020c), indicating the likely limited size of the scheme, and limited expected impact of the scheme. Additionally, construction workforce for this housing development is also expected to be mainly from within the local area (owing to less need for some specialist construction skills) compared to the Proposed Development, so there is likely to be sufficient construction workers available for both schemes.
- APP/2015/1121 - NorthConnect Converter Station at Four Fields, Boddam. This scheme is for a converter station at the UK end of a proposed electricity cable route with Norway and is located 2km from the Proposed Development. Construction has not commenced (despite an expected construction period of 2020 to 2023), due to the scheme not yet being approved by the Norwegian Government. The Norwegian Government announced in March 2020 that NorthConnect's license applications would not be processed at the present time (Energy Live News, 2020), and have since announced that no new power cables to other countries (like the proposed NorthConnect project) would be approved in the current parliament (which is due to run until September 2025). It is therefore considered unlikely that the scheme will commence construction during the Proposed Development's construction phase, and therefore would be no adverse cumulative impact.
- APP/2021/2681 - HVDC Electrical Converter Station near Four Winds Farm, Boddam. This scheme is adjacent to the Proposed Development, and is from a subsidiary of SSE, proposing a subsea connection between Peterhead Power Station and Drax Power Station in Yorkshire. This element is for the converter station at the Peterhead end of the connection and could commence construction in 2023. There is limited consideration of socio-economic impacts in the applicant's planning application submitted to Aberdeenshire Council, suggesting the employment generated is not large enough to result in a significant

increase in demand for construction employment, and therefore is unlikely to cause an adverse cumulative impact.

- APP/2021/2392 - Synchronous Condenser and Associated Infrastructure. This application from Arcus is located to the West of the Proposed Development and is awaiting a decision on planning approval. From the information available on the Aberdeenshire Council, the development is anticipated to be much smaller than the Proposed Development, and therefore rely on a smaller level of construction employment (and this level is not specified in their planning documents). It is therefore deemed unlikely to cause an adverse cumulative impact on the Proposed Development.

17.8.2 CUMULATIVE EFFECTS DURING CONSTRUCTION

17.8.2.1. There is likely to be overlap between construction of some of these mentioned schemes and construction of the Proposed Development. Based on the details considered above, it is unlikely that there will be significant pressure placed on the availability of the construction workforce required for the Proposed Development and other schemes mentioned above.

17.8.2.2. It is not anticipated that the other schemes considered above will have any additional impacts on the core paths, with the majority of the schemes located at least 3km from the Proposed Development. The identified scheme which is located in Boddam in proximity to the Proposed Development would have a limited if any overlap of construction period with the Proposed Development. It is anticipated there would be no change to the impact on core paths as a result of the cumulative effects of the Proposed Development and other schemes within the surrounding area.

17.8.2.3. It is not anticipated that other schemes considered would have any additional impact on local tourism and recreation attractions. It is also considered unlikely that the overlap between the construction of some of these schemes will place significant pressure on the availability of bedspaces within the local hotels and bed and breakfasts and would therefore not reduce the availability of bed spaces to tourists wishing to visit the area.

17.8.2.4. As such, there would not be any additional cumulative impacts during construction.

17.8.3 CUMULATIVE EFFECTS DURING OPERATION

17.8.3.1. It is anticipated that there will not be any cumulative impact on employment during the operation of the Proposed Development. Even if other schemes are being constructed or operated during the operation of the Proposed Development, it is anticipated that there will be sufficient employment available to fill the operational jobs and this will not be impacted by the presence of the other schemes considered.

17.8.3.2. There is no direct operational impact on the core paths and tourism and recreation amenities in proximity to the Proposed Scheme, and it is not anticipated that the presence of the other schemes will change this impact.

17.8.3.3. As such, it is expected that the cumulative impacts from the Proposed Development and the above schemes will not lead to any additional / exacerbated negative effects during operation of the Proposed Development.

17.9. LIMITATIONS OR DIFFICULTIES

17.9.1 SUMMARY

17.9.1.1. The socio-economic assessment is based on the available data at the time of writing and has been based on a desk-based study. The need for site surveys were considered for the EIA Report, but were not considered to be required.

17.10. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

17.10.1 SUMMARY

17.10.1.1. There are likely to be major beneficial temporary effect because of the Proposed Development, which is classified as significant. An estimated 1,081 net jobs during the construction phase of the scheme will benefit the area.

17.10.1.2. No significant adverse residual effects have been identified in the assessment.

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SSE THERMAL

PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

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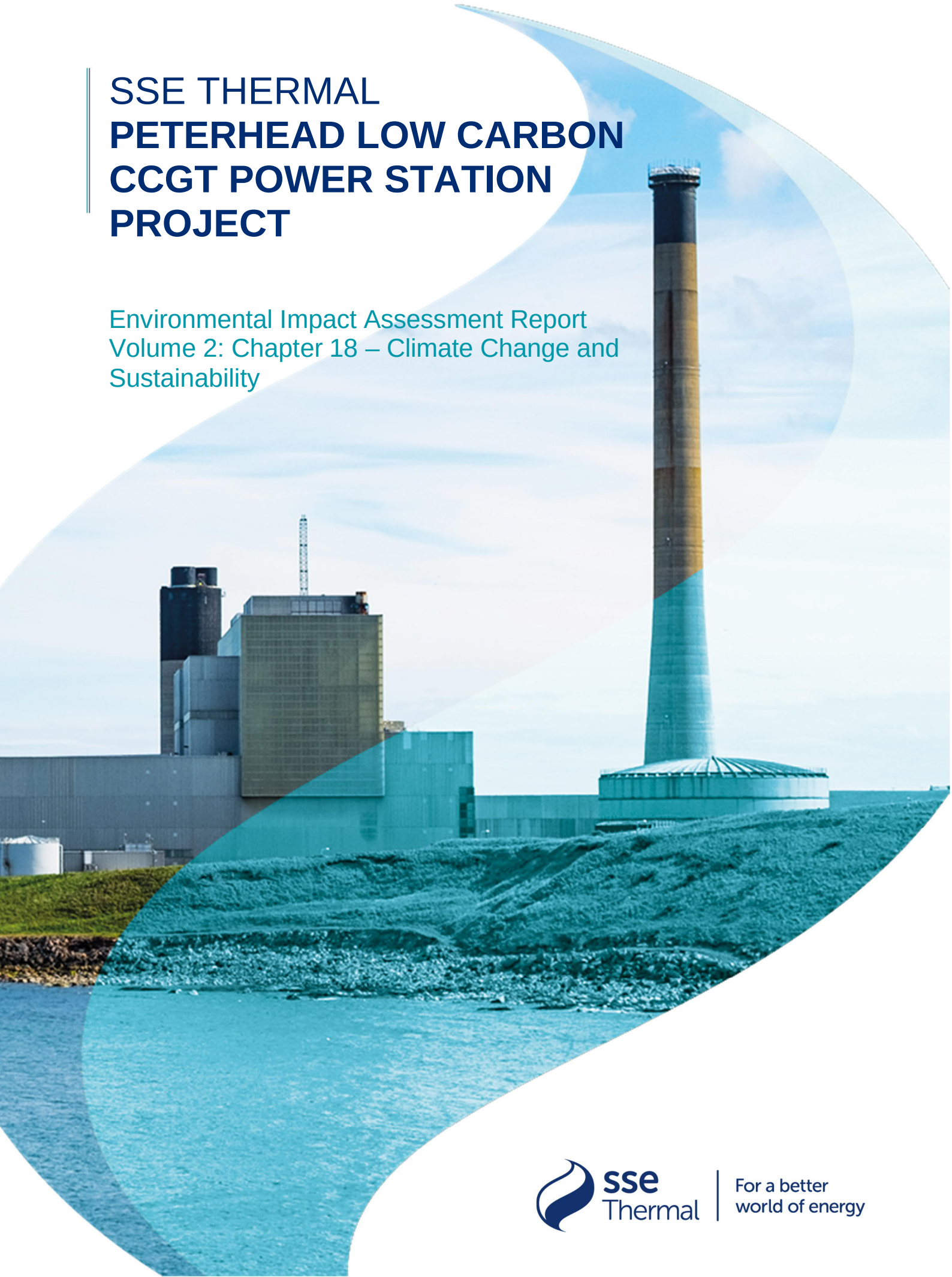
Volume 2: Chapter 18 – Climate Change and Sustainability



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18. CLIMATE CHANGE AND SUSTAINABILITY

18.1. INTRODUCTION

18.1.1. INTRODUCTION

18.1.1.1. This chapter of the Environmental Impact Assessment (EIA) Report assesses the potential impacts of the Proposed Development on the climate and the potential impact of projected future climate change on the Proposed Development and surrounding environment.

18.1.1.2. The Proposed Development includes the construction, operation and eventual decommissioning of a Combined Cycle Gas Turbine (CCGT) generating up to 910 MW electrical power output. The Proposed Development will be fuelled by natural gas and include post combustion carbon capture technology that is estimated to capture at least 90% - and up to 95% - of carbon emissions. A conservative 90% carbon capture rate has been assumed for the purposes of the GHG assessment. Captured carbon will be compressed and directed to an offshore carbon store and not released to the atmosphere.

18.1.1.3. In accordance with the requirements of the Town and Country planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended in 2018) (the 'EIA Regulations') (Scotland) (Town and Country Planning, 2017), guidance from the Institute of Environmental Management and Assessment (IEMA) for climate change mitigation (IEMA, 2017) and adaptation (IEMA, 2015) has been applied. This chapter addresses three separate aspects:

- **Lifecycle greenhouse gas (GHG) impact assessment** – the potential effects on the climate from GHG emissions arising from the Proposed Development, including how the Proposed Development would affect the ability of the government to meet its carbon reduction targets;
- **In-combination climate change impacts (ICCI) assessment** – the in-combination effects of a changing climate and the Proposed Development on receptors in the surrounding environment; and
- **Climate change risk (CCR) assessment** – the resilience of the Proposed Development to projections for climate change, including how the Proposed Development design would be adapted to take account for the projected risks and impacts of climate change.

18.1.1.4. **Appendix 18A: Sustainability Review** (EIA Report Volume 4) accompanies this Chapter and includes an assessment of the Proposed Development during its operational phase against several key sustainability themes. This review outlines where measures have been incorporated to minimise adverse impacts and where the Proposed Development will provide beneficial effects, thus contributing to the wider sustainability of the Proposed Development.

18.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

18.2.1. INTRODUCTION

18.2.1.1. This section identifies and describes legislation, policy and guidance of relevance to the assessment of the potential climate impacts associated with the construction, operation and decommissioning of the Proposed Development.

18.2.1.2. Legislation, policy and other relevant guidance has been considered on an international, national and local level. The following is considered to be relevant to the climate assessment as

it has influenced the sensitivity of receptors and requirements for mitigation or the scope and/or methodology of the assessment.

18.2.2. INTERNATIONAL

18.2.2.1. Relevant international legislation and planning policy is detailed in Table 18-1.

18.2.2.2. **Appendix 18A: Sustainability Review** (EIA Report Volume 4) examines the operational phase of the Proposed Development against the United Nations Sustainable Development Goals (SDGs).

Table 18-1: International legislation and planning policy

Legislation or Planning Policy	Relevance to Climate Change
United Nations Framework Convention on Climate Change Paris Agreement (2016)	The Paris Agreement is an agreement within the UNFCCC requiring all signatories to strengthen their climate change mitigation efforts to keep global warming to below 2°C this century and to pursue efforts to limit global warming to 1.5°C.

18.1.1. NATIONAL

18.2.2.3. Relevant UK and Scottish national legislation and planning policy is detailed in Table 18-2.

Table 18-2: National legislation and planning policy

Legislation or Planning Policy	Relevance to Climate Change
UK Nationally Determined Contribution (UK Government, 2020)	In 2020, the UK communicated its new Nationally Determined Contribution to the UNFCCC. Within this, the UK has committed to reducing GHG emissions by at least 68% by 2030 compared to 1990 levels.
The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019	The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, hereafter referred to as the 'Act' amends the Climate Change (Scotland) Act 2009, setting targets to reduce Scotland's emissions of all greenhouse gases to net-zero by 2045 at the latest. This includes interim targets for reductions of at least 56% by 2020, 75% by 2030, 90% by 2040.
Net Zero Strategy (2021)	The UK Government's Net Zero Strategy: Build Back Greener (2021), published on 19th October 2021, sets out the approach government will take to cut emissions and seize green economic opportunities, in order to meet the UK's Sixth Carbon Budget and Nationally Determined Contribution, cutting emissions by at least 68% by 2030 on 1990 levels, and reaching net zero by 2050. Key policies of the strategy include, all electricity coming from low carbon generation by 2035, investment in hydrogen production to complement the electricity system, decarbonising heat and buildings, supporting the

Legislation or Planning Policy	Relevance to Climate Change
	electrification of UK vehicles, increasing the share of journeys taken by public transport, cycling and walking and increasing the rate of woodland creation.
The Clean Growth Strategy	In 2017, the government published The Clean Growth Strategy (HM Government, updated 2018a). This Strategy details the increased investment and collaboration in carbon capture usage and storage in the UK to drive industrial innovation and its importance in long-term emissions reduction.
The Clean Growth Strategy: The UK Carbon Capture Usage and Storage (CCUS) Deployment Pathway- An Action Plan	The UK Government (HM Government, 2018a) has identified Carbon Capture Usage and Storage (CCUS) as having a significant part to play in the UK's transition to a low carbon economy. CCUS has been identified as a least cost energy system decarbonisation pathway to 2050. In their Clean Growth CCUS action plan it is stated that: "*CCUS has economy-wide qualities which could be very valuable to delivering clean industrial growth. It could deliver tangible results in tackling some of the biggest challenges we face in decarbonising our economy, contributing to industrial competitiveness and generating new economic opportunities – a key part of our modern Industrial Strategy*."
National Planning Framework 3 (The Scottish Government, 2014)	The National Planning Framework (NPF3) was published in 2014 by the Scottish Government and is intended to guide Scotland's spatial development priorities for the next 20 to 30 years. The vision set out in NPF3 is divided into four outcomes, one of which is "a low carbon place – reducing our carbon emissions and adapting to climate change".
Draft National Planning Framework 4 (The Scottish Government, 2021)	Draft National Planning Framework 4 is currently (February 2022) undergoing consultation. When adopted, NPF4 will set out the Scottish Governments priorities and policies for the planning system up to 2045 and how their approach to planning and development will help to achieve a net zero, sustainable Scotland by 2045. NPF4 differs from previous NPFs in two ways. It incorporates Scottish Planning Policy and the NPF into a single document and will form a part of the statutory development plan.
Scottish Planning Policy (2020a)	The Scottish Planning Policy (SPP) document is a statement of the Scottish Government's policy on nationally important land use matters. SPP facilitates development while at the same time "*protecting and enhancing the natural and built environment*" and is considered to be central to the Scottish Government's purpose of achieving sustainable economic growth (para 2).The SPP sets out how climate change should be addressed through planning, by seizing opportunities to encourage mitigation and adaptation measures, to support the transformational change required to

Legislation or Planning Policy	Relevance to Climate Change
	meet emission reduction targets and reduce the vulnerability of existing and future development to climate change. NPF4 is currently (February 2022) out for consultation. When adopted, NPF4 will incorporate Scottish Planning Policy and the NPF into a single document.
Infrastructure Investment Plan (The Scottish Government,2021)	Plan includes a longer-term vision, prioritising de-carbonisation, climate change resilience and adaptation in investments.
Climate Ready Scotland: Climate Change Adaptation Programme 2019-2024 (The Scottish Government, 2019)	Current national 5-year plan for Scotland, detailing adaptation outcomes.

18.1.2. LOCAL

18.2.2.4. Relevant local planning policy is detailed in Table 18-3.

Table 18-3: Local planning policy

Legislation or Planning Policy	Relevance to Climate Change
Aberdeen City and Shire Strategic Development Plan (2020)	Vision for shire includes “sustainable use of natural resources, the ability to live within the area’s environmental capacity, can deal with climate change”. Noting the importance of climate change adaptation for increased risks of unpredictable weather patterns, extreme weather, rising sea level, and flooding

18.1.3. OTHER POLICY

18.2.2.5. Other UK policy, which is not binding in Scotland but which may be relevant to planning decisions in Scotland, is listed in Table 18-4.

Table 18-4: Other planning policy

Legislation or Planning Policy	Relevance to Climate Change
Overarching National Policy Statement for Energy (EN-1)	Published by the Department of Energy and Climate Change (DECC) (2011a), this describes the national policy for energy infrastructure in relation to climate impacts and adaptation; adverse effects and benefits; in relation to the EU Directive and ES requirements; in relation to adaptation measures in response to climate projections; in relation to climate projections, flood risk and the importance of relevant mitigation. This promotes Carbon Capture and Storage (CCS) as an emerging technology that the Government is aiming to facilitate and encourage, including for gas-fired generating stations. Paragraph 2.2.23 of EN-1 states that CCS is part of the UK's plans to "*reduce its dependence on fossil fuels, particularly unabated combustion*". This Policy Statement further states the benefits of having a diverse mix of power generation, including energy supply security as fossil-fuel generation that can be brought online quickly to meet demand and can complement baseload supply from nuclear and renewables. However, these fossil-fuel power generators will need CCS to be low carbon. EN-1 states that the consenting of new fossil-fuelled power stations at or over 300 MW have to be constructed Carbon Capture Ready (CCRe), as described in Section 3.6 and 4.7 of EN-1. Regarding the applicability of EN-1 to Scotland, paragraph 1.4.3 states that *"In Scotland and in those areas of the REZ where Scottish Ministers have functions, the Secretary of State will have no functions under the Planning Act 2008 in relation to consenting energy infrastructure projects except as set out in paragraph 1.4.4. However, energy policy is generally a matter reserved to UK Ministers and this NPS may therefore be a relevant consideration in planning decisions in Scotland."*
National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (EN-2)	Published by the DECC (2011b), this describes the need for all new fossil fuel electricity generating plants to assess the viability for supporting carbon capture and storage technologies. Paragraph 1.5.2 states that: *"In Scotland, the Infrastructure Planning Commission (IPC) will not examine applications for nationally significant generating stations. However, energy policy is generally a matter reserved to UK Ministers and this NPS may therefore be a relevant consideration in planning decisions in Scotland."*

Legislation or Planning Policy	Relevance to Climate Change
National Planning Policy Guidance on Climate Change	Guidance published by the Ministry of Housing, Communities and Local Government (2019), this describes how to identify suitable mitigation and climate adaptation measures to incorporate into the planning process. Stating "*effective spatial planning is an important part of a successful response to climate change as it can influence the emission of greenhouse gases… Planning can also help increase resilience to climate change impact through the location, mix and design of development*." While not directly applicable to Scotland, the guidance may contain relevant points for consideration.

18.1.4. GUIDANCE

18.2.2.6. Relevant guidance used in this assessment is detailed in Table 18-5.

Table 18-5: Guidance

Legislation or Planning Policy	Relevance to Climate Change
IEMA: Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (2017)	In the absence of any widely accepted guidance on assessing the significance of the impact effect of GHG emissions, the EIA Guidance published by IEMA in 2017 will be followed. This provides a framework for the consideration of GHG emissions in the EIA process. The guidance sets out how to: • Identify the GHG emissions baseline in terms of GHG current and future emissions; • Identify key contributing GHG sources and establish the scope and methodology of the assessment; and • Consider mitigation in accordance with the hierarchy for managing project related GHG emissions (avoid, reduce, substitute, and compensate).
IEMA: Environmental Impact Assessment Guide to: Climate Chance Resilience and Adaptation (2020)	The IEMA Guidance for assessing climate change resilience and adaptation in EIA will be followed. It provides guidance for consideration of the impacts of climate change within project design. The guidance sets out how to: • Define climate change concerns and environmental receptors vulnerable to climate factors; • Define the environmental baseline with changing future climate parameters; and

Legislation or Planning Policy	Relevance to Climate Change
	• Determine the resilience of project design and define appropriate mitigation measures to increase resilience to climate change.
The GHG Protocol (World Resources Institute and World Business Council for Sustainable Development, 2015)	The GHG Protocol provides overarching guidance on developing GHG inventories and reporting standards
British Standards	The British Standards Institution (BSI) BS EN ISO 14064-1:2019 and 14064-2:2019 (2019a and b, respectively) provides specifications for organisational-level and project-level guidance for the quantification and reporting of GHG emissions and removals.
PAS 2080:2016 Carbon Management in Infrastructure	PAS 2080 is a global standard for managing infrastructure carbon and has been authored to meet World Trade Organization requirements. The framework looks at the whole value chain, aiming to reduce carbon and reduce cost through more intelligent design, construction and use.

18.3. ASSESSMENT METHODOLOGY

18.3.1. CONSULTATION

18.3.1.1. An EIA Scoping Report was prepared by AECOM and submitted to the statutory and non-statutory consultees in May 2021. The EIA Scoping Report (see **Appendix 1B**, EIA Report Volume 4) sets out the proposed approach to the EIA and is intended to facilitate discussions regarding the scope of the EIA.

18.3.1.2. In response to the EIA Scoping Report, the Energy Consents Unit prepared a Scoping Opinion (see **Appendix 1A**, EIA Report Volume 4). Specific comments raised by any consultees related to climate change are listed in Table 18-6. Table 18-6 demonstrates how these comments have been incorporated into this assessment.

Table 18-6: Summary of comments raised in the Scoping Opinion relevant to climate change

Scoping Opinion Source	Subject	Comments	Response/where addressed in this Chapter
Aberdeenshire Council	Guidance	The assessment of Greenhouse Gas (GHG) Emissions in line with appropriate guidance and standards is welcomed, as is the Climate Change Risk (CCR) Assessment.	Noted
	Scope of Assessment	The decision to scope out sea temperature rise and wind from the CCR Assessment is noted, along with the rationale for doing so.	Noted
	Scope of Assessment	It is accepted that the parameters of consideration within the In-Combination Climate Change Impact (ICCI) Assessment (outlined within Table 19 of the Scoping Report) are to be scoped out of the EIAR as other technical assessments and licences will identify, assess and mitigate these risks.	Noted
	GHG Assessment	It is noted that a net decrease in GHG emissions is anticipated as a result of the proposed development during the operational phase, however during the construction phase, emissions may rise as a result of the embodied carbon of the construction products and materials used. The proposed mitigation of the installation of an improved, high efficiency CCGT unit and carbon capture plant is acknowledged. Any additional mitigation required to reduce emissions from the proposed development, identified as a result of the various assessments, should be indicated within the EIAR.	Noted The calculated net change in GHG emissions are detailed within Section 18.6. Any additional mitigation measures are detailed in Section 18.7.

18.3.2. STUDY AREA

GHG Impact Assessment

18.3.2.1. The study area for the GHG Impact Assessment includes all GHG emissions from within the Proposed Development Site boundary arising during all stages of the construction, operation and decommissioning of the Proposed Development. It will also include emissions arising from offsite activities which are directly related to the onsite activities, such as transport and where possible treatment of materials and waste disposal.

CCR Assessment

18.3.2.2. The study area for the CCR assessment is the Proposed Development itself.

18.3.3. IMPACT ASSESSMENT METHODOLOGY

GHG Impact Assessment

Determining the Sensitive Receptors

18.3.3.1. The identified receptor for GHG emissions is the global climate as the effects are not geographically constrained which means all development has the potential to result in a cumulative effect on GHG emissions. Therefore, for the purposes of the GHG emissions impact assessment, the global climate will be used as the sensitive receptor. The UK's and Scotland's relevant five-year carbon budget will be used as a proxy for the global climate.

Determining the Baseline Scenario

18.3.3.2. The baseline scenario for the GHG assessment is a 'business as usual' scenario where the Proposed Development is not undertaken. The baseline comprises existing sources of GHG emissions – including the existing Peterhead power station in current operating mode - and carbon stock within the boundary of the existing Site described in **Chapter 3: The Site and Surrounding Area** (EIA Report Volume 2). The methodology for calculating GHG emissions and removals is consistently used across all phases of the Proposed Development.

Determining the Project Scenario

18.3.3.3. The alternative project scenario to the 'business as usual' is a 'do something' scenario with the delivery of the Proposed Development, which includes additional GHG-emitting activities undertaken during construction, operation and decommissioning, together with the reduced emissions from the existing power station which will operate in a reduced capacity once the Proposed Development is operational.

Determining GHG Emissions

18.3.3.4. The potential effects of the Proposed Development to the global climate are calculated in line with ISO14064 (BSI, 2019a and b) and the principles of the GHG Protocol (WRI & WBCSD, 2015). Where activity data have allowed, expected GHG emissions arising from the lifecycle activities associated with the Proposed Development have been calculated by multiplying activity data by its relevant emission factor:

Activity data x GHG emissions factor = GHG volume

18.3.3.5. Activity data is a quantifiable measure of activity, such as operating hours or volumes of fuels used. Emission factors convert the activity data into GHG volumes. Activity data has been sourced from client data. Where specific data are not available, a mix of assumptions and industry benchmarks have been used to fill data gaps. Where this is not possible, then a qualitative approach to addressing GHG impacts has been followed, in line with the IEMA Guidance (2017).

18.3.3.6. Emission factors have been sourced from publicly available sources, BEIS (2021), and the University of Bath Inventory of Carbon and Energy (ICE) v.3 (2019). Carbon emissions and sinks through land use change have been calculated by using the EU Commission's Guidelines for Land Carbon Stocks (2010).

18.3.3.7. In line with the ISO standard 14064 and the principles of the GHG Protocol (WRI & WBCSD, 2015), when calculating GHG emissions, the seven Kyoto Protocol GHGs have been considered, specifically:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Sulphur hexafluoride (SF_6);S
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Nitrogen trifluoride (NF_3).

18.3.3.8. These GHGs are broadly referred to in this chapter under an encompassing definition of 'GHG emissions', with the unit of tCO_2e (tonnes CO_2 equivalent) or $MtCO_2e$ (megatonnes of CO_2 equivalent).

18.3.3.9. Activities included in the baseline and project scenarios are described in more detail and, where possible, quantified in Sections 18.4.1,0, 0, and 0.Any relevant design and impact avoidance measures described within Section 18.5 will be incorporated into the calculation assumptions.

18.3.3.10. As agreed during the consultation process, Table 18-7 summarises the key anticipated GHG emissions sources associated with the Proposed Development and whether they have been scoped into the final assessment.

Table 18-7: Scope of GHG emissions sources

Lifecycle Stage	Activity	Scoped In/Out	Rationale
Pre-construction/ Enabling Works	Any enabling works, land clearance, and disposal of waste generated during the enabling works	In	GHG emissions are expected
Construction	Raw material extraction, product manufacture of construction materials, electricity use, on-site fuel use, waste disposal, and transport	In	GHG emissions are expected
Operation	Power station emissions, raw material extraction, electricity production and use, fuel use onsite, transport, waste disposal, landscaping or other offsets/carbon capture	In	GHG emissions or savings are expected
Decommissioning	Removal or renewal of the Proposed Development	In	GHG emissions are expected

Determining Significance of GHG Emissions

18.3.3.11. There is currently no published standard definition for receptor sensitivity of GHG emissions. The global climate has been identified as the receptor for the purposes of the GHG assessment. The sensitivity of the climate to GHG emissions is considered to be 'high'. The rationale supporting this includes:

- Any additional GHG impacts could compromise the Scotland's and the wider UK's ability to reduce its GHG emissions and therefore the ability to meet its future carbon budgets; and
- The importance of meeting the Paris Agreement goal of limiting global average temperature increase to well below 2°C above pre-industrial levels (Section 18.2.2). Additionally, recent reports by the IPCC have highlighted the importance of limiting global warming below 1.5°C (IPCC, 2018 and 2021).

18.3.3.12. IEMA (2017) guidance states that there are currently no agreed methods to evaluate levels of GHG significance and that professional judgement is required to contextualise the projects emission impacts but that all GHG emissions are classed as having the potential to be significant as all emissions contribute to climate change and this should be contextualised against pre-determined carbon budgets. In the absence of sector-based or local emissions budgets, the Scottish and UK Carbon Budgets can be used to contextualise the level of significance.

18.3.3.13. When considering the scope and boundary for inclusion of GHG emissions it is standard accounting practice to exclude minor sources as these are not material. Both the DECC (2013) and the PAS 2050 Specification (BSI, 2011) allow emissions sources that contribute or remove less than 1% to the total inventory to be excluded as immaterial. Inventories that exclude these minor sources are still considered complete for verification purposes. This exclusion of emission sources that are <1% of a given emissions inventory is on the basis of a 'de minimis' (relatively minimal) contribution. On this basis, where GHG emissions from the Proposed Development are equal to or more than ±1% of the relevant annual Scottish or UK Carbon Budgets the impact of the Proposed Development on the climate is considered of high significance. This is summarised in Table 18-8. Carbon budgets are detailed in Table 18-9.

Table 18-8: Magnitude and significance criteria of GHG emissions

Magnitude	Magnitude Description	Sensitivity	Significance
High Increase	Estimated GHG emissions equate to or equal to or more than 1% of total emissions across the relevant five-year Scottish or UK Carbon Budget period in which they arise	High	Major adverse significance
Low Increase	Estimated GHG emissions equate to less than 1% of total emissions across the relevant five-year Scottish or UK Carbon Budget period in which they arise		Minor adverse significance
Low Reduction	Estimated GHG emissions equate to a reduction of less than 1% of total emissions across the relevant five-year Scottish or UK Carbon Budget period in which they arise		Minor beneficial significance
High Reduction	Estimated GHG emissions equate to a reduction of equal to or more than 1% of total emissions across the relevant five-year Scottish or UK Carbon Budget period in which they arise		Major beneficial significance

18.3.3.14. Table 18-9 shows the published Scottish carbon targets, which at present have only been calculated up to 2045 when net zero is anticipated. These annual targets have been extrapolated from a 1990/1995 baseline of 75.5 Mt CO_2e, and annual percentage reductions from the baseline, as described by the Scottish Government (2020b and 2020c, respectively). Scotland is targeting a net zero date of 2045.

18.3.3.15. Table 18-9 also details the published UK carbon targets which will also be used to contextualise the GHG emissions. The UK is currently in the 3rd carbon budget period, which runs from 2018 to 2022. The 3rd to the 5th carbon budgets reflect the earlier UK target (80% reduction target by 2050). The 6th carbon budget, legislated for in June 2021, is the first budget to reflect the amended net zero target of 2050.

Table 18-9: Scottish and UK carbon targets

Year	Scottish: Annual reduction target from baseline (%) and extrapolated upper target value in parentheses (Mt CO_2e)	UK Carbon Budget
2021	57.9% (31.87Mt CO_2e)	3rd Carbon Budget (2018-2022) 2,544 Mt CO_2e
2022	59.8% (30.43Mt CO_2e)	
2023	61.7% (28.99Mt CO_2e)	4th Carbon Budget (2023-2027) 1,950 Mt CO_2e
2024	63.6% (27.55Mt CO_2e)	
2025	65.5% (26.12Mt CO_2e)	
2026	67.4% (24.68Mt CO_2e)	
2027	69.3% (23.24Mt CO_2e)	
2028	71.2% (21.8Mt CO_2e)	5th Carbon Budget (2028-2032) 1,725 Mt CO_2e
2029	73.1% (20.36Mt CO_2e)	
2030	75% (18.93Mt CO_2e)	
2031	76.5% (17.79Mt CO_2e)	
2032	78% (16.65Mt CO_2e)	
2033	79.5% (15.52Mt CO_2e)	6th Carbon Budget (2033-2037) 965 Mt CO_2e
2034	81% (14.38Mt CO_2e)	
2035	82.5% (13.25Mt CO_2e)	

Year	Scottish: Annual reduction target from baseline (%) and extrapolated upper target value in parentheses (Mt CO_2e)	UK Carbon Budget
2036	84% (12.11Mt CO_2e)	
2037	85.5% (10.98Mt CO_2e)	
2038	87% (9.84Mt CO_2e)	Budgets yet to be published
2039	88.5% (8.71Mt CO_2e)	
2040	90% (7.57Mt CO_2e)	
2041	92% (6.06Mt CO_2e)	
2042	94% (4.54Mt CO_2e)	
2043	96% (3.03Mt CO_2e)	
2044	98% (1.51Mt CO_2e)	
2045	100% (net-zero emissions) (0Mt CO_2e)	
2046	100% (net-zero emissions) (0Mt CO_2e)	
2047	100% (net-zero emissions) (0Mt CO_2e)	
2048	100% (net-zero emissions) (0Mt CO_2e)	
2049	100% (net-zero emissions) (0Mt CO_2e)	
2050	100% (net-zero emissions) (0Mt CO_2e)	100% (net-zero emissions) (0Mt CO_2e)

CCR Assessment

18.3.3.16. An assessment of climate change risk has been undertaken for the Proposed Development to identify potential climate change impacts, and to consider their potential consequence and likelihood of occurrence, taking account of the measures incorporated into the design of the Proposed Development.

Determining the Sensitive Receptors

18.3.3.17. The types of receptors considered at risk to climate change, are:

- Construction phase receptors (i.e., workforce, plant and machinery);
- The Proposed Development assets and their functionality (i.e., pavements, structures, earthworks and drainage, technology assets, etc.); and

- End-users (i.e., staff and commercial operators etc.).

Determining the Baseline Scenario

18.3.3.18. The current baseline scenario for the CCR assessment is based on recent historic climate data obtained from the Met Office (2021b) recorded by the closest meteorological station to the Proposed Development (Fraserburgh).

Determining the Project Scenario

18.3.3.19. The future climatic baseline for Proposed Development Site has been determined through the UK Climate Impacts Programme UK Climate Projections 2018 (UKCP18).

Determining Climate Change Risks

18.3.3.20. The CCR assessment considers resilience against both gradual climate change, and the risks associated with an increased frequency of extreme weather events as per the UKCP18 (the Met Office, 2021a). The identification and assessment of climate change resilience within EIA is an area of emerging practice.

18.3.3.21. There is no single prescribed format for undertaking such assessments; therefore, the approach adopted to undertaking and reporting the assessment has drawn on good practice from other similar developments and studies and is aligned with existing guidance such as that of IEMA (IEMA, 2020).

18.3.3.22. This assessment of climate change risk is undertaken for the Proposed Development to identify potential climate change impacts, and to consider their potential consequence and likelihood of occurrence, taking account of the measures incorporated into the design of the Proposed Development. As agreed during the consultation process, the scope of the CCR assessment is detailed in Table 18-10.

Table 18-10: Scope of the CCR assessment

Climate Risk	Scoped In/Out	Rationale
Extreme weather event	In	The Proposed Development may be vulnerable to extreme weather events such as storm damage, coastal erosion and storm surge to structures and assets.
Precipitation	In	The Proposed Development may be vulnerable to changes in precipitation, for example, pressure on water supply during periods of reduced rainfall, and damage to structures and drainage systems during periods of heavy precipitation.
Temperature	In	Increased temperatures may increase cooling requirements of the Proposed Development and could impact on structural integrity of buildings and materials.
Sea level rise	In	The Proposed Development Site is in an area that could be susceptible to sea level rise depending on the local topography.

Climate Risk	Scoped In/Out	Rationale
Sea temperature	Out	The Proposed Development is not likely to be affected by the small increase in sea temperature during its operational life.
Wind	Out	Currently, there is no evidence of compelling trends in storminess when considering maximum gusts over the last five decades (Kendon *et al.*, 2020).

18.3.3.23. Once potential climate risks have been identified, the likelihood of their occurrence during the project phase is categorised. Likelihood is categorised into five levels depending on the probability of the hazard occurring. Table 18-11Table 18-11 presents the likelihood levels and definitions used. This is in line with the definitions presented in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (IPCC, 2014).

Table 18-11: Level of likelihood of a climate risk occurring

Likelihood Category	Description (probability of occurrence)
Very likely	90-100% probability that the impact will occur
Likely	66-90% probability that the impact will occur
Possible, about as likely as not	33-66% probability that the impact will occur
Unlikely	0-33% probability that the impact will occur
Very unlikely	0-10% probability that the impact will occur

18.3.3.24. The consequence of an impact has been measured using the criteria detailed in Table 18-12. The probability and consequence will take into account embedded design and impact avoidance measures.

Table 18-12: Level of consequence of a climate risk occurring

Consequence of Impact	Measure of Consequence for Climate Change Risk
Very high	Permanent damage to structures/assets; Complete loss of operation/service; Complete/partial renewal of infrastructure; Serious health effects, possible loss of life; Extreme financial impact; and Exceptional environmental damage.
High	Extensive infrastructure damage and complete loss of service; Some infrastructure renewal; Major health impacts; Major financial loss; and Considerable environmental impacts.

Consequence of Impact	Measure of Consequence for Climate Change Risk
Medium	Partial infrastructure damage and some loss of service; Moderate financial impact; Adverse effects on health; and Adverse impact on the environment.
Low	Localised infrastructure disruption and minor loss of service; No permanent damage, minor restoration work required; and Small financial losses and/or slight adverse health or environmental effects.
Very low	No damage to infrastructure; No impacts on health or the environment; and No adverse financial impact.

Determining Significance of Climate Change Risks

18.3.3.25. The significance is determined as a function of the likelihood or a climate risk occurring and the consequence to the receptor if the hazard occurs. This is detailed in Table 18-13. Where an effect has been identified as moderate or major will be classed as a significant CCR effect. If significant CCR effects are assessed, then appropriate additional mitigation measures (secondary mitigation) are identified.

Table 18-13: CCR significance matrix

		Likelihood of a CCR occurring				
		Very unlikely	Unlikely	Possible	Likely	Very Likely
Consequence	Very low	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Minor	Minor	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major	Major
	Very high	Negligible	Minor	Moderate	Major	Major

18.3.4. ASSESSMENT ASSUMPTIONS AND LIMITATIONS

GHG Impact Assessment

18.3.4.1. The most recent UK government projections of future grid carbon intensity were published in July 2021 (BEIS, 2021b), and take account of the UK's 2050 Net-Zero commitment. All such forecasts and projections are inevitably subject to considerable uncertainty, but the Government's estimates of future grid carbon intensity are the most authoritative data available.

18.3.4.2. There is limited information on CO_2 emissions during start-up of the CCP and this will not be quantifiable until after the detailed design stage and verified through plant commissioning. A conservative assessment has been undertaken whereby it is assumed that the plant will operate for 8,000 hours per year at 90% capture efficiency; this is envisaged to lead to higher annual emissions than a dispatchable plant operating at lower load factors with start-up emissions.

18.3.4.3. The GHG assessment of construction impacts assumes that the measures outlined within the Development Design and Impact Avoidance section of this chapter would be incorporated into the design of the Proposed Development. These measures are considered standard best practice that are usually applied across construction sites in the UK. No additional mitigation has been identified as necessary for the construction phase of the Proposed Development.

18.3.4.4. The current GHG assessment is limited to the availability of data and information. Table 18.7 details the scope of the emissions sources covered in the GHG assessment.

CCR Assessment

18.3.4.5. The CCR assessment of construction impacts assumes that the measures outlined within the Development Design and Impact Avoidance section of this chapter would be incorporated into the design of the Proposed Development. These measures are considered standard best practice that are usually applied across construction sites in the UK.

18.3.4.6. While modelled climate change projections represent anticipated average weather conditions, they do not capture the full range of possible future severe weather events (i.e., droughts, heatwaves and prolonged heavy rainfall). The CCR assessment is limited to the availability of data and information at the date this assessment was prepared.

18.4. BASELINE CONDITIONS

18.4.1. GHG EMISSIONS

18.4.1.1. The Proposed Development Site is described in **Chapter 3: The Site and Surrounding Area** (EIA Report Volume 2). The Proposed Development Site is situated within the existing Peterhead Power Station and land under the control of the Applicant. If the Proposed Development is not consented, it is assumed that the current activities will continue. These activities include the ongoing operation of the Peterhead Power Station which comprises three combined cycle gas turbines. The existing power station currently has Transmission Entry Capacity (TEC) of 1,180 MW. There is currently no anticipated end date for existing operations.

18.4.1.2. Table 18-14 and Plate 18-1 present annual GHG emissions since 2013 for the existing power station, as reported under the installations GHG emissions permit (Ref UK-S-IN-12376) which was issued under the European Union Emission Trading System (now replaced in the UK by the UK Emissions Trading Scheme). These figures demonstrate the variability of emissions on an annual basis, and it is not possible to predict with any certainty what the future operations of the existing power station might be up until the Proposed Development becomes operational.

Table 18-14: Verified historic emissions from the existing Peterhead Power Station

Year	Annual Emissions (tCO_2e)
2013	1,316,371
2014	330,961
2015	54,696
2016	601,641

Year	Annual Emissions (tCO_2e)
2017	950,298
2018	1,911,466
2019	1,578,522
2020	1,293,967

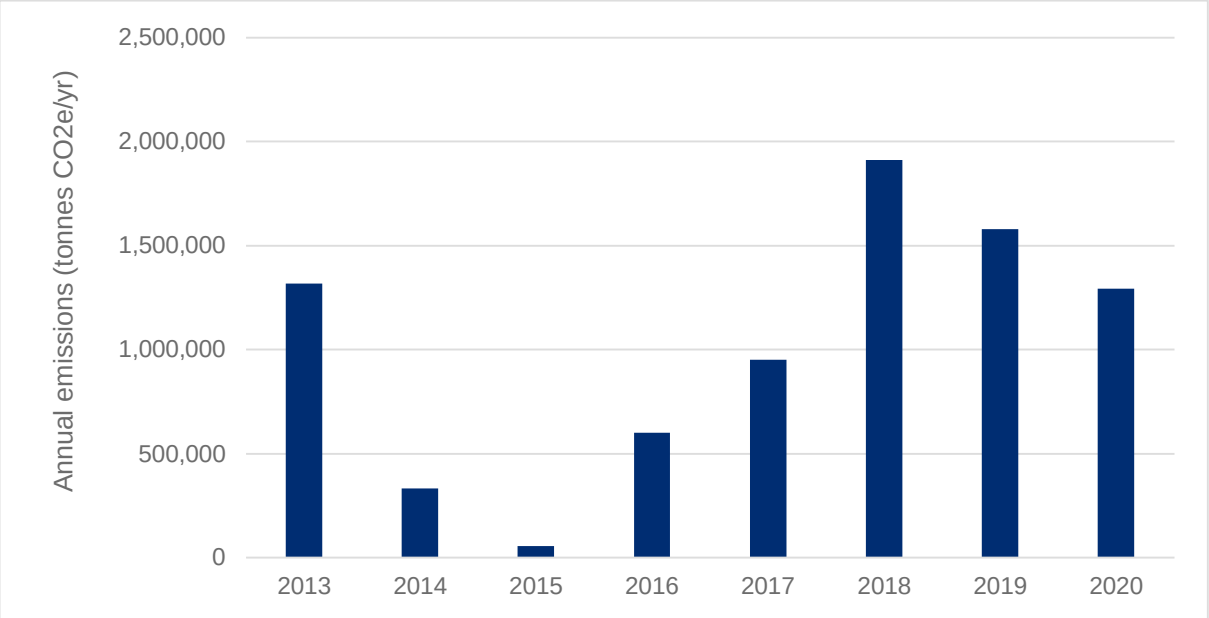

Plate 18-1 Annual emissions from the existing gas-fired power station, 2013-2020

18.4.1.3. The emissions values in Table 18-14 only include direct emissions associated with the fuel used within the power station, specifically fuel used by the gas turbines, auxiliary boilers, emergency generators (x2), diesel fire pumps (x4) and portable plant and equipment. The emissions values do not include any of the other operational activities that might typically be occurring (see Table 18-7). Not including indirect activities in the GHG baseline value would result in a GHG over-estimate for the project scenario as it will assume these project-activities are all additional to the baseline scenario, when they are likely already occurring.

18.4.1.4. Stocks of terrestrial carbon have also not been considered as part of the baseline emissions as the area is largely unvegetated. The majority of the Proposed Development Site for all configurations are located on an area of existing stony and sparsely vegetated ground north-west of the existing power station which includes a small areas of neutral grassland. The proposed connections and supporting infrastructure overlie an existing area of mostly built-up land, with minor losses of semi-improved neutral grassland and improved pasture. The construction laydown areas overlie mainly improved pasture, with some loss of low quality semi-improved neutral grassland to the north. Hedgerows and scrub are also very localised, and loss of trees/scrub to the Proposed Development will be prevented or be minimal. In total, the Proposed Development overlies a maximum of 5 hectares of vegetated habitat.

18.1.5. CURRENT CLIMATIC BASELINE

18.4.1.5. The current baseline for the CCR assessment is based on recent historic climate data obtained from the Met Office (2021b) recorded by the closest meteorological station to the Proposed Development (Fraserburgh, approximately 24km from Site) for the period 1981-2010. The data is listed in Table 18-15.

Table 18-15: Recent historical climate data summary

Climatic Variable	Month	Value
Average annual maximum daily temperature (°C)	-	11.4
Warmest month on average (°C)	August	17.17
Coldest month on average (°C)	February	2.42
Mean annual rainfall levels (mm)	-	747.65
Wettest month on average (mm)	October	89.68
Driest month on average (mm)	June	47.96

18.4.1.6. The Met Office historic 10-year averages for the 'West Scotland' region identify gradual warming from 1971, with increased rainfall also. Information on mean maximum annual temperatures and mean annual rainfall is summarised in Table 18-16.

Table 18-16: Historic 10-year climate averages for the West Scotland region

Climate Period	Climate Variable	
	Mean maximum annual temperatures (°C)	Mean annual rainfall (mm)
1971-1980	11.0	1561.6
1981-1990	11.0	1792.0
1991-2000	11.4	1801.0
2001-2010	11.8	1729.5
2011-2020	11.8	1927.4

18.1.6. FUTURE CLIMATIC BASELINE

18.4.1.7. The future baseline for the CCR assessments is based on future UK Climate Projections 2018 (UKCP18) from the Met Office for the Peterhead area (2020a). This projection data provides probabilistic indications of how global climate change is likely to affect areas of the UK using pre-defined climate variables and time periods.

18.4.1.8. For the purpose of the assessment, UKCP18 probabilistic projections for pre-defined 20-year periods for the following average climate variables have been obtained and will be further analysed:

- Mean annual temperature;
- Mean summer temperature;
- Mean winter temperature;
- Maximum summer temperature;
- Minimum winter temperature;
- Mean annual precipitation;
- Mean summer precipitation;
- Mean winter precipitation; and
- Sea level rise.

18.4.1.9. Projected variables are presented in Table 18-17 and Table 18-18. UKCP18 probabilistic projections have been analysed for the 25 km grid square in which the Site is located. These figures are expressed as temperature/ precipitation anomalies in relation to the 1981-2010 baseline. This baseline was selected as it provides projections for 30-year time periods (e.g., 2010-2039) for the parameters analysed within the assessment compared to the 30-year land-based projections that would be generated from the 1981 - 2010 baseline.

18.4.1.10. UKCP18 uses a range of possible scenarios, classified as Representative Concentration Pathways (RCPs), to inform differing future emission trends. These RCPs "…*specify the concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to preindustrial levels*." RCP 8.5 is considered to be the worst-case global scenario with the greatest concentration of GHGs in the atmosphere and has been used as the purposes of this assessment as a worst-case scenario.

18.4.1.11. Depending on project economics, construction of the Proposed Development is expected to take four years starting at worst-case in 2030. Power generation and carbon capture are then expected from 2034 for up to 25 years, after which time the Project elements would be assessed for ongoing viability and only if no longer viable, be decommissioned. Therefore, the CCR assessment has considered a scenario that reflects a high level of greenhouse gas emissions at the 10%, 50% and 90% probability levels up to the 2058 projection to assess the impact of climate change over as much of the lifetime of the Proposed Development as possible.

Table 18-17: Projected changes in temperature, 50% probability, 10% and 90% probability in parenthesis

	Time Period		
Climatic Variable	**2010-2039**	**2030-2059**	**2060-2089**
Mean annual air temperature anomaly at 1.5m (°C)	+0.7 (+0.2 to +1.1)	+1.2 (+0.5 to +1.9	+2.4 (+1.1 to +3.8)
Mean summer air temperature anomaly at 1.5m (°C)	+0.6 (+0.1 to +1.2)	+1.1 (+0.2 to +2.0	+2.5 (+0.7 to +4.3)

	Time Period		
Climatic Variable	**2010-2039**	**2030-2059**	**2060-2089**
Mean winter air temperature anomaly at 1.5m (°C)	+0.7 (-0.1 to +1.5)	+1.2 (+0.1 to +2.3)	+2.2 (+0.6 to +3.9)
Maximum summer air temperature anomaly at 1.5m (°C)	+0.6 (-0.1 to +1.2)	+1.1 (-0.1 to +2.2)	+2.6 (+0.5 to +4.7)
Minimum winter air temperature anomaly at 1.5m (°C)	+0.6 (-0.1 to +1.5)	+1.1 (+0.1 to +2.4)	+2.3 (+0.6 to +4.3)

Table 18-18: Projected changes in rainfall, 50% probability, 10% and 90% probability in parenthesis

	Time Period		
Climatic Variable	**2010-2039**	**2030-2059**	**2060-2089**
Annual precipitation rate anomaly (%)	+4.7 (-0.2 to +9.7)	+5.6 (-0.8 to +11.7)	+6.4 (-2.8 to +16.0)
Summer precipitation rate anomaly (%)	+0.1 (-8.7 to +9.8)	-4.0 (-16.0 to +8.2)	-12.5 (-28.3 to +2.5)
Winter precipitation rate anomaly (%)	+10.8 (-0.4 to +22.6)	+17.4 (+0.5 to +36.1)	+25.0 (+0.7 to +53.7)

18.4.1.12. Sea level rise may increase up to 14cm from current levels by the time operations start (worst case 2030) and up to 37cm when operations are completed, and potential decommissioning of the Proposed Development initiates (from 2058). The ranges of projected sea level rise from the 1981-2000 baseline are detailed in Table 18-19.

Table 18-19: Projected 50% probability of sea level rise under RCP 8.5 relative to the 1981-2000 Baseline period (10% and 90% probability in parenthesis)

	2030	**2034**	**2048**	**2058**
Sea level anomaly (m)	+0.10 (+0.07 to +0.14)	+0.12 (+0.08 to +0.16)	+0.19 (+0.13 to +0.27)	+0.26 (+0.18 to +0.37)

18.4.1.13. Using the definitions for likelihood (Table 18-11) and climate change projection data (Table 18-17 to Table 18-19) under the worst case RCP8.5 scenario from UKCP18, the likelihood of occurrence of potential climate hazards is detailed in Table 18-20.

Table 18-20: Potential climate hazards and likelihood of occurrence

Climatic Variable	Potential Hazard	Likelihood of occurrence in timeframe		
		2010-2039	2030-2059	2060-2089
Mean annual air temperature anomaly at 1.5m (°C)	Increase in mean annual air temperature	Very likely	Very likely	Very likely
Mean summer air temperature anomaly at 1.5m (°C)	Increase in mean summer air temperature	Very likely	Very likely	Very likely
Mean winter air temperature anomaly at 1.5m (°C)	Increase in mean winter air temperature	Likely	Very likely	Very likely
Maximum summer air temperature anomaly at 1.5m (°C)	Increase in maximum summer air temperature	Likely	Likely	Very likely
Minimum winter air temperature anomaly at 1.5m (°C)	Increase in minimum winter air temperatures	Likely	Very likely	Very likely
Annual precipitation rate anomaly (%)	Increase in annual precipitation rate	Likely	Likely	Likely
Summer precipitation rate anomaly (%)	Decrease in summer precipitation rate	Likely	Very likely	Very likely
Winter precipitation rate anomaly (%)	Increase in winter precipitation rate	Likely	Very likely	Very likely
Sea level rise (m)	Increase in sea level	Very likely	Very likely	Very likely

18.4.1.14. The 2019 State of the UK Climate report (Kendon *et al*., 2020) states that there are 'no compelling trends in storminess when considering maximum gust speeds over the last five decades', therefore an increase in storm intensity is currently considered unlikely.

18.4.1.15. Kendon *et al*., (2020) states that there has been a decline in the longest sequence of consecutive dry days. However, projected drier summers are suggestive of a drying trend. Therefore, an increase in droughts is currently considered possible.

18.4.1.16. Research by Sanderson *et al*., (2017) into the historical trends of heatwave frequency in the UK found variable results, with some weather stations recording a decline in very long

heatwaves and others an increase in short heatwaves. Accordingly, the likelihood of an increase in heatwaves is considered possible.

18.5. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

18.5.1. CONSTRUCTION

GHG Impact Assessment

18.5.1.1. Aspects of GHG emissions will be managed through the final Construction Environmental Management Plan (CEMP) and related plans that controls construction activities to minimise any impact on the environment through relevant regulations, industry good practice and specific measures described within this ES. The appointed contractors will be required to develop and implement a CEMP to measure, monitor and report energy and water consumption and GHG emissions during construction. A Framework CEMP (**Appendix 5A** EIA Report Volume 4) has been developed, and includes proposed measures to reduce GHG emissions through:

- Reduced fuel consumption on site in vehicles, equipment and plant through minimisation of idling, and switching off when not being used. Preference of lower carbon fuels such as hydrotreated vegetable oil (HVO) fuel, biodiesel or electric powered plant instead of traditional fossil fuels;
- Reduced water consumption in the on-site amenity blocks and construction activities;
- Reduction in transportation of materials to the site, by implementing measures set out in **Appendix 10B: Framework Construction Traffic Management Plan** (EIA Report Volume 4) and secured through a requirement in the Section 36 application;
- Minimisation of emissions through worker commuting by:
  - encouraging group transport by the provision of minibuses;
  - provision of facilities for cyclists; and
  - provision of information on public transport links (all of which will be described in **Appendix 10C: Construction Workers' Travel Plan** (EIA Report Volume 4) and secured through a requirement in the Section 36 application;
- Setting minimum rates for material recycling and re-use, as be described in the Framework Construction Environmental Management Plan, a framework of which is provided in **Appendix 5A** (EIA Report Volume 4); and
- Reducing construction works by re-using, replacing or upgrading the existing water connection infrastructure on Site, and using techniques such as the ‘no dig’ trenchless construction where practicable.

CCR Assessment

18.5.1.2. Details of embedded design measures that reduce the vulnerability of the Proposed Development are contained within the Framework CEMP and other assessments, such as **Chapter 12: Water Environment**, **Chapter 13: Flood Risk**, and **Chapter 14: Ground Conditions** (EIA Report Volume 2). Examples of these measures include:

- Storage of topsoil and other construction materials outside of the 1 in 100-year floodplain to protect materials from high rainfall and flooding events or sea level rise;
- Suitable storage and bunding of fuels, chemicals etc to protect from high rainfall events or sea level rise. This will be further supported by the Water Management Plan and an Incident and Emergency Response Plan;

- Laydown and welfare areas will be laid will permeable membranes to protect the Site from high rainfall and flooding events; and
- The Contractor will monitor weather forecasts and receive SEPA flood alerts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as storms, flooding or heatwaves.

18.5.2. OPERATIONS

GHG Impact Assessment

18.5.2.1. The purpose of this Proposed Development is to provide low carbon electricity through the use of a high efficiency gas-fired power station with carbon capture and off-shore carbon storage. Though its overall design, the Proposed Development offers the opportunity to reduce the carbon emissions from the power station site as a whole and aid decarbonisation of the electricity supplied to the national grid. A carbon capture plant fitted to the generating station will use a chemical process to absorb and capture up to 95% of the carbon dioxide in the flue gases. However, there is potential for the capture rate to be higher. Captured CO_2 (carbon emissions) will be compressed and pumped into an offshore geological store and therefore prevented from eventual release to the atmosphere.

18.5.2.2. The PPC Permit application will present several measures that the Proposed Development would include in order to improve energy efficiency and to reduce overall GHG emissions. The design of the Proposed Development will be based on European Best Available Technique (BAT) reference documents ('BRefs') for CCGT plants and the new Environment Agency BAT Guidance for carbon capture plants (2021). The GHG assessment within this Chapter has been based on high levels of thermal efficiency within the CCGT as an H-Class unit is proposed to be used.

18.5.2.3. Process emissions would be managed and regulated through a PPC Permit issued by SEPA in accordance with the Industrial Emissions Directive and Energy Efficiency Directive. Other embedded measures incorporated in the operational design are described in the EIA Report, in particular **Chapter 4: Proposed Development** and **Chapter 8: Air Quality** (EIA Report Volume 2).

18.5.2.4. To reduce emissions associated with operational worker commuting, sustainable forms of travel will be promoted including provision of cycle storage areas.

CCR Assessment

18.5.2.5. Details of embedded design measures that reduce the vulnerability of the Proposed Development are contained within other technical disciplines, such as **Chapter 12: Water Environment** and **Chapter 13: Flood Risk** (EIA Report Volume 2). Examples of these measures include:

- The power station is designed to operate over a large range of ambient conditions including winter and summer extreme values. Temperature changes would therefore not have a noticeable impact on the plant's operation although it does affect the peak electrical output;
- Suitable storage and bunding of fuels, chemicals etc to protect from high rainfall. This will be supported by a Site Emergency Response Plan;
- Cabling will be buried underground, insulating against overheating in times of heatwaves;
- Installation of a suitable surface water drainage network and management system, Sustainable drainage systems (SuDS), to protect the Site from high rainfall events;
- Flood Resistance and Resilience Measures to be implemented, including:

- critical equipment assets to be raised above estimated peak flood level (see **Appendix 13A: Flood Risk Assessment** EIA Report Volume 4). Critical equipment would include electrical equipment, transformers, main boiler feed pumps, condensate extraction pumps, primary air fan and induced draught fan;
- Flood Emergency Response plan to be developed in consultation with SEPA;
- adherence to SEPA flood warnings and alerts;
- defined emergency access and egress routes; and
- maintenance of the drainage system will be incorporated in general site management and remains the responsibility of the operator.

18.5.3. DECOMMISSIONING

GHG Impact Assessment

18.5.3.1. At this stage, limited specific additional mitigation measures have been identified for the decommissioning phase of the Proposed Development due to uncertainties in the future emission factors, and demolition technologies available. A Decommissioning Environmental Management Plan (DEMP) will be produced to appropriate guidance and legislation at the time, and will likely include measures to reduce GHG emissions, for example encouraging the contractors to recycle the bulk of the plant, equipment and materials.

CCR Assessment

18.5.3.2. At this stage, limited specific mitigation measures have been identified for the decommissioning phase of the Proposed Development. A DEMP will be produced to appropriate guidance and legislation at the time and will likely be similar to that of the construction phase but reflect future climatic conditions at that point in time in the future.

18.6. LIKELY IMPACTS AND EFFECTS

18.6.1. CONSTRUCTION

GHG Impact Assessment

18.6.1.1. To assess the magnitude of the climate change impacts because of GHG emissions associated with construction of the Proposed Development, the GHG emissions that would be associated with the project activities are calculated based on the assumptions listed below:

- The construction programme is anticipated to take 4 years (2030 – 2034 has been considered in the assessment) operating within the hours of 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on Saturday;
- As described in 18.4.1, the baseline carbon held in terrestrial stocks has not been quantified as it is largely a built-up area; however small (less than 5 hectares) losses of grassland, pasture, hedgerow and scrub are expected;
- Numbers of construction workers and vehicle traffic have been estimated from **Chapter 5: Construction Programme and Management** (EIA Report Volume 2), **Chapter 10: Traffic and Transport** (EIA Report Volume 2) and **Appendix 10C Construction Worker Travel Plan** (EIA Report Volume 4);
- Materials transport has been included in this estimate; materials are assumed to be travelling a one-way distance of 50km, and includes a return trip;
- Embodied carbon from construction materials is partially included in this estimate. Using building floor area from the gas turbine hall, heat recovery steam generator, and steam turbine, estimates have been made using WRAPs Net Waste Tool. This excludes fit-out

materials and other infrastructure of these buildings due to insufficient data or information at this stage in the design. Excluded materials and components are not considered material to the overall GHG assessment;

- Additional construction activities included in this estimate include mains water for domestic, sanitation and construction purposes. It is assumed that each person on-site uses 71 litres of water per day (Water UK, 2021). Other construction water uses such as wheel-washing or dust suppression have been accounted for conservatively with an industry benchmark from the Strategic Forum for Construction Water Subgroup (2011);
- Waste transport and disposal is included in this estimate. Construction waste volume estimates have based on building floor area areas for the indicative Proposed Development layout (**Chapter 4: The Proposed Development** EIA Report Volume 2) and waste types published by Construction Resources and Waste Platform (CRWP, 2009). Landfill wastes from excavation wastes as described in **Chapter 5: Construction Programme and Management** (EIA Report Volume 2) are included. Water treatment volumes from domestic and sanitation uses are assumed to all be treated and are included in this estimate. Demolition wastes from two gas turbines, a water tank and an oil pump house are expected but are not included within this estimate due to the level of current design detail;
- Fuel-usage onsite has been included in this estimate. Using construction value, an approximate volume of emissions has been calculated using industry benchmarks (Glenigan, 2018). This figure is likely to be conservative in consideration of the Development Design and Impact Avoidance measures to use lower carbon fuels such as HVO fuel, biodiesel or electric powered plant instead of traditional fossil fuels; and
- Uses of grid electricity for temporary welfare and office facilities have been included in this estimate. Usage has been conservatively estimated on continuous use during construction hours using CIBSE Energy Benchmarks (2008) and is based upon 500m^2 of facilities.

18.6.1.2. As detailed in Table 18-21, using the listed inclusions and exclusions, the total construction-related GHG emissions from the Proposed Development are calculated to be 98,864 tCO_2e with the majority (65%) of emissions being associated with the carbon embodied in materials and products used to construct. Over the 4-year construction period, average annual emissions are estimated to be approximately 24,716 tCO_2e/yr. As these activities would not happen if this Proposed Development, all these emissions are considered additional to the baseline scenario.

Table 18-21: Construction phase GHG emissions

Lifecycle Stage	Project Activity/Emission Source	Emissions (tCO_2e) over 4-year Construction Period	% of total
Product Manufacture	Embodied carbon of material and products	64,261	65.0%
Construction and Commissioning	Materials and product transport	23,300	23.6%
	Electricity usage	176	0.2%
	Fuel usage onsite	3,755	3.8%
	Worker commute	7,089	7.2%
	Waste disposal	255	0.3%

Lifecycle Stage	Project Activity/Emission Source	Emissions (tCO_2e) over 4-year Construction Period	% of total
	Materials	28	0.0%
TOTAL		**98,864**	
Annual estimation		**24,716**	

Significance of GHG Emissions

18.6.1.3. Emissions associated with the construction of Proposed Development have been examined for their significance against the Scottish and UK Carbon Budgets in Table 18-22. At most, during the years the construction emissions occur, the estimated emissions contribute 0.16% to the Scottish Carbon Budget in 2033, and 0.004% to the 5th UK Carbon Budget.

Table 18-22: Significance assessment of construction phase emissions

Year	Potential Construction Phase Emissions (Mt CO_2e)	Scottish Carbon Budget (Mt CO_2e)	Percentage Contribution of Emissions to Scottish Carbon Budget	UK Carbon Budget	Percentage Contribution of Emissions to UK Carbon Budget
2028	0	21.8	0		
2029	0	20.4	0		
2030	0.05	18.9	0.13%	5th Carbon Budget (2028-2032) 1,725 Mt CO_2e	0.004%
2031	0.05	17.8	0.14%		
2032	0.05	16.7	0.15%		
2033	0.05	15.5	0.16%		
2034	0	14.4	0		
2035	0	13.2	0	6th Carbon Budget (2033-2037) 965 Mt CO_2e	0.003%
2036	0	12.1	0		
2037	0	11.0	0		

18.6.1.4. The receptor for the GHG assessment is the global climate but using the corresponding Scottish and UK Carbon Budgets as a proxy. Total GHG emissions associated with the Proposed Development do not exceed 1% of the corresponding carbon budget limits. Therefore, the

construction phase GHG emissions are considered as having a ‘low increase’ magnitude and therefore classified as ‘minor adverse’ significance (Table 18-9).

CCR Assessment

18.6.1.5. Future climate change projections have been reviewed and the sensitivity of assets of during the construction of the Proposed Development examined. Assets of the Proposed Development are assessed in Table 18-23 and are based upon climate change hazards scoped in (see Table 18-10).

18.6.1.6. No significant climate change risks during construction phase of the Proposed Development have been identified.

Table 18-23: Potential construction phase CCRs

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation Measures
Increased frequency and intensity of heat waves	Possible	Plant and vehicles, physical structures, materials, and access routes to sites	Overheating of electrical equipment Damage to materials	A high-level risk assessment of severe weather impacts on the process will be produced by the main contractor to inform mitigations. The Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as high temperatures. Any receptors, construction-related operations and activities potentially sensitive to severe weather events should be considered in the assessment. Climate change projections should be considered in the risk assessments	Very Unlikely	Low	Negligible	No	None
Increased frequency and intensity of heat waves	Possible	Staff, visitors on-site	Increased heat stress/ heat exhaustion for workers.	Prevention measures covered in the CEMP and health and safety plans e.g., temporary buildings such as site offices will be designed with measures to control summertime overheating.	Unlikely	Medium	Minor	No	None

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation Measures
Increased frequency of droughts	Possible	All receptors	None considered	None considered	Very Unlikely	Very Low	Negligible	No	None
Increase in storm intensity	Unlikely	Plant and vehicles, physical structures, materials, and access routes to sites	Damage to structures/materials/equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks. May include high winds increasing dust (and other debris), storm surge	• The potential risks to the Proposed Development arising from storm events, is considered within **Appendix 13A: FRA** (EIA Report Volume 4). This includes a consideration of any required mitigation to ensure resilience for the lifetime of the project. The FRA will inform the adoption of any adaptation / mitigation measures that need to be incorporated into the final design. • A high-level risk assessment of severe weather impacts on the process will be produced by the main contractor to inform mitigations. The Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as storms. Any receptors, construction-related operations and	Unlikely	Low	Minor	No	None

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation Measures
			and coastal erosion.	activities potentially sensitive to severe weather events should be considered in the assessment. Climate change projections should be considered in the risk assessments Flood Resistance and Resilience Measures to be implemented, including i) critical equipment assets to be raised above estimated peak flood level (e.g. electrical equipment, transformers, main boiler feed pumps, condensate extraction pumps, primary air fan and induced draught fan); ii) Flood Emergency Response plan to be developed in consultation with SEPA; iii) make use of SEPA flood warnings and alerts; iv) define emergency access and egress route; and v) ensure maintenance of the drainage system will be incorporated in general site management and remains the responsibility of the operator.					

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation Measures
Sea level rise	Very Likely	Plant and vehicles, physical structures, materials, and access routes to sites	Viability of and access to sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply or inundation of sites).	The contractors will use a short to medium range weather forecasting service from the Met Office, or other approved meteorological data and weather forecast provider, to inform short to medium term programme management, environmental control and impact mitigation measures. The contractors will register with SEPA's flood warning service in areas of flood risk.	Possible	Low	Minor	No	None

18.6.2. OPERATIONS

GHG Impact Assessment

18.6.2.1. To assess the magnitude of the climate change impacts through GHG emissions associated with operating the Proposed Development, the GHG emissions that would be associated with the project activities are calculated based on the assumptions listed below:

- The Proposed Development is expected to be available and manned 24 hours a day, 7 days per week for 25 years. Information regarding maintenance schedules is not currently available, however it is assumed that the plant will be offline for two weeks every two years for maintenance (worst case frequency described in **Chapter 4: The Proposed Development** (EIA Report Volume 2), and therefore running approximately 8,000 hours per year.
- Carbon stocks gained through landscaping are assumed to be zero at this stage. Landscaping plans are yet to be finalised but there are likely to be some locations where it would be beneficial. Any increases in carbon stocks in this stage will reduce the overall emissions, therefore this is a conservative precautionary assumption.
- Grid electricity is assumed to be zero as all requirements will be obtained via a parasitic load when the plant is operating. Grid electricity will be used for building and offices when the plant is switched off during dispatch mode or during maintenance, however this is expected to not be material as the majority of electricity consumption will arise through the use of the absorber and CO_2 compressors which will not be operating during these periods.
- Fuels and oils required on-site, other than natural gas, may include but are not limited to diesel required for the emergency diesel generator, lubricating oils and acetylene. One tonne of diesel per annum has been included within this estimate, and volumes of other fuels and oils are assumed to be a minor fraction and are not included.
- The majority of carbon emissions will arise from the CCGT plant's use of natural gas when operating in abated mode. The carbon capture system is designed to remove carbon dioxide from the flue gases. The overall effectiveness of the carbon capture system varies depending on the operating mode applied and has been calculated based on material balance flow data provided for each mode, assuming 90% capture rates are achieved for the purposes of providing a conservative estimate for the Reference Case.
- The abated CCGT unit will produce up to a net electrical output of 741 MW (which accounts for the reduction in electrical output from the CCGT as steam is diverted from the steam turbine for use in the CCP, as well as the parasitic load of the CCP and HP compressor), with a carbon intensity of approximately 37.98 tonnes CO_2 per GWh based on 90% capture of the CO_2. It is assumed that the carbon capture storage system and sequestration technology is operational and functioning as expected.
- In the event that the CCP is not available, the unabated CCGT unit would produce up to a net 874 MW electrical output, with a carbon intensity of approximately 322 tonnes CO_2 per GWh.
- CO_2 may be used for purging of the electrical generators for maintenance purposes. The volumes of gas and the frequency of the activity is not known at this stage of design although these are likely to be a minor source of GHG emissions. These are therefore not included in this estimate.
- Electrical circuit breakers and other switchgear historically used sulphur hexafluoride (SF6) as an arc quencher and noise suppressant. This gas has a very high global warming potential, but suppliers are increasingly producing SF6-free equipment, or sealed-for-life

units with extremely low leakage rates. For the purposes of this assessment, it is assumed that leakage rates will be negligible and is not included.

- Emissions associated with some waste transport and disposal have been included in this estimate. Municipal waste estimates have been included and are based upon annual per person waste statistics (Zero Waste Scotland, 2017) and it is assumed half the volume is recycled. Industrial waste volumes are assumed to be the same weight as incoming materials that could be quantified. Water treatment volumes are included from domestic sanitation uses and are assumed to all be treated offsite.
- Worker commuting has been included in this estimate using current estimates of required operational staff. This assumes that all 50 workers will travel by petrol car with an occupancy of 1 person per vehicle. Using current estimates of likely distribution of worker staff, it is assumed that 87% of workers will commute from Aberdeen, 8% from Peterhead and 5% from Fraserburgh, as described in **Chapter 10: Traffic and Transport** (EIA Report Volume 2). All transits include a two-way journey. It is assumed a further 50 staff will be required onsite during the 14-day maintenance every two years using the same car occupancy rates and location distribution.
- Embodied emissions associated with operational materials have been partially included in this estimate. For mains water for domestic and sanitation uses, it is assumed that each person on-site uses 71 litres of water per day, half of the average daily water use in England and Wales (Water UK, 2021). Materials required for operations are likely to include bulk solvent, sodium hydroxide and sulphuric acid, ammonia/ urea, triethylene glycol, hydrogen, biocides, anti-scalants, sulphuric acid, sodium hydroxide, phosphoric acid, polyelectrolyte, molasses, cleaning chemicals, inert firefighting gases, carbon dioxide and mains water. Available volumes included in this estimate include sodium hydroxide, sulphuric acid, fresh solvent, and hydrogen.
- It has been assumed that materials required for operations (fuels and oils, other than natural gas, chemicals, and parts) are generally available on average within 80 km of the Site including a return trip. Five incoming HGVs haves been included in this estimate.

18.6.2.2. The material balance flow data for each operating mode includes information on final stack emissions of CO_2. For each operating mode, a gross power plant electricity output figure has been combined with the expected electricity demand of the CCP and other ancillary equipment to give a net power plant electricity output in megawatts. Combining the final stack emissions per operating hour with the net electricity output of the generating station with carbon capture plant gives an average emissions factor in tonnes CO_2e/GWh for each operating mode. These emissions factor have been compared with the current (BEIS 2021b) UK average emissions factor, and with UK government estimates of projected emissions factors for each of the years in the plant's operating lifetime.

Operational Modes

18.6.2.3. Operational Modes are discussed further within **Chapter 4: The Proposed Development** (EIA Report Volume 2). The four operating modes used to form the basis of this assessment are listed below:

- **Reference Case**: The Proposed Development will operate for up to c. 8,000 hours per year at 100% full load on the CCGT and 90% carbon capture rate;
- **Minimum flow Case**: The Proposed Development will operate for up to c. 8,000 hours per year at 40% load on the CCGT and 90% carbon capture rate;
- **Combined Winter/Summer Case**: As noted earlier, there are some differences in the operation of the generating station depending on seasonal variations. To consider this

within the assessment, a combined summer/ winter scenario was included. Under this scenario, the Proposed Development will operate for up to c. 4,000 hours in each mode each year. The CCGT will be under 100% load with 90% carbon capture running 4,000 hours in each mode each year; and

- **Reference scenario with enhanced carbon capture performance**: The Proposed Development will operate for up to c. 8,000 hours per year at 100% CCGT load with 95% carbon capture.

18.6.2.4. As described in **Chapter 4: The Proposed Development** (EIA Report Volume 2), there are several technical and engineering factors which will influence the carbon capture rate.

18.6.2.5. It is generally the case that there is a linear relationship between operating hours and direct operational plant GHG emissions for each mode, so for a reduced number of operating hours the total annual emissions can be adjusted accordingly. The only minor changes to a linear relationship are associated with start-up and shut-down cycles; given the limited changes in these periods and the low frequency of start-up and shut-down, they are considered to be negligible for the purposes of this assessment.

18.6.2.6. GHG emissions and electrical output data has been provided for four possible operating modes as follows (Table 18-24).

Table 18-24: Direct operational GHG Emissions from the abated power plant running in four different operating modes

Operating mode	Reference Case	Minimum Flow Case	Combined Winter/Summer Case	Reference Case (95% carbon capture)
Gross output from power plant (MW)	**777.3**	309.7	741.1	777.3
Electrical load from capture, compression and ancillary plant (MW)	**35.9**	19.9	35.0	35.9
Net output from abated power plant (MW)	**741.4**	289.8	706.1	741.4
Hourly unabated GHG emissions from power plant (kg CO_2e)	**281,547**	133,454	270,056	281,547
Hourly GHG emissions to atmosphere (kg CO_2e)	**28,155**	13,345	27,006	13,934
Overall carbon capture rate (%)	**90%**	90%	90%	95%
Annual Operating Hours	**8,000**	8,000	8,000	8,000
Annual GHG emissions to atmosphere (tonnes CO_2e)	**225,238**	106,760	216,044	111,472
Annual output from abated plant (GWh)	**5,931**	2,319	5,649	5,931

Operating mode	Reference Case	Minimum Flow Case	Combined Winter/Summer Case	Reference Case (95% carbon capture)
Lifetime emissions to atmosphere (tonnes CO2e)	**5,630,940**	2,669,000	5,401,100	2,786,800
Lifetime output from abated plant (GWh)	**148,275**	57,969	141,229	148,275
Average emissions factor (tonnes CO2e/GWh)	**37.98**	46.04	38.24	18.79

18.6.2.7. As detailed in Table 18-25, using the listed inclusions and exclusions, the gross operational GHG emissions from the Proposed Development are calculated to be 6,249,277 tCO_2e with the majority (5,630,940 tCO_2e, or 90.11%) of emissions being associated with fuel usage onsite as calculated above. Assuming that emission-related activities remain constant over the operational design life, annual emissions are estimated to be approximately 249,971 tCO_2e.

Table 18-25: Gross Operations phase GHG emissions

Lifecycle Stage	Project Activity/Emission Source	Emissions over 25 year operational period (tCO2e)	Percentage of total operational emissions
Operations	Embodied carbon of materials and products, largely chemicals used in carbon capture process	392,495	6.28%
	Materials and product transport	7,509	0.12%
	Electricity usage	0	0.00%
	Fuel usage onsite (CCGT emissions)	5,630,940	90.11%
	Fuel usage onsite (other fuels)	98	<0.1%
	Waste disposal	208,655	3.34%
	Worker commute	9,580	0.15%
	Carbon stocks (landscaping)	0	0.00%
	TOTAL	**6,249,277**	

Lifecycle Stage	Project Activity/Emission Source	Emissions over 25 year operational period (tCO2e)	Percentage of total operational emissions
Average annual operational emissions		249,971	

Net Operational Carbon

18.6.2.8. As described in Section 18.4.1, the baseline scenario represents GHG emissions from activities that will be undertaken should the Proposed Development not be consented. Verified annual emissions reports submitted for the existing gas-fired power station are available for the period 2013 – 2020 inclusive (European Commission, 2021), and these annual emissions are shown in Table 18-15: Recent historical climate data summary and in Plate 18-1. Historic emissions are clearly variable, so it is challenging to forecast with any certainty what the future baseline emissions are likely to be. Furthermore, there is uncertainty over the lifetime of the existing power station in the event that the Proposed Development is not consented.

18.6.2.9. Assuming that the 2020 annual emissions from Plate 18-2 is broadly representative of the existing installation, then annual emissions from the Proposed Development would be substantially lower than from the existing power station. Plate 18-2 shows the relative annual emissions from the existing power station and the Proposed Development, with emissions from the Proposed Development 81% lower in absolute term, reducing overall emissions by over a million tonnes per year. It should be noted, however, that this compares the Proposed Development running baseload with the existing power station running as a mid-merit plant with lower annual running hours. In addition, the abated generating capacity of the Proposed Development is lower than that of the existing power station.

18.6.2.10. On the assumption that the existing power station operates with a representative CCGT carbon intensity of 354 tonnes CO_2e/GWh (DECC, 2015), the carbon intensity of the Proposed Development operating under the reference case will be 89.3% lower than that of the existing installation.

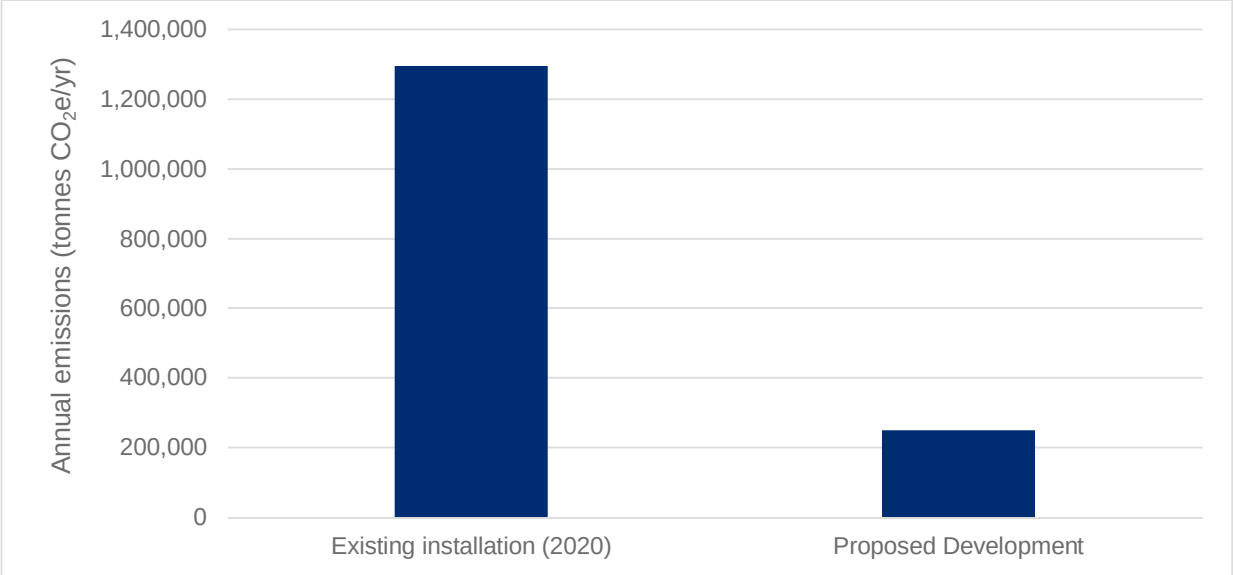

Plate 18-2: Comparison between annual emissions from the existing power station and the Proposed Development

GHG Avoidance

18.6.2.11. The GHG avoidance and net benefit of the Proposed Development is centred on the carbon capture, carbon export pipeline and offshore sequestration technology being operational. The use of carbon capture and storage on dispatchable gas-fired generation is a key technology that will allow Scotland and the UK to make the transition to net zero emissions including the development of resilient electricity networks powered by zero emissions renewable generation technologies. The emissions from consumption of natural gas detailed above are for the reference case described in Table 18-24 above, with the carbon capture plant running as designed and achieving at least 90% capture of carbon. With carbon capture technology, up to 95% of emissions will be captured, geo-sequestered and not released into the atmosphere.

18.6.2.12. The Proposed Development will be to supply low-carbon electricity to the UK electricity supply grid and therefore displace higher carbon intensity grid electricity (or other power generation sources). Table 18-26 presents the carbon intensity of national averages for electricity generation in the UK in 2018. The table details the carbon intensity associated with the combustion of the primary fuel source only.

18.6.2.13. Table 18-26 compares the carbon intensity of the Proposed Development (both with and without the carbon capture technology). Unabated, the carbon intensity of the Proposed Development (322 tCO_2 per GWh) is lower than the typical combined-cycle gas-fired generation (354 tCO_2 per GWh) due to the plant efficiency. Using the carbon capture technology, the abated plant will result in a carbon intensity of 37.98 tCO_2 per GWh at 90% capture, which is significantly less than the grid average emissions in 2021 of 212 tCO_2 per GWh (BEIS, 2020a).

Table 18-26: Recent carbon intensities of UK electricity grid generation sources

Generation source by fuel type	Emissions (tonnes of CO_2 per GWh of Electricity generated)
Combined Cycle Gas Turbine (DECC, 2015)	354
Open Cycle Gas Turbine (DECC, 2015)	460
UK Grid average (BEIS, 2021)	212
Proposed Development (unabated - without carbon capture technology)	322.1
Proposed Development (abated - with 90% carbon capture)	37.98

18.6.2.14. The UK electricity grid is in the process of being decarbonised as the UK transitions toward net zero by 2050. BEIS (2021) provides grid intensity projections to 2100. Current projections indicate that the UK grid average will fall to 7 tCO_2 for every GWh generated by 2050, with the carbon intensity remaining constant at that level to 2100.

18.6.2.15. Plate 18-3 presents the GHG intensity of electricity generation from the Proposed Development at 90% and 95% carbon capture alongside projected average grid intensity (BEIS, 2021). Forecast average grid intensity is based on an anticipated mix of electricity generation sources including fossil fuel, nuclear and renewable energy. Future GHG intensity presented in this figure is based on projected emission intensity factors published by the UK Government (2021). As with all projections, these future grid carbon factors are subject to considerable uncertainty.

18.6.2.16. Furthermore, the reduction in grid carbon intensity cannot take place without a shift from unabated to abated gas-powered generation alongside an increase in renewable generating capacity. Installations such as the Proposed Development will play a vital role in decarbonising the Scottish power sector, replacing as it does the most carbon-intensive remaining power source in Scotland.

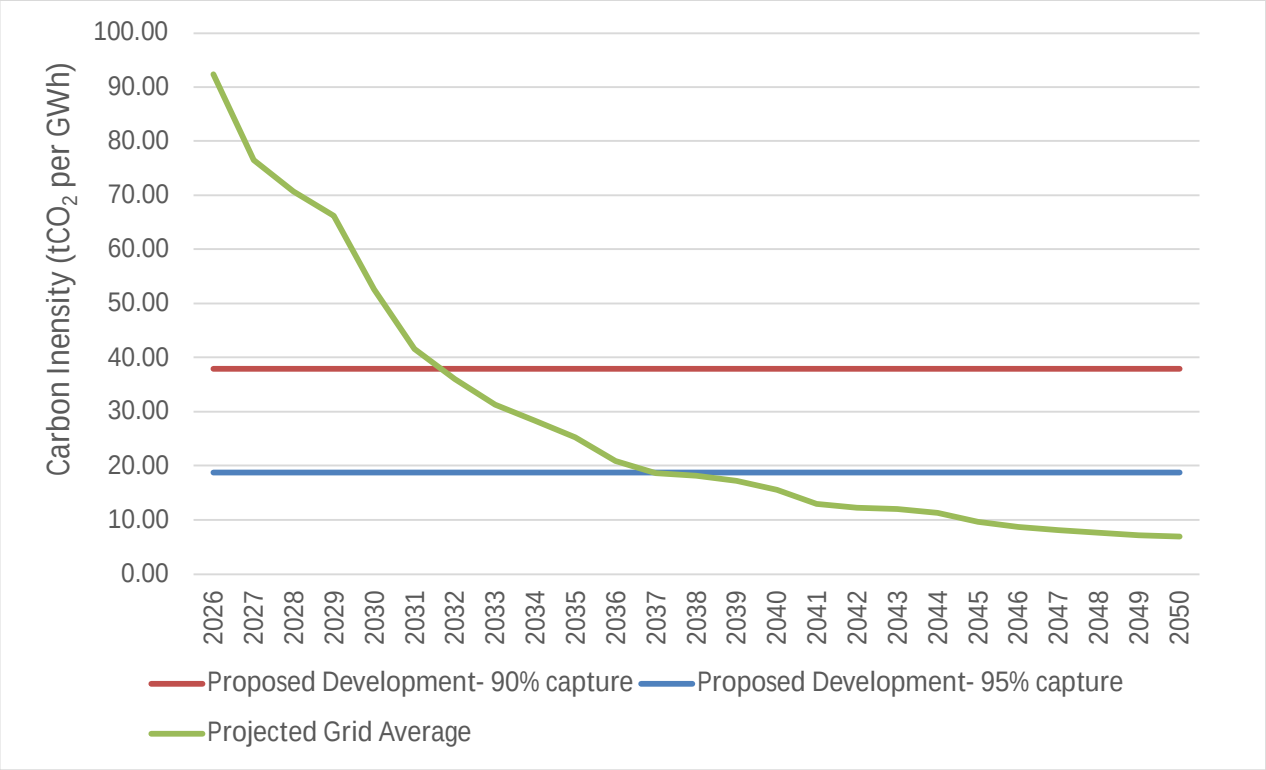

Plate 18-3: Forecast UK grid intensity vs Proposed Development under 90% and 95% carbon capture rates

Significance of GHG Emissions

18.6.2.17. Emissions associated with the operation of Proposed Development have been examined for their significance against the Scottish and UK Carbon Budgets in Table 18-27. During the 6th UK carbon budget period, operational emissions contribute 0.104% to the UK budget. Emissions can be compared to the Scottish Carbon Budget on an annual basis. In the first year of operation, the Proposed Development contributes 1.7% of the Scottish Budget, but this proportion rises steadily as the budget drops. By 2044, the Proposed Development's share of the Scottish Budget will have risen to 16.5%, and thereafter the budget effectively falls to zero making further percentage calculations meaningless.

18.6.2.18. But it is important to note that although the Proposed Development will result in significant emissions to the atmosphere, investment in abated gas-fired generation capacity to provide reliable, dispatchable power remains vital for the ongoing decarbonisation of the Scottish power sector. The Proposed Development will effectively replace an unabated gas-fired installation at the same site. As noted above, the Proposed Development will have annual operational emissions over 80% lower than those of the existing installation in the most recent year for which reliable emissions data exists.

Table 18-27: Significance assessment of operational phase emissions

Year	Potential Operational Phase Emissions (Mt CO_2e)	Scottish Carbon Budget (Mt CO_2e)	Percentage Contribution of Emissions to Scottish Carbon Budget	UK Carbon Budget	Percentage Contribution of Emissions to UK Carbon Budget
2033	0	15.5	0.0%		
2034	0.250	14.4	1.7%	6th Carbon Budget (2033-2037) 965 Mt CO_2e	0.104%
2035	0.250	13.2	1.9%		
2036	0.250	12.1	2.1%		
2037	0.250	11.0	2.3%		
2038	0.250	9.8	2.5%		
2039	0.250	8.7	2.9%	7th Carbon Budget (2038-2042) *Not yet published*	
2040	0.250	7.6	3.3%		
2041	0.250	6.1	4.1%		
2042	0.250	4.5	5.5%		
2043	0.250	3.0	8.3%	8th Carbon Budget (2043-2047) *Not yet published*	
2044	0.250	1.5	16.5%		
2045	0.250	0.0			

18.6.2.19. The receptor for the GHG assessment is the global climate but using the corresponding Scottish and UK Carbon Budgets as a proxy. Total GHG emissions associated with the Proposed Development could exceed 1% of the Scottish carbon budget each year depending on running hours of the plant. When viewed in isolation, therefore, the operational phase GHG emissions are considered as having a 'high increase' magnitude and therefore classified as 'major adverse' significance (Table 18-8).

18.6.2.20. However, when the emissions from the Proposed Development are considered relative to those from the existing unabated gas-fired power station, they clearly represent a significant reduction in emissions that will assist with the ongoing decarbonisation of the Scottish power sector, helping Scotland to achieve its 2045 net zero target. Estimated annual emissions from the Proposed Development are over one million tonnes lower than those of the existing power station, and when compared with the Scottish Carbon Budget this emissions reduction means

that the Proposed Development can be considered to have a '**major beneficial' significance** relative to the current baseline**.**

CCR Assessment

18.6.2.21. Future climate change projections have been reviewed and the sensitivity of assets of during the operation of the Proposed Development examined. Assets of the Proposed Development are assessed in Table 18-28 and are based upon climate change hazards scoped in (see Table 18-10).

18.6.2.22. No significant climate change risks during operational phase of the Proposed Development have been identified.

Table 18-28: Potential operations phase CCRs

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation
Increase in annual temperature	Very Likely	All receptors	see- Increase in summer temp	see- Increase in summer temp	Very Unlikely	Very Low	Negligible	No	None
Increase in summer temperature	Very Likely	All receptors (infrastructure, buildings, staff and workers)	Thermal comfort of building users. Increase in air conditioning requirements. Overheating of electrical equipment. Heat damage, deformation, cracking and thermal expansion of building surfaces and pavements	All buildings will be designed to UK standards and specifications. Detailed design of buildings will include consideration of cooling requirements.	Unlikely	Low	Minor	No	None
Increase in summer temperature	Very Likely	Function of facility	Reduced efficiency of CCGT	The power plant is designed to operate over a large range of ambient conditions and the plant efficiency. Temperature changes would not have a noticeable impact.	Unlikely	Medium	Minor	No	None
Increase in winter temperature	Very Likely	All receptors	see- Increase in summer temp	see- Increase in summer temp	Very Unlikely	Very Low	Negligible	No	None

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation
Increase to heat waves	Possible	Built terrestrial assets, staff facilities and access routes to sites	Impacts on the thermal comfort of building users Increase in ambient temperature of buildings, leading to higher air conditioning requirements and impacts on the thermal comfort of building users Overheating of electrical equipment Heat damage, deformation, cracking and thermal expansion of building surfaces and pavements	All buildings will be designed to UK standards and specifications. Detailed design of buildings will include consideration of cooling requirements.	Unlikely	Low	Minor	No	None
Increase to heat waves	Possible	Function of facility	Reduced efficiency of CCGT	The power plant is designed to operate over a large range of ambient conditions and the plant efficiency.	Unlikely	Medium	Minor	No	None
Decrease in annual rainfall	Likely	All receptors	See- Decrease in summer rainfall	See- Decrease in summer rainfall	Unlikely	Medium	Minor	No	None

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation
Decrease in summer rainfall	Very Likely	All receptors	Water shortages. Drying out of pavement structures. Deterioration of structures or foundations due to decrease in soil moisture levels. Insufficient water for plant cooling	Detailed building design to consider water efficiency fixtures.	Unlikely	Medium	Minor	No	
Increase to winter rainfall	Very Likely	All receptors	Surface water flooding and standing waters. Deterioration of structures or foundations due to increase in soil moisture levels. Damage to building surfaces/ exposed utilities from increased drying/wetting and increase frost penetration. Damage to infrastructure through storm surge and river flooding. Deterioration of structures or foundations due to increase in soil moisture levels. Damage to building surfaces/ exposed utilities from increased drying/wetting and increase frost penetration	• Initial capture of surface water run-off through appropriate sustainable drainage system (SuDS) methods detailed in **Appendix 13B** (EIA Report Volume 4). • The Flood Risk Assessment (FRA) (**Appendix 13A** EIA Report Volume 4) includes a number of adaptation measures that would be considered in the detailed design and operations management.	Possible	Low	Minor	No	

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation
Increase droughts	Possible	Built terrestrial assets, staff facilities and access routes to sites	See- Decrease in summer rainfall	See- Decrease in summer rainfall	Unlikely	Medium	Minor	No	None
Increase droughts	Possible	Restored / enhanced habitat, including replanting	Increased drought may limit ability to establish target habitats as desired vegetation may not survive extended dry periods. Trees planted may also die as a result of drought.	Habitat restoration / enhancement areas and any areas of replanting will be monitored to determine success in establishing target habitats / vegetation. Where required, remedial actions will be implemented including watering or replacement of dead specimens.	Possible	Medium	Moderate	No	None
Increase in storm intensity	Unlikely	Built terrestrial assets, staff facilities and access	Damage to utilities and roofs due to high winds or intense rainfall Damage to drainage systems, gutters and downpipes due to flooding from intense rainfall Flooding from drainage systems during intense or prolonged	• Initial capture of surface water run-off will be provided by appropriate sustainable drainage system (SuDS) methods. A range of different potential SuDS solutions are considered further within **Appendix 13B** (EIA Report Volume 4).	Unlikely	Very High	Minor	No	None

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation
			rainfall. Land loss, destabilisation and flooding from erosion and storm surge	• The Flood Risk Assessment (FRA) (**Appendix 13A** EIA Report Volume 4) will inform the any adaptation measures that need to be incorporated into the final design and operations management.					
Sea level rise	Very Likely	Built terrestrial assets, staff facilities and access routes to sites	Surface water flooding and standing waters Deterioration of structures or foundations due to increase in soil moisture levels Damage to building surfaces/ exposed utilities from increased drying/wetting and increase frost penetration Damage to infrastructure through storm surge and river flooding Deterioration of structures or foundations due to increase in soil moisture levels Damage to building surfaces/ exposed utilities from increased	• Initial capture of surface water run-off will be provided by appropriate sustainable drainage system (SuDS) methods. A range of different potential SuDS solutions are considered further within **Appendix 13B** (EIA Report Volume 4). • Flood Resistance and Resilience Measures to be implemented, including i) critical equipment assets to be raised above estimated peak flood level (e.g. electrical equipment, transformers, main boiler feed pumps, condensate extraction pumps, primary air fan and induced draught fan); ii) Flood Emergency Response plan to be developed in consultation with SEPA; iii) make use of SEPA flood warnings and alerts; iv)	Unlikely	Low	Minor	No	None

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation
			drying/wetting and increase frost penetration	define emergency access and egress route; and v) ensure maintenance of the drainage system will be incorporated in general site management and remains the responsibility of the operator.					

18.6.3. DECOMMISSIONING

GHG Impact Assessment

18.6.3.1. To assess the magnitude of the climate change impacts through GHG emissions associated with decommissioning of the Proposed Development, the GHG emissions that would be associated with the Proposed Development decommissioning activities could include those associated with:

- Demolition and excavation of all buildings and infrastructure, as required;
- Disposal and treatment of all wastes; and
- Return of the Site to an industrial brownfield use under hardstanding (i.e., no change in land use).

18.6.3.2. At this stage of the design, details regarding these activities have not been developed, however they are assumed to be commensurate with emissions generated during the construction stage (e.g., of the approximate magnitude of 184,184 tCO_2e). As these activities would not happen if this Proposed Development did not take place, all these emissions are considered additional to the baseline scenario.

Significance of GHG Emissions

18.6.3.3. As these emissions would happen after net zero targets for both Scotland and the UK, any emissions would be classed as ‘major adverse significance’ and would need to follow any carbon offsetting or carbon taxation requirements prescribed at the time.

CCR Assessment

18.6.3.4. Future climate change projections have been reviewed and the sensitivity of assets of during the decommissioning of the Proposed Development examined. Assets of the Proposed Development are assessed in Table 18-29: and are based upon climate change hazards scoped in (see Table 18-10).

18.6.3.5. No significant climate change risks during decommissioning phase of the Proposed Development have been identified.

Table 18-29: Potential decommissioning phase CCRs

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation Measures
Increase to heat waves	Possible	Staff, visitors on-site	Increased heat stress/ heat exhaustion for workers.	Prevention measures covered in the CEMP and health and safety plans e.g., temporary buildings such as site offices will be designed with measures to control summertime overheating.	Unlikely	Medium	Minor	No	None
Increase droughts	Possible	All receptors	None considered	None considered	Very Unlikely	Very Low	Negligible	No	None
Increase in storm intensity	Unlikely	Built assets, materials, staff facilities and access routes to sites	Damage to structures/materials/equipment and resulting in delays to programme and associated costs and/or unacceptable safety risks.	A high-level risk assessment of severe weather impacts on the process will be produced by the main contractor to inform mitigations. The Contractor will monitor weather forecasts and plan works accordingly, protecting workers and resources from any extreme weather conditions such as high temperatures. Any receptors,	Unlikely	Low	Minor	No	None

Climate Hazard Type	Projection Likelihood	Sensitive Receptor	Description of Potential Impact	Embedded Design Measures	Likelihood of an Impact Occurring	Consequence of Impact Occurring	Climate Change Risk Level	Significant?	Additional Mitigation Measures
				decommissioning-related operations and activities potentially sensitive to severe weather events should be considered in the assessment. Climate change projections should be considered in the risk assessments"					
Sea level rise	Very Likely	Built assets, materials, staff facilities and access routes to sites	Viability of and access to sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply or inundation of sites).	The contractors will use a short to medium range weather forecasting service from the Met Office, or other approved meteorological data and weather forecast provider, to inform short to medium term programme management, environmental control and impact mitigation measures. The contractors will register with the SEPA flood warning service in areas of flood risk.	Unlikely	Low	Minor	No	

18.7. MITIGATION, MONITORING AND ENHANCEMENT MEASURES

18.7.1. OVERVIEW

18.7.1.1. The management of impacts and the application of mitigation/ adaption measures during construction will be secured through the CEMP. The use of the carbon capture plant will control up to 95% of GHG emissions during plant operation. The Proposed Development will result in significantly decreased emissions relative to the existing installation, reducing the carbon intensity of dispatchable power generation to help the transition to net zero emissions.

18.7.1.2. As no significant CCR risks have been identified, no further mitigation or enhancement measures have been proposed. No additional monitoring is recommended, other than that detailed within the CEMP during construction, and that which will be required under the PPC Permit during the operational stage of the Proposed Development.

18.8. CUMULATIVE EFFECTS

18.8.1. CUMULATIVE EFFECTS

18.8.1.1. Climate change is the result of cumulative impacts as it is the result of innumerable minor activities, a single activity may itself result in a minor or insignificant impact, but when combined with many other activities, the cumulative impact could be significant. The nature of greenhouse gases is such that their impact on receptors (the global climate) is not affected by the location of their source. The GHG emissions assessment by its nature is a cumulative assessment and considers whether the Proposed Development would contribute significantly to emissions on a national level.

18.8.1.2. The global atmosphere is the receptor for climate change impacts and has the ability for holding GHG emissions. Nevertheless, as stated by IEMA (2017), all GHG emissions are considered significant and therefore would contribute to climate change. While the impact of any individual proposed development may be limited, it is the cumulative impact of many proposed developments over time that could have a significant impact on climate change.

18.8.1.3. As such it is not possible to define a study area for the assessment of cumulative effects of GHG emissions nor to undertake a cumulative effects assessment, as the identified receptor is the global climate and effects are therefore not geographically constrained. Consequently, consideration of the effects of the Proposed Development together with other developments on GHG emissions is not considered to be applicable.

18.8.1.4. Cumulative effects are not relevant to the CCR assessment, as it considers the impact of climate change on the Proposed Development itself.

18.9. LIMITATIONS OR DIFFICULTIES

18.9.1. GHG IMPACT ASSESSMENT

18.9.1.1. The most recent UK government projections of future grid carbon intensity were published in July 2021. All such projections are subject to considerable uncertainty.

18.9.1.2. There is limited information on CO_2 emissions during start-up of the CCP and this will not be quantifiable until after the detailed design stage and verified through plant commissioning. A conservative assessment has been undertaken whereby it is assumed that the plant will operate for 8,000 hours per year at 90% capture efficiency. Carbon capture rates of up to 95% are likely to be achieved and the plant is expected to run in dispatchable mode to support renewables generation, rather than as a baseload plant.

18.9.2. CCR ASSESSMENT

18.9.2.1. The CCR assessment of construction impacts assumes that the measures outlined within the Development Design and Impact Avoidance section of this chapter would be incorporated into the design of the Proposed Development. These measures are considered standard best practice that are usually applied across construction sites in the UK. No additional mitigation has been identified as necessary for any stage of the Proposed Development.

18.9.2.2. While modelled climate change projections represent anticipated average weather conditions, they do not capture the full range of possible future severe weather events (i.e. droughts, heatwaves and prolonged heavy rainfall). The CCR assessment is limited to the availability of data and information at the date this assessment was prepared.

18.10. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

18.10.1. SUMMARY

18.10.1.1. Following mitigation, the residual GHG impact remains Major Adverse when viewed in isolation; when considered relative to the baseline GHG emissions from the existing power station, which the Proposed Development effectively replaces, the residual GHG impact is Major Beneficial. This is on the expectation that the Proposed Development results in the progressive reduction in use of the existing power station.

18.10.1.2. No significant residual CCR impacts have been identified.

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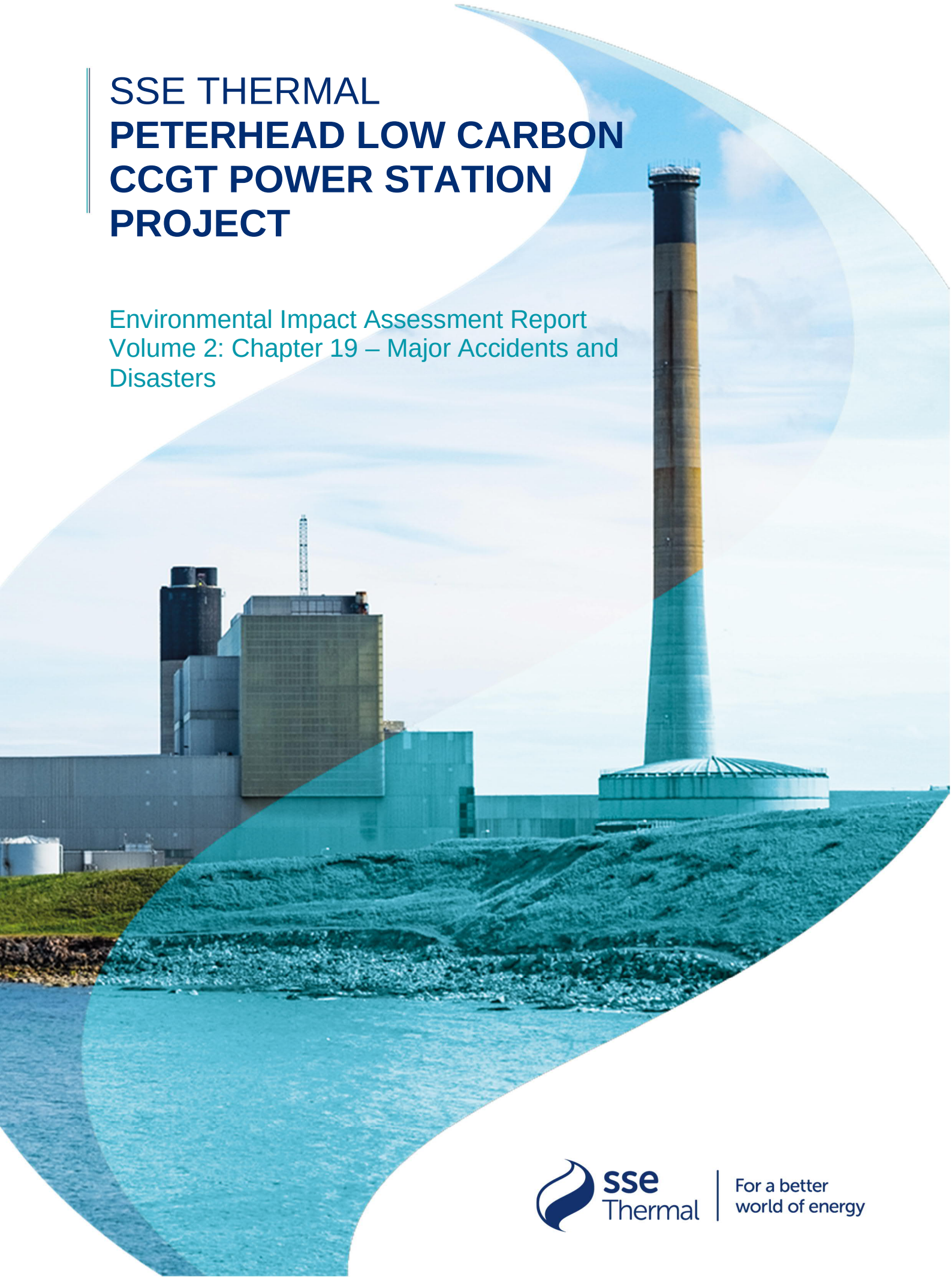
PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 19 – Major Accidents and Disasters



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CONTENTS

TABLES

19. Major Accidents and Disasters

19.1. INTRODUCTION

19.1.1 INTRODUCTION

19.1.1.1. This chapter of the Environmental Impact Assessment (EIA) Report presents an assessment of the Major Accidents and Disasters (MA&D) that have the potential to arise during the construction, operation and decommissioning of the Proposed Development. This includes an assessment of the reasonably foreseeable worst-case environmental consequences, the measures envisaged to prevent or mitigate adverse effects of such events on the environment, and details of the preparedness for and proposed response to MA&D hazards and threats relevant to the construction, operation and decommissioning of the Proposed Development.

19.1.1.2. The underlying objective of this assessment is to identify appropriate precautionary actions, to prevent or mitigate potentially significant risks associated with MA&D.

19.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

19.2.1 LEGISLATION

19.2.1.1. The following legislation is of relevance to the Proposed Development:

- The Electricity Act 1989 (as amended)
- The Town and Country Planning (Scotland) Act 1997 (as amended).
- The Electricity Works (EIA) (Scotland) Regulations 2017.
- The Climate Change (Scotland) Act 2009 (as amended).

19.2.1.2. The Electricity Works (EIA) (Scotland) Regulations 2017 ('the EIA Regulations') implement the requirements of Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment ('EIA Directive') which introduced the requirement for MA&D to be considered as part of the EIA process.

19.2.1.3. Regulation 4, Paragraph 2 of the EIA Regulations states that:

"The environmental impact assessment must identify, describe and assess in an appropriate manner, in light of the circumstances relating to the proposed development, the direct and indirect significant effects of the proposed development (including, where the proposed development will have operational effects, such operational effects) on the factors specified in paragraph (3) and the interaction between those factors."

19.2.1.4. Regulation 4, Paragraph 4 of the EIA Regulations states that:

"The effects to be identified, described and assessed under paragraph (2) include the expected effects deriving from the vulnerability of the development to risks, so far as relevant to the development, of major accidents and disasters."

19.2.1.5. Schedule 4, paragraph 8 requires an EIA Report to provide:

"A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.... Where appropriate, this description should include

measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies…"

19.2.1.6. An assessment of the risk of MA&D relevant to the Proposed Development is therefore required, together with the measures envisaged to prevent or mitigate adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.

19.2.1.7. The Construction (Design and Management) (CDM) Regulations 2015 ('the CDM Regulations') and accompanying guidance place particular duties on clients, designers and contractors, to ensure that health and safety is considered throughout the lifecycle of a project, from inception through to design, construction, operation and into subsequent demolition and removal. Under the CDM Regulations, designers must avoid foreseeable risks, as far as reasonably practicable.

19.2.1.8. During its operation, depending on the volumes of hazardous materials stored on the Proposed Development Site, a Hazardous Substances Consent (HSC) may be necessary under the Town and Country Planning (Hazardous Substances Regulations) (Scotland) 2015 and the Proposed Development could be subject to the Control of Major Accident Hazards (COMAH) Regulations 2015 ('the COMAH Regulations') which implement Directives 96/82/EC (European Commission, 1996) and 2003/105/EC on the control of major accident hazards involving dangerous substances.

19.2.1.9. The aim of the COMAH Regulations is the prevention of major accidents and limitation of their consequences for people and the environment. The competent authority for the purposes of the COMAH Regulations in Scotland is the Scottish Environmental Protection Agency (SEPA) and Health and Safety Executive (HSE).

19.2.1.10. If an installation falls within the COMAH Regulations, the Applicant will be required to:

- Take all measures necessary to prevent major accidents and limit their consequences for persons and the environment;
- Prepare an on-site emergency plan;
- Demonstrate to the competent authority that all measures necessary to comply with the COMAH Regulations are in place; and
- Notify any major accidents to the competent authority.

19.2.1.11. The primary legislation governing the safety of pipelines in the UK is the Pipelines Safety Regulations (PSR) 1996 ('PSR 1996') which encompasses control of aspects including integrity, safe design, construction, installation, operation, maintenance, and decommissioning. The PSR considers emergency events and the need to ensure that procedures are in place to limit the risk of loss of containment. Specific reference is made to major accident hazards which for the purposes of PSR is defined as "*death or serious injury involving a dangerous fluid*". Additional duties are included in PSR for major accident hazard pipelines (MAHP) which transport products defined as dangerous fluids.

19.2.1.12. A PPC Permit will be required for the operation of the Proposed Development Site in accordance with the Pollution Prevention and Control (Scotland) Regulations 2012. It is envisaged that the Applicant will seek to agree the permitting requirements with SEPA. An application for a PPC Permit will be made after submission of the Section 36 application.

19.2.1.13. Other relevant legislation includes:

- Health and Safety at Work etc. Act 1974. This legislation places general duties on employers, people in control of premises, manufacturers and employees;
- Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) . These Regulations under the Health and Safety at Work etc. Act 1974 aim to reduce the risk of injury from lifting equipment used at work and outline control measures to minimise the risk;
- The Management of Health and Safety at Work Regulations 1999. This legislation places health and safety duties on employers and employees, which go beyond those included within the CDM Regulations;
- The Workplace (Health, Safety and Welfare) Regulations 1992. This legislation covers a wide range of basic health, safety and welfare issues and applies to most workplaces (except those involving construction work on construction sites);
- Personal Protective Equipment (PPE) at Work Regulations 1992. This seeks to ensure that where risks cannot be controlled by other means PPE should be correctly identified and put into use.
- Pressure Systems Safety Regulations 2000 cover the safe design and use of pressure systems.
- Planning (Hazardous Substances) Regulations 2015. These regulations set out planning procedures in relation to sites where hazardous substances are held and for land near those sites;
- Control of Substances Hazardous to Health Regulations 2002 (COSHH). COSHH Regulations place requirements on employers to assess and manage health risks associated with hazardous substances, maintain and monitor control measures and plan for emergencies; and
- Fire (Scotland) Act 2005 and Fire Safety (Scotland) Regulations 2006.; and
- Building (Scotland) Regulations 2004.

19.2.2 SCOTTISH PLANNING POLICY (SPP)

19.2.2.1. The purpose of the Scottish Government's SPP (Scottish Government, 2014) is to set out national planning policies that reflect Scottish Ministers' priorities for operation of the planning system and for the development and use of land. There are no policies of relevance to this assessment.

19.2.3 DRAFT NATIONAL PLANNING POLICY FRAMEWORK 4

19.2.3.1. Policy 15 of the Draft National Planning Policy Framework 4 states "*Development proposals in the vicinity of major-accident hazard sites should take into account the potential impacts on the proposal and the major-accident hazard site of being located in proximity to one another. Applications regarding the presence of hazardous substances should take account of the potential impacts on surrounding populations and the environment. Decisions should be informed by, amongst other things, the Health and Safety Executive's planning applications advice (including on hazardous substances consent), and, in relevant cases, that of the Office of Nuclear Regulation. Similar considerations apply in respect of development proposals either for or near licensed explosive sites (including military explosive storage sites)*."

19.2.4 NATIONAL MARINE PLAN

19.2.4.1. The National Marine Plan (Scottish Government, 2020a) covers both Scottish inshore waters (out to 12 nautical miles) and offshore waters (12 to 200 nautical miles). It also applies to the exercise of both reserved and devolved functions. Policy OIL & GAS 6 states that

"Consenting and licensing authorities should be satisfied that adequate risk reduction measures are in place, and that operators should have sufficient emergency response and contingency strategies in place that are compatible with the National Contingency Plan and the Offshore Safety Directive".

19.2.5 PLANNING POLICY GUIDANCE

19.2.5.1. SEPA has published several documents and good practice guides. Where these have been referenced within **Chapters 8** to **18** of this EIA Report (EIA Report Volume 2), they are also relevant to this assessment.

19.2.6 LOCAL POLICY

19.2.6.1. There are no requirements of specific relevance to MA&D assessment in the following local policy documents:

- Aberdeenshire Council Local Development Plan (Aberdeenshire Council, 2017);
- Draft Aberdeenshire Council Local Development Plan 2022 (Aberdeenshire Council, 2020); and
- Aberdeen City and Shire Strategic Development Plan (Aberdeenshire Council, 2020a).

19.2.7 OTHER GUIDANCE

19.2.7.1. The Institute of Environmental Management and Assessment (IEMA, 2020) has recently developed a guidance document 'Major Accidents and Disasters in EIA: A Primer' (IEMA, 2020) to increase awareness of major accidents and disasters within EIA and its application. The guidance outlines an assessment methodology based on known current practice within the UK to date, and key terminology that can be used in MA&D assessments. This guidance, in particular the assessment methodology and terminology, has been considered within this assessment.

19.2.7.2. There is also a considerable amount of information and guidance available to developers on the identification and control of major hazards associated with the design and operation of gas fired power stations, the storage and use of chemicals, and MAHP conveying high pressure gases. Comparable facilities have been in operation for many years and employ conventional, established technology to produce electrical power from the combustion of natural gas. The HSE publishes a number of applicable guidance notes on their website relating to these assets, including:

- Emergency planning for major accidents: Control of Major Accident Hazards Regulations 1999 (COMAH), (HSE, 1999); and
- Further guidance on emergency plans for major accident hazard pipelines (HSE, 1996).

19.2.7.3. As a regulator, the HSE uses the principle of 'as low as reasonably practicable' ('ALARP') in risk management (HSE, 2020a). In a practical sense, ALARP involves 'weighing a risk

against the trouble, time and money needed to control it' noting that 'ALARP describes the level to which we expect to see risks controlled' (IEMA 2020). For the purposes of this assessment, ALARP has been used.

19.2.7.4. Carbon dioxide (CO_2) is toxic to human health at much lower concentrations that those which cause suffocation from a lack of oxygen. HSE studies have identified that an excess of CO_2 in the blood stream could lead to a loss of consciousness. CO_2 is not flammable and will not support combustion. Compared with many other materials conveyed via major pipelines in the UK, such as natural gas and ethylene, the risks to human health and the environment from events such as explosion are relatively low. However, as the concentration of CO_2 in ambient air or water rises, the hazardous effects on people and the environment increase. The key risk relates to its potential to act as an asphyxiant gas at low-lying locations, should it displace air from these locations due to its higher density. High levels of dissolved CO_2 in water can also result in impacts from acidification and subsequent effects on shell-forming species. However, the HSE studies have concluded that CO_2 data indicates it does not meet the criteria for classification as a dangerous substance.

19.2.7.5. Guidance and best practice information for carbon capture plant (CCP) technology and carbon dioxide transport via pipeline is available from the HSE, who have published a number of guidance documents including:

- Guidance on conveying carbon dioxide in pipelines in connection with carbon capture and storage projects (HSE, 2020); and
- CO_2 Pipelines Good Practice Guidelines – Technical Report (HSE, 2013).

19.2.7.6. The HSE does not currently provide Land Use Planning (LUP) advice for CO_2 capture, transport or storage, and the status of the Proposed Development relating to the COMAH Regulations (UK Parliament, 2015) has not yet been finalised. However, consultation with the HSE will be undertaken and will be ongoing throughout the design and planning process.

19.2.7.7. Other guidance that is of relevance to the assessment of MA&D includes:

- Chemicals and Downstream Oil Industries Forum Guidelines, Environmental Risk Tolerability for COMAH Establishments (CDOIF, 2017);
- ISO 31000:2009 Risk Management principles and guidelines (The International Standards Organization, 2009);
- Chapter 4 of the Cabinet Office's Emergency Preparedness guidance on part 1 of the Civil Contingencies Act 2004 (hereafter referred to as the 'CCA risk assessment framework') (HM Government, 2012); and
- Reducing Risks, Protecting People: HSE's decision making process, (HSE, 1999a).

19.2.7.8. Additionally, the following guidance has been considered in the identification of all potential major accidents and disasters:

- The National Risk Register (HM Government, 2020);
- North of Scotland Community Risk Register 2021 (North of Scotland Regional Resilience Partnership, 2021); and
- Early Warning, Early Action (The International Federation of Red Cross & Red Crescent Societies, 2008).

19.3. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

19.3.1 DEFINITIONS

19.3.1.1. A hazard or a threat is defined as an event which may cause harm. Hazards for the purposes of the MA&D assessment are defined as non-malicious events. Threats for the purposes of the MA&D assessment are defined as malicious attacks.

19.3.1.2. Major accidents are defined as:

'*Events that threaten immediate or delayed serious environmental effects to human health, welfare and/ or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events.'* (IEMA, 2020).

19.3.1.3. Disasters can be natural hazards, such as earthquakes, landslides and flooding or can be man-made hazards (e.g. caused by accidental loss of containment) or external hazards (e.g. act of terrorism) which result in consequences for people or the environment.

19.3.1.4. The environmental impact of major accidents and/ or disasters can be significant, with the potential to impact people both on and off-site, assets and property on and off-site, and the surrounding environment.

19.3.2 CONSULTATION

19.3.2.1. Within the EIA Scoping Report (**Appendix 1A** EIA Report Volume 4), it was proposed to include a brief assessment MA&D within the EIA Report, as it is considered that the risks of major accidents are suitably assessed, regulated and controlled by other legislative frameworks. This approach was agreed by Aberdeenshire Council in their EIA Scoping Opinion issued on the 13 July 2021.

19.3.2.2. Following this agreement, the Project has taken a decision to present a full assessment of MA&D within the EIA to provide further information on the control measures to ensure MA&D risks are reduced to be ALARP. The scope and proposed approach to the MA&D assessment presented herein has not been consulted upon but goes beyond the approach that was initially agreed with Aberdeenshire Council.

19.3.3 APPROACH TO ASSESSMENT

19.3.3.1. As discussed above, the MA&D assessment approach differs from typical EIA methodology in which assessments broadly consider the magnitude of impacts and value/ sensitivity of resources/ receptors that could be affected to classify effects.

19.3.3.2. The MA&D assessment identifies the reasonably foreseeable worst-case consequence of a hazard or a threat (i.e. the likely significant effect) on human health and the environment on the basis of its potential severity of harm and duration. However as by definition, all MA&D hazards and threats could result in some form of serious damage and therefore the assessment then considers the likelihood of a significant hazard or threat occurring. Furthermore, the arrangements that have been identified to manage the risk to be ALARP

are considered. This is determined based on review of available documentation; any risks which may require further mitigation are identified.

19.3.3.3. In identifying the potential for the Proposed Development to create or alter the existing baseline MA&D risks for receptors, the assessment is conducted using a staged approach:

- Identification of receptors;
- Identification of hazards and threats based on the concept design work completed to date and in accordance with industry standard approaches to hazard identification;
- Screening of hazards and threats, including the potential for likely significant effects;
- Identification of prevention, minimisation and/ or mitigation measures; and
- Determination of whether risk has been mitigated to ALARP and identification of any residual risks and their significance.

19.3.3.4. MA&D assessment considers effects that may occur in the event of a major accident at the Proposed Development Site, which may cause consequences for nearby sites. It also considers the vulnerability of the Proposed Development Site to major accident hazards at nearby sites that could result in a major accident at the Proposed Development Site. For the purposes of this assessment, each hazard or threat has been considered on an individual basis. Where a hazard or threat has the potential to result in another hazard, this has been clearly identified within the assessment.

19.3.3.5. The vulnerability of the Proposed Development to natural disasters is assessed, using findings from the EIA climate and flood risk assessments.

Information sources

19.3.3.6. MA&D 'risk events', to which the Proposed Development is considered vulnerable, have been identified by referring to the results of preliminary risk assessments undertaken for the Proposed Development and determining whether there is potential interaction with an 'in-scope' receptor. Information sources for identifying these source-pathway-receptor linkages for MA&D hazards have included review of the following:

- Potential natural hazards using data reported in a Landmark EnviroCheck Report (Landmark Information Group, 2020) for the Proposed Development Site, augmented by desk based research published by British Geological Society (BGS);
- Meteorological hazards based on data reported in **Section 18.4.3** of **Chapter 18**: **Climate Change and Sustainability** (EIA Report Volume 2);
- Existing major accident hazard sources within the Proposed Development Site or off-site within the study area based upon data presented on the HSE website (COMAH sites) and within the Landmark EnviroCheck Report (HSC sites);
- Other hazards and threats identified within the UK National Risk Register (HM Government, 2020) and North of Scotland Community Risk Register (North of Scotland Regional Resilience Partnership, 2021); and
- Sensitive environmental receptors within the study area at risk of MA&D hazards, taking into account **Chapter 3: The Site and its Surroundings** (EIA Report Volume 2).

19.3.3.7. In addition to the above, the baseline presented within the MA&D assessment has utilised baseline information presented within other technical assessments of the EIA Report, where relevant, including receptors identified in **Chapters 8 – 18** of this EIA Report (EIA Report Volume 2).

Identification of receptors

19.3.3.8. Receptors considered in this assessment include:

- Population and human health of members of the public, local communities and nearby workers at other facilities, if relevant;
- Biodiversity, with particular attention to species and habitats protected under The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) (transposing the EU Council Directives on Birds (Council Directive 2009/147/EC) and Habitats (Council Directive 92/43/EEC));
- Land, soil, water, air and climate; and
- Property and material assets, cultural heritage and the landscape.

19.3.3.9. It is recognised that potential effects of the Proposed Development on the Applicant's employees and/ or its contractors and suppliers (e.g. construction, operational and maintenance staff) are managed through compliance with other health and safety legislation, as described in **Section 19.2**. Through compliance with health and safety legislation, risks to employees will be mitigated to ALARP and no further mitigation will be available. However, for completeness, risks to employees and/ or contractors – including those at neighbouring facilities - are included within the assessment results presented in **Section 19.6**.

19.3.3.10. The Applicant proposes to adopt appropriate measures to provide a secure boundary for the Proposed Development which will reduce the likelihood of trespass to ALARP. For completeness, potential effects related to vandalism/ terrorism are included within the assessment results presented in **Section 19.6**.

Assessment Criteria

19.3.3.11. Taking into account IEMA 2020 guidance, factors that are considered in this Chapter in determining whether potential adverse effects are significant include:

- The geographic extent of the effects. Effects beyond the project boundaries are more likely to be considered significant;
- The duration of the effects. Effects that are permanent (i.e. irreversible) or long lasting are considered significant;
- The severity of the effects in terms of number, degree of harm to those affected and the response effort required. Effects that trigger the mobilisation of substantial civil emergency response effort are likely to be considered significant;
- The sensitivity of the identified receptors; and
- The effort required to restore the affected environment. Effects requiring substantial clean-up or restoration efforts are likely to be considered significant.

19.3.3.12. An approach that has been commonly adopted in MA&D assessments in recent applications considers the Chemical and Downstream Oil Industries Forum Guidelines on Environment Risk Tolerability for COMAH Establishment (CDOIF, 2017). These guidelines characterise threats or hazards against the following categories in order to assign a tolerability and a risk classification to each hazard or threat:

- Severity of harm;
- Duration;
- Consequence; and
- Probability.

19.3.3.13. When assessing severity of harm, duration, and the consequence of a hazard or threat, each of the factors defined within IEMA's 2020 Guidance is considered. In addition, IEMA 2020 considers other relevant documentation, including the Cabinet Office's National Risk Register of Civil Emergencies (HM Government, 2020).

19.3.3.14. Further details of the approach to the assessment, including descriptions of the above categories, is provided in **Appendix 19A** (EIA Report Volume 4). In summary the assessment considers and determines the consequence of a hazard or threat based on the severity of harm and duration of a reasonably foreseeable worst-case environmental effect of the event, in the absence of mitigation, as identified in Table 19.1.

Table 19-1: Identifying Consequence of a Hazard or Threat

		Duration*			
		Short term	Medium term	Long term	Very long term or permanent
Severity of Harm*	Catastrophic	Not a MA&D	C	D	D
	Major	Not a MA&D	B	C	D
	Severe	Not a MA&D	A	B	C
	No Serious Damage	Not a MA&D	Not a MA&D	Not a MA&D	Not a MA&D

*definitions are defined in **Appendix 19A** (EIA Report Volume 4)

19.3.3.15. The probability of the hazard or threat occurring is determined considering the proposed embedded mitigation, and whether the proposed embedded mitigation measures need augmenting further. This is because embedded mitigation would reduce the likelihood of the maximum severity of harm, duration, consequence and/ or frequency of a hazard or threat occurring. Probability has been assigned in accordance with Table 19.2.

Table 19-2: Defining Probability of a Hazard or Threat

Probability	Extremely Improbable	Extremely Remote	Remote	Rare	Unlikely	Likely
CDOIF Quantitative Definition	Less than 1 in 10,000,000 years	1 in 1,000,000 years to 1 in 10,000,000 years	1 in 100,000 years to 1 in 1,000,000	1 in 10,000 to 1 in 100,000 years	1 in 100 years to 1 in 10,000 years	Greater than 1 in 100 years

Probability	Extremely Improbable	Extremely Remote	Remote	Rare	Unlikely	Likely	
CCA Quantitative Definition	> 1 in 20,000 chance over 5 years			> 1 in 2,000 chance over 5 years	> 1 in 200 chance over 5 years	> 1 in 20 chance over 5 years	> 1 in 2 chance over 5 years
CCA Qualitative Descriptor	Negligible			Rare	Unlikely	Possible	Probable

19.3.3.16. As outlined in the CDOIF, 2017 Guidelines on Environment Risk Tolerability for COMAH Establishment, for COMAH sites, environmental risk can be assessed within the ALARP framework and residual risk can be evaluated to be either 'intolerable', 'tolerable if ALARP' classifications are defined in the COMAH Competent Authority 'All Measures Necessary'. Environmental Aspects guidance (HSE, 2016) as summarised below:

- Intolerable: if the risk is in this classification, then ALARP cannot be demonstrated and action must be taken to reduce the risk almost irrespective of cost;
- Tolerable if ALARP: if the risk falls within this region then a case specific ALARP demonstration is required. Relevant good practice is expected to be applied. Further risk reduction measures must be taken so far as is reasonably practicable (i.e. upgrade required unless the steps are not practicable at the site or their cost would be grossly disproportionate to the benefits); and
- Tolerable: if the risk is in this classification then it is regarded as adequately controlled through incorporation of good practice or equivalent risk reduction measures.

19.3.3.17. The tolerability of the residual risk is determined by combining the reasonably foreseeable worst-case consequence and probability categories as shown in **Table 19.3**.

Table 19-3: Defining Tolerability of a Hazard or Threat

Consequence	Probability					
	Extremely improbable	Extremely remote	Remote	Rare	Unlikely	Likely
D	Tolerable	TifALARP*	Intolerable	Intolerable	Intolerable	Intolerable
C	Tolerable	Tolerable	TifALARP*	Intolerable	Intolerable	Intolerable
B	Tolerable	Tolerable	Tolerable	TifALARP*	Intolerable	Intolerable
A	Tolerable	Tolerable	Tolerable	Tolerable	TifALARP*	Intolerable
Not a MA&D	Not within the scope of MA&D assessment					

*Tolerable if ALARP'

19.3.3.18. As a general rule:

- 'Tolerable if ALARP' and 'tolerable' risks are considered as 'not significant'; and
- Intolerable risks are considered as 'significant'.

19.3.3.19. For comparison, high and very high risks under the CCA risk assessment framework would fall under the 'intolerable' risk classification within **Table 19.3**, as they are 'primary or critical risks'

19.3.3.20. Depending on materials and volumes on site, risks categorised as 'tolerable if ALARP' would generally require further approval of the details of proposed mitigation by an appropriate regulatory body such as the HSE or SEPA.

Study Area

19.3.3.21. The study area for individual identified hazards and threats has been considered based on the likely impact pathways, distances to receptors, the scale of potential worst-case impact from case-study incidents, or on professional judgement if no information on previous events is available.

19.3.3.22. In considering the geographical scope, external features/ sites that may present a hazard to the Proposed Development, including those beyond the Proposed Development Site boundary, have been considered where there is a potential for these to interact with the Proposed Development.

Scenarios

19.3.3.23. The scope of this assessment addresses potential unplanned events or situations that have been determined as relevant to the Proposed Development, with a potential to result in significant adverse effects. The assessment of potential MA&D associated with the Proposed Development is structured around the following scenarios:

- Construction phase, including construction of the Combined Cycle Gas Turbine (CCGT) and post-combustion carbon capture plant (CCP), and the connections within the identified connection corridors;
- Operation phase of the Proposed Development; and
- Decommissioning phase.

19.3.3.24. MA&D effects arising during the decommissioning phase of the Proposed Development are considered comparable to those that would be experienced during the construction period. When the time approaches, a Decommissioning Environmental Management Plan (DEMP) would be submitted to the relevant planning authority and/ or HSE, depending on COMAH licence status, for approval, secured by Requirement. Appropriate best practice mitigation measures will be applied during any decommissioning works and documented in a DEMP.

19.3.4 USE OF ROCHDALE ENVELOPE

19.3.4.1. This assessment is based on the current engineering design documentation. This assessment does not seek to duplicate the assessment of matters covered by other regulatory regimes such as the COMAH Regulations or Pollution Prevention and Control (Scotland) Regulations 2012; instead it provides a summary of the types of MA&D hazards and threats anticipated by these regimes, the potential worst-case environmental consequences these could pose and any required mitigation. Further hazard and risk analysis will be undertaken throughout the Proposed Development lifecycle, in accordance with the requirements of Pollution Prevention and Control (Scotland) Regulations 2012 and COMAH Regulations.

19.3.4.2. This assessment has applied Rochdale Envelope principles, which assesses credible, worst-case MA&D risks and consequences associated with the Proposed Development. This conservative methodology establishes the worst-case scenarios, the risk of which should be reduced to a level that is ALARP during the detailed design, construction planning and operation of the Proposed Development. At this stage in the project, safety and control systems have not yet been designed for the Proposed Development. However, standard industry approaches to managing risk will be used. In addition, equipment such as process monitoring and safeguarding systems and embedded mitigation such as fire and gas detection, and passive and active fire prevention measures will be installed as required.

19.4. BASELINE CONDITIONS

19.4.1 INTRODUCTION

19.4.1.1. This section presents a description of the baseline environmental characteristics within the study area. The baseline relevant to this topic comprises:

- A description of potential natural hazards which may impact the Proposed Development Site, including meteorological hazards, geological hazards and other types of hazards;
- Existing major accident hazard sources that may impact the Proposed Development Site;
- Sensitive environmental receptors within the study area at risk of MA&D hazards associated with the Proposed Development; and
- Other hazards that have been screened out of the assessment.

19.4.2 NATURAL HAZARDS

Meteorological Hazards

19.4.2.1. Hazards resulting from severe weather events which could impact the Proposed Development have been derived considering the baseline information reported in **Chapter 18: Climate Change and Sustainability** (EIA Report Volume 2) and **Appendix 13B:** Flood Risk Assessment (EIA Report Volume 4) and are considered to include:

- Flooding following heavy rainfall events including fluvial, surface water, ground water and sewer flooding. Baseline flood risk is defined within **Chapter 13: Flood Risk** (EIA Report Volume 2) as:
  - Pluvial
  - Fluvial
  - Coastal
  - Groundwater
- Storms and gales;
- Drought;
- Heatwave;
- Cold and snow;
- Lightning and electrical storms (thunderstorms);
- Events of reduced visibility and air quality (e.g. due to dust sand or fog);
- Extreme temperatures (heatwaves and sub-zero temperatures); and
- Extreme humidity (high and low).

19.4.2.2. The potential for climate change to impact upon the frequency and severity of these meteorological hazards in future years is discussed in **Section 18.4.3** of **Chapter 18: Climate Change and Sustainability** (EIA Report Volume 2) which is based on future UK Climate Projections 2018 (UKCP18) from the Met Office (2021) for the Peterhead area.

Geological and Ground Related Hazards

19.4.2.3. There is low risk of hazards associated with ground stability, such as landslides, ground collapse, sinkholes, running sand and shrinking or swelling of clay at the Proposed Development Site.

19.4.2.4. **Appendix 14A**: **Phase 1 Desk Based Assessment** (EIA Report Volume 4) presents the geology underlying the Proposed Development Site and considers the potential for natural deposits to present ground related hazards. The published geology and historic boreholes indicate the presence of diamicton, clay, sand, gravel and silt.

Seismic Hazards and Tsunamis

19.4.2.5. Based on available information published by the British Geological Survey (BGS, 2021) the Proposed Development Site is located in one of the lowest areas of seismic hazard risk in the UK.

Wildfires

19.4.2.6. The Scottish Fire and Rescue Service (SFRS) annually handles a large number (approximately 500) of outdoor fires that are classed as grassland/woodland/crops fires. Fire Danger Rating Systems combine knowledge of fire-related vegetation characteristics with climate and weather data to give spatial and temporal information regarding the level of fire risk. Currently there are no systems that can be applied with confidence within

Scotland. On this basis it not possible to rule out the potential for a wildfire to occur given the habitats present within the Proposed Development Site and adjacent land parcels.

19.4.3 EXISTING MAJOR ACCIDENT HAZARDS

19.4.3.1. Industrial sites that could be the source of, or increase the risk or consequences of, a major accident and/ or susceptible to a MA&D risk introduced by the Proposed Development have been identified. Existing major accident hazard sources include industrial sites (such as those operated under the COMAH Regulations and HSC) and other notable local industrial sites identified by desk-based research.

19.4.3.2. Desk based searches have been undertaken in order to determine the proximity of such sites to the Proposed Development Site. **Appendix 14A: Phase 1 Desk Based Assessment** (EIA Report Volume 4) adopts a land contamination study area that extends 250m from the boundary of the Proposed Development Site. To provide a conservative screening distance for MA&D, sites within the following study areas have been identified:

- Relevant COMAH sites located within 1km of the Proposed Development Site; and
- HSC sites located within 500m of the Proposed Development Site.

19.4.3.3. According to the HSE website (HSE, 2021), there are no COMAH sites located within 1km of the Proposed Development Site. The nearest COMAH sites are:

- Peterhead South Base, operated by ASCO UK Limited located approximately 1.2km north east of the Proposed Development site;
- Peterhead, operated by NorSea Group (UK) Limited located approximately 2.5km north east of the Proposed Development site;
- Peterhead North Base – Castle Street, operated by ASCO UK Limited located approximately 2.8km north east of the Proposed Development site; and
- Peterhead North Base – Ship Street, operated by ASCO UK Limited located approximately 2.8km north east of the Proposed Development site.

19.4.3.4. All four COMAH sites identify relevant major accident hazards related to accidental release of dangerous substances, explosion and fire. As these sites are located beyond the 1km screening distance considered relevant for the Proposed Development, they are not considered further in the assessment tables provided in **Section 19.6**, although **Section 19.5** includes relevant design and impact avoidance measures to be adopted by the Applicant.

19.4.3.5. As reported in **Appendix 14A: Phase 1 Desk Based Assessment** (EIA Report Volume 4) there are no HSC site within the study area of that that of the existing power station.

19.4.3.6. No other relevant industrial sites are located within 500m of the Proposed Development Site.

19.4.4 OTHER POTENTIAL MAJOR ACCIDENT HAZARDS

19.4.4.1. The existing Peterhead Power Station could present a risk of MA&D that requires consideration, particularly given its proximity to the Proposed Development Site. It is noted that the Applicant operates an environmental management system (EMS) which is integrated within a safety, health and environmental (SHE) Management System, accredited to ISO14001:2015 standard. The SHE Management System is underpinned by a

Safety and Health Policy which includes a Major Accident Prevention Policy and Environment and Climate Change Policy and broadly covers:

- Systematic identification of hazards and risk assessment;
- Plant integrity and maintenance;
- Safe systems of work;
- Controls for the safe operation of processes; and
- Emergency planning including preparedness and response.

19.4.4.2. Implementation of this SHE Management System to minimise the risk of MA&D hazards for the Proposed Development Site is implicit within this assessment.

19.4.4.3. The Proposed Development Site contains a number of existing underground services including electrical cables and oil pipelines. The locations of these have been considered within the design of the Proposed Development and consultation undertaken with relevant stakeholders as appropriate.

19.4.4.4. The nearest airfield is Longside Airfield, operated by the North Sea Helicopter operator, is located approximately 5.2km north west of the Proposed Development Site. Although the airfield has not published details of any relevant aerodrome safeguarding or obstacle limitation surface (OLS) distances, it is considered that the Proposed Development Site would be highly unlikely to interfere with any such zones, if they exist, given the intervening distance. Aberdeen International Airport is located approximately 38.5km south-west of the Proposed Development Site and was consulted during the EIA Scoping process, however no comments were received as the Proposed Development Site is located outside of the safeguarding zone.

19.4.4.5. As reported in **Appendix 14A: Phase 1 Desk Based Assessment** (EIA Report Volume 4) residual risks from unexploded ordnance (UXO) have been considered. A specialist preliminary UXO report (**Annex C** of **Appendix 14A: Phase 1 Desk Based Assessment** (EIA Report Volume 4)) for the Proposed Development Site identifies that the potential for UXO to exist is assessed as low and considered unlikely and a detailed study was not considered necessary.

19.4.5 SOCIETAL RISKS

19.4.5.1. Existing societal risks include pandemics, which may cause civil emergencies and large numbers of people to fall ill and risk of terrorist attack on infrastructure is also included in the assessment presented in **Section 19.6**.

19.4.6 SENSITIVE ENVIRONMENTAL RECEPTORS

19.4.6.1. **Chapter 3: The Site and Surrounding Area** (EIA Report Volume 2) sets out the closest environmental receptors to the Proposed Development Site. These include residential receptors, the Buchan Ness to Collieston Coast Special Protection Area (SPA). **Figure 3.4** (EIA Report Volume 3) illustrates the location of urban areas and other environmental designations surrounding the Proposed Development Site where members of the public could be present.

19.4.6.2. The location of sensitive ecological receptors in proximity to the Proposed Development Site that require consideration in relation to MA&D risk are shown in **Figures 11.1 – 11.4** (EIA Report Volume 3).

19.4.6.3. The location of designated and non-designated heritage assets in proximity to the Proposed Development Site that require consideration in relation to MA&D risk are shown in **Figures 16.1** and **16.2** (EIA Report Volume 3).

19.4.7 OTHER HAZARDS SCREENED OUT

Volcanic eruptions

19.4.7.1. Volcanic eruptions present a risk of causing environmental damage, disruption to transport and poor air quality. Volcanic activity does not occur in the UK and has been screened out since it is not considered a risk to the Proposed Development.

Avalanches

19.4.7.2. Avalanches present a risk of causing damage to property and infrastructure. The topography of the Proposed Development Site is relatively flat and level and therefore the risk of avalanche has been screened out.

Coastal Flood Risk

19.4.7.3. The Proposed Development Site is located directly adjacent to the Aberdeenshire coastline; however, the topography is such that it is unaffected by coastal flooding. Adjacent low lying areas are likely to be affected by coastal flooding, including the footpath below the existing Power Station and at Boddam Harbour, however this is limited, and ground levels generally rise steeply from the shore.

19.4.8 FUTURE BASELINE

19.4.8.1. **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4) identifies projects that either have consent (and so may be constructed and/or commence operating) or are in the consenting process.

19.4.8.2. For the purposes of this Chapter, the projects detailed in **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4) will be considered as part of the future baseline, as they will be assumed to have been constructed before or during the construction of the Proposed Development.

19.4.8.3. To provide a conservative assessment in this Chapter, the identified projects presented in **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4) and **Figure 2.1** (EIA Report Volume 3) have been considered as potential receptors to MA&D risks during construction and operation of the Proposed Development.

19.4.8.4. The list of projects has also been reviewed to determine whether they are likely to give rise to new off-site hazards that could impact the Proposed Development.

19.4.8.5. The potential for climate change to impact upon the frequency and severity of meteorological hazards in future years is inherent within the assessment and discussed in **Chapter 18**: **Climate Change and Sustainability** (EIA Report Volume 2).

19.5. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

19.5.1 INTRODUCTION

19.5.1.1. The following impact avoidance measures will either be incorporated into the design or are standard construction or operational measures. These measures have therefore been considered during the impact assessment process described in this Chapter.

19.5.2 DESIGN

19.5.2.1. A Health and Safety Plan covering the works, commissioning and operation of the Proposed Development will be prepared by the Applicant. For design and construction, a competent and adequately resourced Construction (Design and Management) (CDM) Coordinator and Principal Contractor will be appointed. The Applicant will monitor that its own staff, its designers and contractors follow the Approved Code of Practice (ACoP) laid down by the CDM Regulations 2015.

19.5.2.2. Written procedures clearly describing responsibilities, actions and communication channels will be available for operational personnel dealing with emergencies. Procedures will be externally audited, and contingency plans written in preparation for any unexpected complications.

19.5.2.3. The Proposed Development is using 'safety in design' principles to take into consideration safety issues and risks within the ongoing design, to reduce risks from the installation to as low as reasonably practicable (ALARP). As part of the layout evolution, the following safety in design mitigation hierarchy has been adopted:

- Eliminate a hazard; in preference to;
- Control the hazard; in preference to; and
- Provide personal protective equipment (PPE).

19.5.2.4. Design mitigation at the current concept design stage includes consideration of potential CO_2 releases and includes, (but is not limited to):

- Careful equipment and material selection;
- Siting of high-pressure CO_2 equipment considering areas of potential exposure and prevailing wind direction;
- Incorporation of gas leak detection systems; and
- Consideration of venting arrangements.

19.5.2.5. The design engineers will prepare several philosophies with regard to process safety and safeguarding, isolation, emergency shutdown and if required, depressurisation. The design engineers will also review the layout and give due consideration both to the on-site location of facilities as well as the off-site receptors.

19.5.2.6. The concept of a Sustainable Urban Drainage System (SuDS) has been developed for the Proposed Development, to capture and treat surface runoff, discharging it to coastal water. It is proposed that this scheme be designed to a 0.5%AEP standard, due to the existing at the Peterhead Power Station. The Surface Water Drainage Strategy identifies that a combination of filter drains, oil interceptors and a "QuadraCeptor" - Filtration system for removal of sediment and pollutants, will be suitable for mitigating all the pollution from the site

19.5.2.7. As the design of the Proposed Development progresses, further consideration will continue, to confirm whether design mitigation is considered ALARP for the installation as a whole (i.e. future site users and general public). A design hazard management plan will be prepared and a number of hazard identification and evaluation assessments (HAZID and HAZOP reviews) will be carried out on the Proposed Development during the design process. This is a standard approach for the identification of hazards and the development of risk mitigation measures for preventing or otherwise minimising hazardous scenarios through appropriate design during the Front End Engineering Design (FEED) studies to be progressed.

19.5.2.8. Major accident assessments and studies will be prepared over the course of the design development and a Major Accident Prevention Plan (MAPP) will be prepared to inform the application for COMAH Licence for the operational facility, if required.

19.5.2.9. The advice provided for high hazard sites relating to security measures (National Counter Terrorism Security Office and Association of Chief Police Officers (NaCTSO, 2014) to prevent trespassers will be considered in the detailed design of the Proposed Development.

19.5.2.10. The Proposed Development Site will be within an area where similar facilities such as the adjacent power station have been in operation for many years. Consequently, these hazards are well understood by plant operators and controlled by the regulatory authorities. The Applicant will draw on this expertise of designing, building and operating major power generation facilities, to reduce the risk of major accidents occurring to ALARP.

19.5.2.11. The engineering design of the Proposed Development will incorporate appropriate standards, proven design methods and control measures necessary to reduce the risks of such accidents to an acceptable level, i.e. ALARP, which is the standard expected by the regulatory authorities (HSE and SEPA).

19.5.2.12. The Proposed Development will require appropriate permissions to be in place for its operation including a COMAH licence, if required and PPC Permit, and these regulatory controls will stipulate a number of requirements that must be demonstrated to prevent or minimise the effects of major accidents.

19.5.3 CONSTRUCTION

19.5.3.1. The use of suitably experienced contractors, risk assessments, working method statements, operating procedures and personnel training will provide the basis for reducing the potential for accidental scenarios occurring during construction of the Proposed Development.

19.5.3.2. A Construction Environmental Management Plan (CEMP) will be prepared to set out how construction activities are to be managed and controlled in compliance with accredited health and safety and environmental management systems, relevant legislation and PPC permits, consents and licences. The scope of the CEMP is set out in a Framework CEMP submitted with the Application. The Final CEMP will control potential impacts upon people, businesses and the natural and historic environment.

19.5.3.3. A Framework Construction Traffic Management Plan has been prepared to identify measures to control the impact of HGVs on the strategic and local road network during construction. It also defined the requirement for a programme of monitoring and gatehouse recording.

19.5.3.4. A Framework Construction Worker Travel Plan (CWTP) to outline how workers would travel to the Proposed Development Site during the construction phase. The CWTP would act in helping the environment by reducing the number of trips made to and from the Proposed Development Site by private car during the construction phase. The primary objectives of the CWTP are to:

- Facilitate an appropriate package of measures to encourage sustainable travel behaviour;
- Reduce car usage (particularly single occupancy car journeys);
- Raise awareness of the sustainable transport measures serving the Proposed Development Site; and
- Minimise the impact of traffic on sensitive locations.

19.5.3.5. Site security and lighting (during hours of darkness) would be provided 24 hours a day 7 days a week. This would include the provision of fencing and security arrangements which would be monitored on site, including CCTV and controlled vehicular access.

19.5.4 OPERATION

19.5.4.1. As outlined previously, a COMAH Licence from the HSE is likely to be required and a PPC Permit from SEPA will be required for the operation of the Proposed Development. It is assumed that a lower tier COMAH Licence will be required as a minimum at this stage pending finalisation of which hazardous substances will be handled on site and the inventories involved. Both permissions require a number of stipulations and requirements to be fulfilled to the satisfaction of the regulators including use of appropriate control and monitoring procedures, risk assessments, management systems and control measures to minimise the risk of major accidents occurring and to minimise the effects of any such major accidents on off-site receptors as well as the operational workforce. The permit requires the approach to managing accidents and emergencies to be in accordance with the use of Best Available Techniques (BAT).

19.5.4.2. To reduce the risks of contamination to processes and surface water, all liquid chemicals stored on site will be kept in bunded controlled areas with a volume of 110% of storage capacity and be appropriately segregated.

19.5.4.3. Design and operational controls will be in place to manage the risks associated with the smaller inventories of the above hazardous substances including use of dedicated bunded above ground storage areas, segregation of incompatible materials, dedicated filling points and management procedures for the handling, storage and use of the materials.

19.6. LIKELY IMPACTS AND EFFECTS

19.6.1 INTRODUCTION

19.6.1.1. Several potential major accident scenarios could occur during the construction, operational and decommissioning phases of the Proposed Development. These scenarios have been grouped into the following risk events:

- Extreme weather (e.g. flooding, drought);
- Wildfires;

- Seismic hazards/ tsunamis;
- Fire/ explosion and risk of release of harmful gas;
- Spillage/ leak of chemicals or pollutants into groundwater/ surface water;
- Vandalism (trespass)/ terrorism;
- Ground collapse (including UXO risk);
- Major road traffic accident;
- Release of asbestos;
- Aircraft/ drone impact;
- Outbreak of disease/ pandemic;
- Absent or deficient safety/ environmental management systems (e.g. inadequate planning, resource provision, procedures);
- Emergency response activities implemented on site impacting on sensitive receptors; and
- MA&D event at the neighbouring Peterhead Power Station.

19.6.2 CONSTRUCTION

19.6.2.1. A summary of identified potential construction MA&Ds are outlined within the relevant risk event groupings within **Table 19.4**.

Table 19-4: Potential Construction Phase Major Accidents and Disasters

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
C1	Extreme weather (e.g. flooding, drought) which is either caused or exacerbated by the construction of the Proposed Development and leads to release of stored construction related material, equipment and potential contaminants.	Flooding of the site and properties downstream. Prolonged periods of dry weather creating hard and dry surfaces across the site. Potential creation of dust from site due to dry weather. Extreme heat impacting operational workers. Coastal flooding as a result of a storm event or tsunami or breach of flood defences resulting in the flooding of the site and surrounding areas. *<u>Not covered under this item</u>: Wildfires – C3* *Spillage/ leak of pollutants into groundwater/ surface water due to construction activities - C5, MA&D event at the adjacent Peterhead Power Station – C13*	Irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.). Worsened extreme weather impact leads to fatality /injury to members of public.	Major	Very long term or permanent	Category D	Construction of the Proposed Development on a platform set at an elevation of 9.58mAOD would provide 600mm freeboard above the 0.5% AEP event with an allowance for climate change. An alternative design will be considered to mitigate existing and future flood risk to the existing Power Station and the Proposed Development. The CEMP sets out requirements for emergency preparedness and monitoring of extreme weather events, including on-site emergency response The CEMP will set out requirements for the establishment of safe systems of work. Compliance with the provisions of the Health and Safety at Work Act 1974, ensuring occupational health and safety arrangements are in place	Remote	Tolerable if ALARP (**not significant**)
C2	Seismic Hazards	Earthquakes, tremors resulting in physical damage *<u>Not covered under this item</u>: Extreme weather (Tsunami) - C1, Fire/ explosion and risk of release of harmful gas - C4, Ground collapse - C7, C9, MA&D event at the adjacent Peterhead Power Station – C13*	Damage to construction and risk of fatality / injury to construction workers	Major	Very long term or permanent	Category D	The design of earthworks and foundations and selection of materials will be undertaken in accordance with relevant standards, taking into account potential for ground movement and compaction. All safety critical features would be seismically qualified.	Extremely remote	Tolerable (**not significant**)
C3	Wildfire	Wildfire spreading onto the construction site *<u>Not covered under this item</u>: Fire/ explosion and risk of release of harmful gas - C4, Ground collapse*	Damage to construction and risk of fatality / injury to construction workers. Physical damage to sensitive environmental receptors.	Catastrophic	Very long term or permanent	Category D	The CEMP will set out requirements for fire prevention and control.	Extremely improbable	Tolerable (**not significant**)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
		- C7, C9, MA&D event at the adjacent Peterhead Power Station – C13	Indirect effects on human health, property, heritage assets and wildlife due to smoke and ash deposition.						
C4	Fire/ explosion and risk of release of harmful gas.	*Not covered under this item: Wildfire - C3, C9, MA&D event at the adjacent Peterhead Power Station – C13*	Risk of fire/ explosion and release of harmful gas leading to fatality/ injury to member of public. Risk of fire/ explosion causes irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.); or structural damage to buildings and/ or infrastructure.	Major	Very long term or permanent	Category D	A ground investigation will be designed to target the potentially contaminative sources identified, on the Proposed Development Site. Where risks are deemed to be significant, detailed remediation strategies will be developed accordingly. A CEMP will be in place to control potential environmental impacts of construction works. Control measures will be implemented to prevent fires and procedures will be prepared and implemented to respond to fires, in the event that they were to arise.	Extremely remote	Tolerable if ALARP (**not significant**)
C5	Spillage/ leak of pollutants into groundwater/ surface water due to construction activities	Risk of contamination of water resources.	Irreversible damage to waterbodies and dependant species/ habitats. Loss of water supply	Major	Long term	Category B	Impact avoidance measures related to leaks and spills are presented in **Chapter 12**: **Water Environment** (EIA Report Volume 2). A CEMP will be implemented to manage storage of construction materials and potential environmental impacts of construction works.	Remote	Tolerable if ALARP (**not significant**)
C6	Vandalism (trespass)	Risk of vandalism/ terrorism/ arson leading to fires/ explosions. *Not covered under this item: Wildfire – C3, Fire/ explosion and risk of release of harmful gas - C4, MA&D event at the adjacent Peterhead Power Station – C13*	Fatality/ injury to member of public off site from fire/ explosions; and/ or irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.).	Catastrophic	Very long term or permanent	Category D	Appropriate security measures will be installed at the construction site, including site security and fencing to prevent trespassers and mitigate this risk to ALARP.	Extremely improbable	Tolerable if ALARP (**not significant**)
C7	Ground collapse and unexploded ordnance	Risk of construction resulting in disturbance of manmade or naturally occurring ground related hazards. Vibration causes ground instability/ collapse/ settlement.	Localised collapse and subsidence of ground at the surface/ surface settlement could lead to uncontrolled movement affecting objects/ people/ materials/ plant/ equipment which could cause injury/ fatality to persons on site and/ or lead to secondary impacts e.g. damage to utilities leading to explosion.	Major	Very long term or permanent	Category D	As identified in **Chapter 14: Ground Conditions** (EIA Report Volume 2), ground investigation will be undertaken before construction to inform the development of the preliminary and detailed design.	Extremely remote	Tolerable if ALARP (**not significant**)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
		Not covered under this item: Wildfire – C3, Fire/ explosion and risk of release of harmful gas - C4, Release of asbestos – C9, MA&D event at the adjacent Peterhead Power Station – C13							
C8	Major road traffic accident	Movement of construction vehicles on local roads leading to increased risk of road traffic accidents.	Fatality/ injury to members of public.	Major	Very long term or permanent	Category D	Controls will be implemented including a construction traffic management plan (CTMP) and construction workers' travel plan (CWTP) – A Framework CTMP **Appendix 10B** (EIA Report Volume 4) and Framework CWTP **Appendix 10C** (EIA Report Volume 4) are submitted with the Application. Risks to road users have been assessed in **Chapter 10**: **Traffic and Transportation** (EIA Report Volume 2) and are not considered significant.	Extremely remote	Tolerable if ALARP (**not significant**)
C9	Release of asbestos	Risk of uncontrolled release of asbestos present on site, if disturbed during construction of the Proposed Development.	Risk of uncontrolled release of asbestos containing materials (ACM) during excavation works leading to short term exposure to construction personnel, and possibly members of the public off-site in surrounding areas.	Severe	Very long term or permanent	Category C	**Chapter 14: Ground Conditions** (EIA Report Volume 2) identified There is potential for asbestos to be present in any Made Ground on site (albeit none has been encountered during the previous ground investigations). Any Made Ground found to be contaminated with asbestos will require suitable management if it is to be retained on-site or removed. Asbestos management should be covered within the CEMP and DEMP. governing the handling and disposal of ACM.	Extremely remote	Tolerable if ALARP (**not significant**)
C10	Aircraft/ drone impact	Risk of collision between aircraft and tall construction machinery, e.g. cranes. Construction lighting and tall structures have the potential to present a visual distraction to pilots, causing aircraft incident. Potential risk of asset damage and subsequent fires/ explosions. *Not covered under this item: Fire/ explosion and risk of release of harmful*	Aircraft incident results in fatality/ injury to member of public and/ or irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.).	Catastrophic	Very long term or permanent	Category D	The Proposed Development is in an area which does not have a high density of air traffic. Consultation with Aberdeen airport has been undertaken as part of the EIA Scoping Process. The CEMP will include vigilance and security systems to safely shutdown the plant in the event of any aircraft related incident.	Extremely remote	Tolerable if ALARP (**not significant**)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
		gas - C4, Ground collapse - C7, C9							
C11	Outbreak of disease/ pandemic	Risk of pandemic causing civil emergency.	Risk of pandemic occurring which may cause civil emergency and large numbers of people to fall ill, including construction workers. Risk of loss of control of construction site.	Catastrophic	Very long term or permanent	Category D	If a pandemic was to disrupt the construction of the Proposed Development, measures would be adopted in accordance with guidance at the time of the event. The CEMP would be followed to ensure no adverse environmental effects occurred during this time.	Extremely remote	Tolerable if ALARP (**not significant**)
C12	Absent or deficient safety/ environmental management systems (e.g. inadequate planning, resource provision, procedures)	Absent or deficient safety/ environmental management systems increasing the risk of any MA&D hazards identified.	As described within this table for all hazards relevant to the construction phase.	Catastrophic	Very long term or permanent	Category D	Construction works will be completed in compliance with accredited safety and environmental management systems (e.g. certified to ISO 45001 and 14001 standards or equivalent). Regular audits will be undertaken to monitor compliance against the site management systems.	Extremely remote	Tolerable if ALARP (**not significant**)
C13	MA&D event at the adjacent Peterhead Power Station	Risk of loss of containment of natural gas leading to fire/explosion and risk of release of harmful gas which may spread to the Proposed Development due to close proximity. *<u>Not covered under this item</u>: Wildfire – C3, Fire/ explosion and risk of release of harmful gas – C4*	Fire and/or explosion could spread to the Proposed Development due to the close proximity and result in significant harm (serious injuries / fatalities) to construction personnel. Risk of irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.) or structural damage to buildings and/or infrastructure. Risk of harm to people, buildings and other receptors off-site depending on severity of fire/ explosion/ incident e.g. due to radiant heat burns and impact injuries from explosions.	Major	Very long term or permanent	Category D	Existing operational and emergency procedures in place at Peterhead Power Station In addition, through the implementation of a CEMP at the Proposed Development Site, the risk of domino effects occurring will be minimised.	Extremely remote	Tolerable if ALARP (**not significant**)
C14	Emergency response activities implemented on site impacting on sensitive receptors	Water from fire extinguishing draining into environmentally sensitive areas and/ or controlled waters	Contamination and pollution of identified sensitive environmental receptors	Severe	Medium term	Category B	Measures embedded within the drainage design for pollution prevention and control. The CEMP will include measures relating to pollution prevention, including arrangements for incident response and control, compliance with regulatory requirements (such as COSSH and PPC permits).	Remote	Tolerable (**not significant**)

19.6.3 OPERATION

19.6.3.1. A summary of identified potential operational phase risks are outlined within the relevant risk event groupings within **Table 19.4**.

19.6.3.2. The assessment of MA&D considers operations on the Proposed Development Site. In common with many types of thermal power stations there will be hazardous and potentially harmful substances present on the Proposed Development Site, the CO_2 compression station and Natural Gas Connection in quantities that, if released, have the potential to cause a major accident.

19.6.3.3. In addition to CO_2 and natural gas, the hazardous substances required to be stored and used on the operational Proposed Development Site are presented in **Section 4.8** of **Chapter 4: The Proposed Development** (EIA Report Volume 2) and in summary will include:

- Solvent that will remove the carbon dioxide from the gas stream in the CCP. The solvent to be used is the subject of ongoing technical studies but is assumed to be an aqueous solution of amines. The CCP includes equipment for reclaiming used solvent within the process, but make-up will be required.
- Sodium hydroxide and sulphuric acid for pH control and treatment within the CCP;
- Power plant treatment chemicals (oxygen scavenger, SCR reagent (ammonia or urea) and phosphate);
- Capture plant treatment chemicals (sodium hydroxide, sulphuric acid and triethylene glycol – insulating gas for HV electrical systems);
- Water treatment plant chemicals (biocides, antiscalants, sulphuric acid, sodium hydroxide, phosphoric acid, polyelectrolyte, molasses);
- Hydrogen for generator cooling and deoxygenation of product carbon dioxide stream; and
- Cooling tower chemicals (biocides, bio dispersants, corrosion inhibitors).
- Other chemicals required for routine cleaning, maintenance and emergency firefighting uses include:
  - Distillate fuel;
  - Nitrogen (natural gas system and other equipment purge);
  - Cleaning chemicals;
  - Acetylene (metal cutting);
  - Inert fire-fighting gases;
  - Lubricating oils;
  - Carbon dioxide for purging of electrical generators for maintenance purposes.

19.6.3.4. Smaller quantities of other hazardous materials will also be present at the Proposed Development Site. These substances would not be assumed to be able to initiate or exacerbate MA&D hazards but could be harmful in the event of a major accident that causes loss of containment (for example, if hazardous substances were released during a fire event, due to the failure of storage vessels, this could result in the hazardous substances being present in the firewater runoff). These hazardous materials, present in small quantities, may include traces of nitrosamines and nitramines, which could be present within the CO_2 absorption/ regeneration system. Water and effluent treatment chemicals

used on-site in smaller quantities will include sodium hydroxide, sulphuric and hydrochloric acid. Smaller inventories of synthetic oils will be present in transformers and rotating equipment. Further details of the chemicals used can be found in **Chapter 4: The Proposed Development** (EIA Report Volume 2).

19.6.3.5. **Table 19.4** below lists the potential MA&D relevant to the operation of the Proposed Development and the storage and handling of hazardous substances present.

Table 19-5: Potential Operational Major Accidents and Disasters

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
Op1	Fire/ explosion and risk of release of natural gas and hydrogen.	Natural gas - Loss of containment of natural gas from supply pipeline and/ or power plant equipment leading to unconfined gas explosion. Hydrogen - Loss of containment from storage cylinders, pipework and/ or process equipment (cooling equipment and oxygen removal equipment). Whilst the volume of hydrogen stored on the site will be low, a release of flammable gas could be caused by mechanical failure or impact damage resulting in a loss of containment. Immediate ignition of the gas would lead to a localised flash or jet fire depending on gas volume and pressure. Delayed ignition could lead to an explosion and/ or fire. <u>*Not covered under this item:*</u> *Fire/ explosion and risk of release of distillate fuel oil - Op2,* *Fire/ explosion and risk of release of CO_2 - Op3* *Fire/ explosion and risk of release of amine from the CCP - Op4* *Fire/ explosion and risk of release of N-amine from the CPP - Op5* *Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Spillage/ leak of other chemicals or other hazardous materials - Op7* *Wildfire - Op12* *MA&D event at the adjacent Peterhead Power Station – Op17*	Fire and/ or explosion could result in significant harm, with potential for injuries/ fatalities (on site personnel). There is also potential for harm to people, buildings and other receptors off-site due to radiant heat burns and impact injuries from explosions. Risk of fire/ explosion causes irreversible damage to environmental receptor. (listed building, ecological site, watercourse etc.). or structural damage to buildings and/ or infrastructure. Firewater run-off containing contaminants could be potentially harmful the Humber Estuary Ramsar/ SAC/ SSSI designations and/ or Secondary A aquifer within superficial deposits.	Major	Very long term or permanent	Category D	Design of the natural gas systems to relevant industry codes and standards. Compliance with relevant legislation including the Pressure Equipment (Safety) Regulations 2016 and the Pipelines Safety Regulations (PSR). Selection of pipeline routes across the Proposed Development Site, depth of cover in areas of higher risk. Pipeline safety systems and gas/ liquid pressure regulation to be installed along with operational controls and monitoring. Gas detection systems at the Proposed Development Site. Minimising the storage volumes of high hazard materials to as low as reasonably practicable (e.g. small volumes of hydrogen) Fire detection and fire protection systems will be installed, including passive and active fire suppression systems. The Proposed Development Site would be designed to contain firewater runoff and prevent material reaching unmade ground or other environmental receptors. Detailed emergency plans will be produced for the installation in accordance with the PPC Permit and any other applicable Regulations e.g. COMAH, if required. Provision of three emergency access/ egress points as described in Section 4.4.8 of Chapter 4: The Proposed Development (EIA Report Volume 2).	Extremely remote	Tolerable if ALARP (not significant)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
Op2	Fire/ explosion and risk of release of distillate fuel oil	Distillate fuel oil – release of flammable liquid from storage, pipework or operating equipment. Whilst the volume of distillate fuel stored on the site will be low, the ignition of this fuel, if released due to failure of primary containment, could result in a localised pool fire if the vapour found a source of ignition. <u>*Not covered under this item:*</u> *Fire/ explosion and risk of release of natural gas and hydrogen - Op1* *Fire/ explosion and risk of release of CO_2 - Op3* *Fire/ explosion and risk of release of amine from the CCP - Op4* *Fire/ explosion and risk of release of N-amine from the CPP - Op5* *Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Spillage/ leak of other chemicals or other hazardous materials - Op7* *Wildfire - Op12* *MA&D event at the adjacent Peterhead Power Station – Op17*	A local pool fire could result in harm to people on-site and damage to assets but would be unlikely to escalate to a major accident affecting areas off-site. This is because distillate fuel would only be used in small quantities as start-up fuel or for back-up generators located in close proximity to the main generating station or compression equipment, some distance from the Proposed Development Site boundary.	Major	Very long term or permanent	Category D	Design of the storage tanks to industry codes and standards. Installation of the storage tank(s) within a secondary containment system (bund) designed in accordance with CIRIA C736 guidance (CIRIA, 2014). Instrumentation and control systems will be installed to monitor tank contents and prevent overfill. Minimising the storage volumes of high hazard materials. Depending on the inventory of distillate fuel oil and other hazardous substances, the Proposed Development Site may be regulated through the COMAH Regulations (UK Parliament, 2015). It will also be regulated. though a PPC Permit from SEPA . Provision of three emergency access/ egress points as described in Section 4.4.8 of Chapter 4: The Proposed Development (EIA Report Volume 2).	Extremely remote	Tolerable if ALARP (not significant)
Op3	Fire/ explosion and risk of release of CO_2	Accidental release of CO_2 at medium or high pressure on the Proposed Development Site. CO_2 is toxic and an asphyxiant, depending on the concentration in air. It is also odourless and heavier than air. A release of CO_2 could be caused by mechanical failure or impact damage resulting in a loss of containment. A leak or rupture of a system containing high pressure (dense	The impact of the release on people and the environment depends on the pressure, temperature and mass of material that is lost, however there is the potential for a major accident resulting in significant harm and potential fatalities, both on-site and off-site. Risk of high levels of CO_2 dissolved in water can lead to acidification and effects on shell-forming species.	Major	Very long term or permanent	Category D	Relevant equipment has been located a minimum distance of 50m from the Proposed Development Site boundary and downwind (with respect to the prevailing wind) of all the typically occupied areas (site personnel) and the majority of the equipment. Quantitative risk assessment with dispersion modelling is being undertaken to confirm adequacy of this safeguarding measure for site personnel and general public. Detailed standards and codes of practice written specifically for the design and operation of high pressure CO_2 plant and	Extremely remote	Tolerable if ALARP (not significant)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
		phase) CO_2 will be noisy and will be observed with the naked eye due to the transition between the phases. There will be an associated large reduction in temperature from a high-pressure release Further details of the hazards associated with a CO_2 release are presented below this table. <u>*Not covered under this item:*</u> *Fire/ explosion and risk of release of natural gas and hydrogen - Op1* *Fire/ explosion and risk of release of distillate fuel oil - Op2,* *Fire/ explosion and risk of release of amine from the CCP - Op4* *Fire/ explosion and risk of release of N-amine from the CPP - Op5* *Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Spillage/ leak of other chemicals or other hazardous materials - Op7* *Wildfire - Op12* *MA&D event at the adjacent Peterhead Power Station – Op17*					pipelines are still being developed, therefore industry codes and standards for gas and chemical pipelines will be applied where appropriate. According to the HSE, “ongoing work suggests that the hazards involved with the bulk transport of CO_2 are similar to the hazards transporting natural gas”. Compliance with PSR 1996 and additional specific safety measures for CO_2 pipelines will apply. The high pressure CO_2 will be managed to specification limits defined by the pipeline operator. The gas composition is linked to the pipeline design (materials of construction) and will be carefully managed to ensure no excursions via monitoring and trips. The pipeline operator has undertaken extensive studies of CO_2 pipeline design, including destructive testing. Pressure monitoring and pressure relief systems to prevent over pressurisation situations. Emergency shut down valves to be fitted on certain pipelines to mitigate risk of becoming over pressurised. Use of containment measures and barriers to prevent damage to pipelines and compliance with the Pressure Safety Regulations (2016). Detailed emergency plans will be produced for the installation in accordance with the PPC Permit and all applicable Regulations. Leak detection systems. Isolation valves in the pipeline system to minimise inventory release to the atmosphere. The Proposed Development will use accepted dispersion modelling tools to model the dispersion of CO_2 releases. The outcomes of this modelling will be reviewed by the project team and incorporated into the final design of the Proposed Development.		

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
Op4	Fire/ explosion and risk of release of amine from the CCP.	Release of abnormal levels of amine from CO_2 absorption/ regeneration system. Amines used in the CO_2 absorption/ regeneration system are non-flammable, toxic solvents which are harmful to people and hazardous to the environment. An abnormal release of amines could occur from failure in process equipment, pipework, the offloading (road tanker import) system and storage vessels and could be caused by mechanical failure or impact damage. <u>*Not covered under this item:*</u> *Fire/ explosion and risk of release of natural gas and hydrogen - Op1* *Fire/ explosion and risk of release of distillate fuel oil - Op2,* *Fire/ explosion and risk of release of CO_2 - Op3* *Fire/ explosion and risk of release of N-amine from the CPP - Op5* *Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Spillage/ leak of other chemicals or other hazardous materials - Op7* *Wildfire - Op12* *MA&D event at the adjacent Peterhead Power Station – Op17*	Loss of amines into surface water drains could reach local watercourses and result in irreversible damage to environmental receptor (ecological site, watercourse etc.) as a result of the toxicity of amines, increase in the pH of the environment and reduction in dissolved oxygen concentrations.	Major	Very long term or permanent	Category D	Amine storage tank(s), process equipment and pipework design and construction to industry standards. Site process water to be segregated from surface water drains and routed to holding tanks or wastewater treatment plant for treatment and testing prior to discharge. Surface water drains and attenuation system to have isolation valves installed to be closed in the event of accidental spillage into the uncontaminated surface water drainage system. Design of site containment facilities and drainage systems to industry standards (e.g. CIRIA C736) and operated in accordance with the PPC Permit.	Extremely remote	Tolerable if ALARP (not significant)
Op5	Fire/ explosion and risk of release of N-amine from the CPP.	Release of abnormal levels of N-amine formed as by-products within the CO_2 absorption/ regeneration system (CCP). These are non-flammable, toxic solvents which are harmful to	Irreversible damage to environmental receptor (ecological site, watercourse etc.) depending on concentrations/ duration of release.	Major	Very long term or permanent	Category D	Process equipment and pipework design and construction to industry standards. Wastes from the CO_2 capture system to be collected for off-site disposal via a licensed hazardous waste management contractor.	Extremely remote	Tolerable if ALARP (not significant)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
		people and hazardous to the environment. An abnormal release of N-amines could occur from process abnormalities and could give rise to elevated release concentrations from the emissions stack(s). *<u>Not covered under this item:</u>* *Fire/ explosion and risk of release of natural gas and hydrogen - Op1* *Fire/ explosion and risk of release of distillate fuel oil - Op2,* *Fire/ explosion and risk of release of CO_2 - Op3* *Fire/ explosion and risk of release of amine from the CCP - Op4* *Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Spillage/ leak of other chemicals or other hazardous materials - Op7* *Wildfire - Op12* *MA&D event at the adjacent Peterhead Power Station – Op17*							
Op6	Spillage/ leak of aqueous ammonia solution from the emissions abatement system	Release of aqueous ammonia solution used in the emissions abatement system, through loss of containment (aqueous liquid loss) and ammonia vapours from the liquid. Aqueous ammonia solution is harmful to people, causing burns, eye damage and respiratory irritation. It is toxic to aquatic life in the environment. Risk of spillage of hazardous waste (sludge containing metals and amine degradation products) from amine reclaimer.	Irreversible damage to environmental receptor (ecological site, watercourse etc.) depending on concentrations/ duration of release.	Major	Very long term or permanent	Category D	Ammonia storage tank(s), process equipment and pipework design and construction will meet relevant industry standards. Minimising the storage volumes of high hazard materials. Use of an appropriately licensed and competent hazardous waste contractor. Site drainage philosophy will ensure that process water is segregated from surface water drains and routed to holding tanks or wastewater treatment plant for treatment and testing prior to discharge. Surface water drains and attenuation system to have isolation valves installed to be closed in the event of accidental spillage into the	Extremely remote	Tolerable if ALARP (not significant)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
		A release of these substances could occur from failure in process equipment, pipework, the offloading (road tanker import) system and storage vessels and could be caused by mechanical failure or impact damage. There is a risk that on-site chemical storage facilities could be used for longer than sized for, leading to leaks. Risk of spillage of substances and hazardous goods during transportation off-Site. *<u>Not covered under this item:</u> Spillage/ leak of other chemicals or other hazardous materials - Op7* *Emergency response activities implemented on site impacting on sensitive receptors - Op13*					uncontaminated surface water drainage system. Design of site containment facilities and drainage systems to industry standards (e.g. CIRIA C736) and operated in accordance with the PPC Permit. Transportation of hazardous substances to and from Site will be undertaken in accordance with The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (HM Government, 2009). The Surface Water Drainage Strategy identifies that a combination of filter drains, oil interceptors and a filtration system for removal of sediment and pollutants, will be suitable for mitigating any accidental pollution releases from the site		
Op7	Spillage/ leak of other chemicals or other hazardous materials	Risk of contamination of water resources / damage or contamination of aquifer or borehole. *<u>Not covered under this item:</u> Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Emergency response activities implemented on site impacting on sensitive receptors - Op13*	Risk of drainage system failure leading to damage to local environment due to accidental discharges of oil or other chemicals, e.g. fire-fighting foam.	Major	Very long term or permanent	Category D	In order to mitigate the risk of chemical spillages and leaks leading to water contamination, there will be segregation of clean water/ rainwater/ fire water drains through use of paved areas and rain shelters above outdoor equipment. The Surface Water Drainage Strategy identifies that a combination of filter drains, oil interceptors and a filtration system for removal of sediment and pollutants, will be suitable for mitigating any accidental pollution releases from the site	Extremely improbable	Tolerable if ALARP (not significant)
Op 9	Extreme weather (e.g. flooding, drought) which is either caused	Flooding of the site and properties downstream. Prolonged periods of dry weather creating hard and dry surfaces across the site.	Irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.). Worsened extreme weather impact leads to fatality /injury to members of public.	Major	Medium term	Category B	A Sustainable Urban Drainage System (SuDS) has been developed for the Proposed Development, to capture and treat surface runoff, discharging it to coastal water. It is proposed that this scheme be designed to a	Remote	Tolerable (**not significant**)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
	or exacerbated by the operation of the Proposed Development.	Potential creation of dust from site due to dry weather. Extreme heat impacting operational workers. Coastal flooding as a result of a storm event or tsunami or breach of flood defences resulting in the flooding of the site and surrounding areas. *<u>Not covered under this item</u>:* *Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Spillage/ leak of chemicals or hazardous materials and damage caused by 3rd party - Op8* *Wildfires – Op13*	Damage to infrastructure.				0.5% annual exceedance probability (AEP) standard.		
Op10	Extreme Weather – Extreme temperature and wind speeds	Ambient temperature extremes (high and low), high windspeeds.	The impact of climate change causing extremes of temperature and winds may affect process operation of the Proposed Development Site such as the cooling systems and structural stability. This could potentially impact the operation and efficiency of the Proposed Development.	Major	Very long term or permanent	Category D	The concept engineering design and future detailed design take into account the predicted ambient temperatures and wind speeds over the operational lifecycle of the Proposed Development. The design will incorporate future climate resilience measures, if required to ensure use of suitable materials in the design of utility systems such as cooling water.	Extremely improbable	Tolerable if ALARP (not significant)
Op11	Extreme Weather - Lightning Storm	Risk of lightning strike leading to asset damage, including electrical failure, and potential subsequent fires/ explosions.	A lightning strike could cause a major accident, harm to people on-site and damage to site infrastructure. A lightning strike could also damage the distribution network, leading to damage to the national electricity transmission system. Lightning could also present a source of ignition to flammable materials. A subsequent major fire could harm people both on-site and off-site.	Major	Very long term or permanent	Category D	The engineering design of the Proposed Development will include appropriate electrical earthing and bonding systems. The design and maintenance of these systems will reduce the likelihood of a major accident being initiated by a lightning strike to a very low level. It is anticipated that existing black start operations at the wider site will be used to recover the electricity transmission network from total or partial shutdown. Guidance is provided by the HSE on the management of potential ignition caused by lightning (HSE, 2014).	Extremely improbable	Tolerable if ALARP (not significant)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
Op12	Seismic Hazards	Earthquakes, tremors resulting in physical damage *<u>Not covered under this item</u>: Fire/ explosion and risk of release of natural gas and hydrogen - Op1* *Fire/ explosion and risk of release of distillate fuel oil - Op2,* *Fire/ explosion and risk of release of CO_2 - Op3* *Fire/ explosion and risk of release of amine from the CCP - Op4* *Fire/ explosion and risk of release of N-amine from the CPP - Op5* *Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Spillage/ leak of other chemicals or other hazardous materials - Op7* *Extreme weather (Tsunami) – Op9,* *Wildfire - Op12* *MA&D event at the adjacent Peterhead Power Station – Op17*	Damage to infrastructure and risk of fatality / injury to operational stall and maintenance workers	Major	Very long term of permanent	Category D	Data collated by British Geological Survey and Musson and Sargeant (2007) demonstrate that the seismic hazard of the UK is considered to be very low.	Extremely remote	Tolerable (**not significant**)
Op13	Wildfire	Wildfire spreading onto the Site *<u>Not covered under this item:</u>* *Fire/ explosion and risk of release of natural gas and hydrogen - Op1* *Fire/ explosion and risk of release of distillate fuel oil - Op2,* *Fire/ explosion and risk of release of CO_2 - Op3* *Fire/ explosion and risk of release of amine from the CCP - Op4* *Fire/ explosion and risk of release of N-amine from the CPP - Op5* *Spillage/ leak of aqueous ammonia solution from the*	The worst-case risks and effects of this could be significant harm to site personnel, with potential for injuries/ fatalities. There is also potential for harm to people, buildings and other receptors off site.	Catastrophic	Very long term or permanent	Category D	The applicant will establish an accredited safety and environmental management systems (e.g. certified to ISO 45001 and 14001 standards or equivalent) for the Proposed Development. Regular audits will be undertaken to monitor compliance against the site management systems.	Extremely remote	Tolerable if ALARP (not significant)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
		emissions abatement system - Op6 *Spillage/ leak of other chemicals or other hazardous materials - Op7* *MA&D event at the adjacent Peterhead Power Station – Op17* *Emergency response activities implemented on site impacting on sensitive receptors – Op19*							
Op14	Vandalism (trespass)/ terrorism	Risk of vandalism/ terrorism leading to fires/ explosions. <u>*Not covered under this item:*</u> *Fire/ explosion and risk of release of natural gas and hydrogen - Op1* *Fire/ explosion and risk of release of distillate fuel oil - Op2,* *Fire/ explosion and risk of release of CO_2 - Op3* *Fire/ explosion and risk of release of amine from the CCP - Op4* *Fire/ explosion and risk of release of N-amine from the CPP - Op5* *Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Emergency response activities implemented on site impacting on sensitive receptors - Op7* *Wildfires – Op13* *MA&D event at the adjacent Peterhead Power Station – Op17* *Emergency response activities implemented on site impacting on sensitive receptors – Op19*	The worst-case risks and effects of this could be significant harm to site personnel, with potential for injuries/ fatalities. There is also potential for harm to people, buildings and other receptors off site due to radiant heat burns and impact injuries from explosions.	Catastrophic	Very long term or permanent	Category D	Security measures will be installed at the Proposed Development Site, including site security, CCTV and fencing to prevent trespassers and cyber security measures to prevent hacking. Security advice for high hazard sites provided by the National Counter Terrorism Security Office and Association of Chief Police Officers (NaCTSO, 2014) will be considered during detailed design.	Extremely remote	Tolerable if ALARP (not significant)
Op15	Major road traffic accident	Risk of presence of operation/ maintenance vehicles on local roads leading to increased road traffic accidents due to additional traffic affecting members of public.	Fatality /injury to members of public. Irreversible damage to environmental receptor (ecological site, watercourse etc.)	Major	Very long term or permanent	Category D	Risks to road users (highway safety) has been assessed in Chapter 10: Traffic and Transportation (EIA Report Volume 2) and are considered negligible, not significant. Transportation of hazardous substances and goods will be undertaken in accordance with	Extremely remote	Tolerable if ALARP (not significant)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
		Road traffic accident causes loss of containment of hazardous substances being transported.					The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (HM Government, 2009).		
Op16	Aircraft/ drone impact	Tall structures have the potential to present a visual distraction to pilots, causing aircraft incident. Risk of asset damage, potential subsequent fires, explosions <u>*Not covered under this item:*</u> *Fire/ explosion and risk of release of natural gas and hydrogen - Op1* *Fire/ explosion and risk of release of distillate fuel oil - Op2,* *Fire/ explosion and risk of release of CO_2 - Op3* *Fire/ explosion and risk of release of amine from the CCP - Op4* *Fire/ explosion and risk of release of N-amine from the CPP - Op5* *Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Emergency response activities implemented on site impacting on sensitive receptors - Op7* *MA&D event at the adjacent Peterhead Power Station – Op17* *Emergency response activities implemented on site impacting on sensitive receptors – Op19*	Aircraft incident results in fatality/ injury to member of public and/ or irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.).	Catastrophic	Very long term or permanent	Category D	The Proposed Development is located in an area which does not have a high density of air traffic. Facilities are not designed to withstand such an impact. Consequently, vigilance and security systems are the key mitigation measures, with shutdown and interlocks installed as part of the plant operating philosophy to safely shut down the plant in the event of an abnormal incident. Use of bunding and impermeable surfacing will minimise the risk of chemical releases to ground or controlled waters in the event of any incident.	Extremely remote	Tolerable if ALARP (not significant)
Op17	Pandemic	Risk of pandemic causing civil emergency.	Risk of pandemic occurring which may cause civil emergency and large numbers of people to fall ill, including site operatives.	Catastrophic	Very long term or permanent	Category D	In order to mitigate against a pandemic disrupting operation of the Proposed Development, management plans will be implemented, and emergency protocols followed to ensure the critical infrastructure associated with the Proposed Development is able to operate safely.	Extremely remote	Tolerable if ALARP (not significant)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
Op18	MA&D event at the adjacent Peterhead Power Station	Risk of loss of containment of natural gas leading to fire/explosion and risk of release of harmful gas which may spread to the Proposed Development due to proximity. *<u>Not covered under this item</u>:* *Op1* *Fire/ explosion and risk of release of distillate fuel oil - Op2,* *<u>Not covered under this item:</u>* *Fire/ explosion and risk of release of natural gas and hydrogen - Op1* *Fire/ explosion and risk of release of distillate fuel oil - Op2,* *Fire/ explosion and risk of release of CO_2 - Op3* *Fire/ explosion and risk of release of amine from the CCP - Op4* *Fire/ explosion and risk of release of N-amine from the CPP - Op5* *Spillage/ leak of aqueous ammonia solution from the emissions abatement system - Op6* *Emergency response activities implemented on site impacting on sensitive receptors - Op7* *Emergency response activities implemented on site impacting on sensitive receptors – Op19*	Fire and/or explosion could spread to the Proposed Development due to the close proximity and result in significant harm (serious injuries / fatalities) to construction personnel. Risk of irreversible damage to environmental receptor (listed building, ecological site, watercourse etc.) or structural damage to buildings and/or infrastructure. Risk of harm to people, buildings and other receptors off-site depending on severity of fire/ explosion/ incident e.g. due to radiant heat burns and impact injuries from explosions.	Catastrophic	Very long term or permanent	Category D	Existing operational and emergency procedures in place at Peterhead Power Station The applicant will establish an accredited safety and environmental management systems (e.g. certified to ISO 45001 and 14001 standards or equivalent) for the Proposed Development. Regular audits will be undertaken to monitor compliance against the site management systems.	Extremely remote	Tolerable if ALARP (**not significant**)
Op19	Absent or deficient safety/ environmental management systems (e.g. inadequate planning, resource provision, procedures)	Absent or deficient safety/ environmental management systems increasing the risk of any MA&D hazards identified.	As described within this table for all hazards relevant to the construction phase.	Catastrophic	Very long term of permanent	Category D	The applicant will establish an accredited safety and environmental management systems (e.g. certified to ISO 45001 and 14001 standards or equivalent) for the Proposed Development. Regular audits will be undertaken to monitor compliance against the site management systems.	Extremely remote	Tolerable if ALARP (**not significant**)

ID	Risk Event (High level)	Risk Description	Reasonable worst case consequence if event did occur	Worst Case Severity of Harm	Duration	Consequence	Embedded mitigation	Likelihood	Tolerability and Significance
Op20	Emergency response activities implemented on site impacting on sensitive receptors	Water from fire extinguishing draining into environmentally sensitive areas and/ or controlled waters.	Contamination and pollution of identified sensitive environmental receptors	Severe	Medium term	Category B	Measures embedded within the drainage design for pollution prevention and control. The applicant will develop operational procedures that document measures relating to pollution prevention, including arrangements for incident response and control, compliance with regulatory requirements (such as COSSH and PPC permit).	Remote	Tolerable (**not significant**)

19.6.4 DECOMISSIONING

19.6.4.1. It is considered that the MA&D risks relevant to the decommissioning of the Proposed Development would be the same as those described within **Table 19.4** for the construction phase. On this basis a separate assessment of the decommissioning phase of the Proposed Development is not provided.

19.7. MITIGATION, MONITORING AND ENHANCEMENT MEASURES

19.7.1 OVERVIEW

19.7.1.1. The assessment has identified the potential MA&D hazards and threats which could be applicable to the Proposed Development, associated with the substances present and operations to be undertaken. Principally, these could include fires, explosions and the release of CO_2 gas. These incidents have an extremely low probability of occurrence but could have significant impacts on people and the environment without mitigation.

19.7.1.2. With the implementation of the measures described in **Tables 19.3** and **19.4** above, the MA&D risks are considered to have been mitigated to 'tolerable' and 'tolerable if ALARP' and therefore the effects are considered as 'not significant' for both construction and operation.

19.7.1.3. No additional mitigation measures (i.e. beyond those embedded mitigation measures required either for legal compliance or best practice during construction and operation of the Proposed Development (outlined within **Section 19.5** and **Tables 19.4** and **19.5** above)) have been identified as being required to further mitigate any significant effects for MA&D at this stage. Risks during the decommissioning phase are anticipated to be similar to those addressed within the construction phase. Any mitigation measures specific to the decommissioning phase will be outlined within a DEMP, secured by a Requirement**.**

19.7.1.4. The emergency plans produced for the operational installation will follow relevant guidance provided under the COMAH Regulations 2015 (if required) and/ or Pollution Prevention and Control (Scotland) Regulations 2012. The Consents and Licences relevant to the Proposed Development are detailed in Section 1.5 of **Chapter 1: Introduction** (EIA Report Volume 2) provides further information.

19.8. CUMULATIVE EFFECTS

19.8.1 INTRODUCTION

19.8.1.1. Cumulative schemes could introduce new sources of hazards that the Proposed Development might be susceptible to. The resources and receptors identified in **Section 19.4** could therefore potentially experience cumulative risks relating to major accidents and disasters during the construction and operation of Proposed Development in combination with any new risks introduced by the cumulative schemes identified in **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4).

19.8.1.2. Following a review of **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4) the following cumulative developments within the Zone of Influence of the Proposed Development are considered to have the potential to create new major accident hazards that could affect the Proposed Development or the same receptors identified in **Section 19.4** of this chapter:

- APP/2019.0982 located 0.5km from the Proposed Development site;
- ENQ/2020/0931 / ENQ/2021/1036, located 10km from the Proposed Development site;
- APP/2021/2681 located adjacent to the west of the Proposed Development site; and
- APP/2021/2392 located 0.2km from the Proposed Development site.

19.8.2 CONSTRUCTION

19.8.2.1. During construction, the following risks could be increased because of the cumulative schemes listed above:

- C4/ Op 1/2/3/4/5 - Fire/ explosion and risk of release of harmful gas;
- C5 / Op6/7- Spillage/ leak of pollutants into groundwater/ surface water due to construction activities; and
- C8 / Op15 - Major road traffic accident.

19.8.2.2. Cumulative schemes will require mitigation and control measures to be adopted during their construction. These mitigation measures would include: environmental measures secured through a CEMP or equivalent and compliance with relevant legislation and regulatory requirements.

19.8.2.3. Therefore, it is expected that the cumulative schemes would not result in any new significant major accident risks that the Proposed Development would be susceptible to during construction. Any combined risks with the Proposed Development would be tolerable if as low as reasonably practicable (ALARP) and **not significant**.

19.8.3 OPERATION

19.8.3.1. During the operation of the Proposed Development, cumulative risks relating to major accidents and disasters may arise in-combination with the operation of the cumulative schemes are the same as those identified (fire/explosion, leaks and spills and major road traffic accidents) in paragraph 19.9.2.1 above.

19.8.3.2. Any combined risks would be tolerable if ALARP and not significant on the basis of the operating requirements and required safety procedures that would be in place at each of the site locations.

19.9. LIMITATIONS OR DIFFICULTIES

19.9.1 SUMMARY

19.9.1.1. This assessment is based on the preliminary design of the Proposed Development and early appraisal of potential hazards that will be refined and reappraised as the project develops through the processes regulated and controlled by other legislative frameworks.

19.10. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

19.10.1 SUMMARY

No likely significant residual effects have been identified.

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SSE THERMAL

PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 2 – Assessment Methodology

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2. Assessment Methodology

2.1. ENVIRONMENTAL IMPACT ASSESSMENT APPROACH AND SCOPE

2.1.1 OVERVIEW

2.1.1.1. Environmental Impact Assessment (EIA) is the process of identifying, evaluating, and mitigating the likely significant environmental effects of a development. Early identification of significant effects enables appropriate mitigation to be incorporated into the development's design to avoid, reduce or offset those effects.

2.1.1.2. The EIA of the Proposed Development has been undertaken in parallel with the design process, thereby maximising opportunities to mitigate likely significant effects as they were identified. This approach ensures mitigation is embedded in the design of the Proposed Development and forms an integral component of it.

2.1.1.3. The results of the EIA, published in this EIA Report allows the Scottish Ministers, statutory consultees such as Aberdeenshire Council, other interested parties, and the public, to be made aware of the Proposed Development's environmental effects prior to determination of the application.

2.1.1.4. This Environmental Impact Assessment Report (EIA Report) has been prepared to satisfy the requirements of Section 36 of the Electricity Act 1989 ('the Act') and the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the EIA Regulations').

2.1.1.5. The Scoping Opinion was received from Scottish Ministers on 29 July 2021 **Appendix 1B** (EIA Report Volume 4) and the advice contained within it regarding assessment methodology, topics, and presentation of the final EIA Report. In accordance with Regulation 5(3) of the EIA Regulations, this EIA Report is based on the scoping opinion. Responses received through consultation and engagement have also informed this EIA Report.

2.1.1.6. In response to the Scoping Opinion, the EIA and this EIA Report include assessments of the following environmental topics:

- Chapter 8: Air Quality;
- Chapter 9: Noise and Vibration;
- Chapter 10: Traffic and Transport;
- Chapter 11: Biodiversity and Nature Conservation;
- Chapter 12: Water Environment;
- Chapter 13: Flood Risk;
- Chapter 14: Ground Conditions;
- Chapter 15: Landscape and Visual Amenity;
- Chapter 16: Cultural Heritage;
- Chapter 17: Socio-economics, Recreation and Tourism;
- Chapter 18: Climate Change and Sustainability;
- Chapter 19: Major Accidents and Disasters;
- Chapter 20: Combined Amenity Effects and Summary of Inter-Project Cumulative Effects; and
- Chapter 21: Summary of Likely Significant Residual Effects.

2.1.1.7. The EIA Scoping Report (**Appendix 1A** EIA Report Volume 4) concluded that several topics did not need to be considered as part of the EIA accompanying the consent application for the Proposed Development and could be scoped out. These topics and, where relevant, the response in the Scoping Opinion is described in the following sections of this chapter.

2.1.2 HUMAN HEALTH AND WELLBEING

2.1.2.1. A dedicated population and human health assessment has not been undertaken. Whilst listed under paragraph 4 of Schedule 4 to the EIA Regulations, the likelihood of significant effects on those factors has been covered in other topic chapters within the EIA Report, including:

- Chapter 8: Air Quality (from construction dust and operational emissions from the stack);
- Chapter 9: Noise and Vibration (from construction and operational noise sources);
- Chapter 10: Traffic and Transport (from user safety, fear and intimidation);
- Chapter 12: Water Environment (from pollution incidents);
- Chapter 13: Flood Risk (third party impacts and on workers); and
- Chapter 14: Ground Conditions (from contamination and pollution).

2.1.2.2. Therefore, a dedicated population and human health and wellbeing assessment has been scoped out of the EIA on this basis.

2.1.3 MARINE ECOLOGY

2.1.3.1. As no alterations are required to the coastline boundary or to the existing seawater cooling system intakes and outfalls and the Proposed Development will operate within the current limits set by the existing Pollution Prevention and Control (PPC) Permit and CAR Licence (meaning there will be no change to abstraction or discharge rates, or other parameters that could impact on ecological features in the marine environment), an assessment of marine ecology has not been included in this EIA. The required applications or variations to the existing permits held by the Applicant are being undertaken and will be submitted after the Section 36 application.

2.1.4 COASTAL PROCESSES

2.1.4.1. No works are proposed to the coastline boundary of the existing Peterhead site to facilitate the Proposed Development. The existing seawater cooling system will be utilised and is not in need of any upgrade to facilitate the Proposed Development. Therefore, coastal processes have been scoped out of this EIA.

2.1.5 MAJOR ACCIDENTS AND DISASTERS

2.1.5.1. As described in the Scoping Report (**Appendix 1A** EIA Report Volume 4) Major Accidents and Disasters (MA&D) was initially scoped out for specific assessment within the EIA because it was considered that the risks of major accidents are suitably assessed, regulated, and controlled by other legislative frameworks (including the Control of Major Accident Hazards Regulations 2015 ('the COMAH regulations 2015') and the Pollution Prevention and Control (Scotland) Regulations 2012). Despite the unlikely event of any major accident or disaster occurring and given their suitable regulation and control by legislative framework and site safety reports, a MA&Ds assessment has been scoped into the EIA for completeness and is provided in **Chapter 19: Major Accidents and Disasters** (EIA Report Volume 2).

2.1.5.2. During its operation, depending on the volumes of hazardous materials stored on the Proposed Development Site, a Hazardous Substances Consent (HSC) may be necessary under the Town

and Country Planning (Hazardous Substances Regulations) (Scotland) 2015 (UK Parliament, 2015a) and the Proposed Development could be subject to the COMAH Regulations 2015. This will be kept under review as the detailed design of the proposed Development develops (should permission be granted for the Section 36 Application).

2.2. ENVIRONMENTAL IMPACT ASSESSMENT REPORT

2.2.1 OVERVIEW

2.2.1.1. This EIA Report presents a description of the Proposed Development and its likely significant environmental effects on the environment during construction, operation (including maintenance where relevant) and decommissioning, based on the design and environmental information currently available. It also details measures to avoid or reduce such effects.

2.2.2 APPROACH

2.2.2.1. This EIA Report summarises the outcomes to date of the following EIA activities:

- Establishing baseline conditions;
- Consultation with statutory and non-statutory consultees;
- Consideration of relevant local, regional and national planning policies, guidelines and legislation relevant to the EIA;
- Consideration of technical standards for the development of significance criteria and specialist assessment methodologies;
- Design review;
- Review of secondary information, previous environmental studies, publicly available information and databases;
- Expert opinion;
- Physical surveys and monitoring;
- Desk-top studies;
- Modelling and calculations; and
- Reference to current guidance.

2.2.2.2. These activities have enabled the prediction of impacts in relation to the current and future baseline, and a prediction based on the information available of the significance of effects on environmental receptors. The term ‘impact’ refers to changes arising from the Proposed Development, whereas the term ‘effect’ is used to describe the result of the impact on a receptor.

2.2.2.3. Each technical chapter within this EIA Report (**Chapters 8 to 19** of EIA Report Volume 2) follows the same structure for ease of reference, which is:

- Introduction;
- Legislation, planning policy and guidance;
- Assessment methodology (including consultation and approach to assess the three indicative layout options considered as part of this EIA);
- Baseline conditions;
- Development design and impact avoidance;
- Likely impacts and effects;
- Mitigation and enhancement measures;
- Monitoring;

- Limitations or difficulties;
- Summary of likely significant residual effects; and
- References.

2.3. CONSIDERATION OF ALTERNATIVE INDICATIVE LAYOUT OPTIONS

2.3.1 OVERVIEW

2.3.1.1. As discussed in **Chapter 4: The Proposed Development** (EIA Report Volume 2) several technical parameters have yet to be finalised for the Proposed Development, to maintain flexibility prior to selection of technology suppliers and commencement of the detailed design of the Proposed Development. This is important as the technology for carbon capture from gas-fired power stations is at an early stage in design development, and also to maintain commercial flexibility to meet the evolving demands of the UK market and government policy on the transition to Net Zero, prior to plant construction.

2.3.2 LAYOUT OPTIONS AND DESIGN AND ASSESSMENT PARAMETERS

2.3.2.1. At this stage in project development, an in-principle design has been developed. In addition, two potential technology providers have been engaged to provide outline designs based on their technology. Therefore, three indicative layout options have been considered in the EIA and the worst-case option is presented in each technical chapter to ensure a robust assessment is presented of the likely significant environmental effects of the Proposed Development. Thus, the assessment is based upon the maximum (and where relevant, minimum) parameters for the elements where flexibility needs to be retained, recognising that the worst-case parameter for one technical assessment may differ from another. Wherever this approach is applied, this has been explained in the relevant chapters of this EIA Report. These three indicative layouts are the outcome of early-stage design development and engagement with the supply chain, described further in **Chapter 4: The Proposed Development** (EIA Report Volume 2).

2.3.2.2. Each of the **Chapters 8 to 19** of the EIA Report (EIA Report Volume 2) describe the parameters applied in relation to that discipline. Where key elements of the Proposed Development design have been fixed (e.g. maximum stack heights) these have been clearly described in **Chapter 4: The Proposed Development** (EIA Report Volume 2). However, where it is necessary to retain flexibility in the Application, any future changes to design parameters will remain within the worst-case layout assessed in this assessment. Justification for the need to retain flexibility in certain parameters is outlined in **Chapter 4: The Proposed Development** (EIA Report Volume 2).

2.3.2.3. For the purposes of the assessment, the CCP absorber units have been assessed at three alternative locations within the Proposed Development Site, with different building orientations as applicable, to determine the worst-case impacts at different receptors. The results in **Chapter 8: Air Quality** (EIA Report Volume 2) represent the worst-case from any of the modelled layouts.

2.3.2.4. Similarly, for noise and vibration, to ensure that the impact assessment presented is robust and conservative, several plant configurations have been assessed to determine a worst-case. **Chapter 9: Noise and Vibration** (EIA Report Volume 2) describes this further.

2.3.2.5. In assessing effects on landscape and visual amenity and setting effects on built heritage receptors, the assessment is based upon the largest possible dimensions for the Proposed Development, and a worst-case stack height of up to 130m AOD, as these are considered to be the parameters that give rise to the worst-case assessment. The maximum dimensions of key structures are based upon the largest building footprints and tallest potential heights as detailed in Table 4.1. **Chapter 15: Landscape and Visual Amenity** and **Chapter 16: Cultural Heritage** (EIA Report Volume 2) describe this further.

2.4. CONSIDERATION OF THE EXISTING PETERHEAD POWER STATION

2.4.1 APPROACH

2.4.1.1. The worst-case scenario for all assessments has considered the continuous concurrent operation of the existing Peterhead Power Station. It is proposed that the existing Power Station will continue to operate in a reduced capacity (with one gas turbine and one steam turbine in operation) to allow flexibility to meet Scottish electricity demand at times of high demand. The existing power station will therefore only be used as a back-up if the Proposed Development cannot meet this demand. Low carbon generation from the Proposed Development will be prioritised overuse of the existing power station therefore it is unlikely that it will be needed for continuous use, however for the purposes of providing a worst case assessment for this EIA, continuous use of the existing power station in this way has been assessed as part of the EIA unless otherwise stated.

2.5. STUDY AREAS: SPATIAL SCOPE OF ASSESSMENT

2.5.1 APPROACH

2.5.1.1. The assessment chapters of this EIA Report (**Chapters 8 to 19** of EIA Report Volume 2) describe their spatial scope, including their rationale for determining the specific study area within which the assessment is focussed. The study areas are a function of the nature of the impacts and the locations of potentially affected environmental resources or receptors. The widest spatial scope considered is 15km (as set out in the EIA Scoping Report (**Appendix 1A** EIA Report Volume 4), which relates to the appraisal of potential operational air quality effects on statutory designated ecological sites because of the Proposed Development. Justification for the spatial scope considered appropriate is documented in each topic chapter (**Chapters 8 to 19** of EIA Report Volume 2).

2.5.1.2. The spatial scope of the Proposed Development is focussed on terrestrial areas where the permanent structures of the Proposed Development are to be developed. No works are proposed within the marine environment and therefore this has not been considered as part of the assessment.

2.6. DEFINITION OF EXISITING AND FUTURE BASELINE

2.6.1 APPROACH

2.6.1.1. Existing baseline conditions have been defined for each technical assessment topic in **Chapters 8 to 19** (EIA Report Volume 2), based on desk-based studies and site surveys, where

necessary. As described below, it is also important to consider future baseline conditions (in the absence of the Proposed Development) against which the effects of the Proposed Development can be assessed.

2.7. ASSESSMENT YEARS AND ASSESSMENT SCENARIOS: TEMPORAL SCOPE OF ASSESSMENT

2.7.1 APPROACH

2.7.1.1. The approach has been to assess the environmental impacts of the Proposed Development at key stages in its construction and operation and, as far as practicable, its final decommissioning.

2.7.1.2. The 'existing baseline' date is 2021 since this is the period in which the baseline studies for the EIA have been undertaken. 'Future baseline' conditions are also predicted for each assessment scenario, whereby the conditions anticipated to prevail at a certain point in the future (assuming the Proposed Development does not progress) are identified for comparison with the predicted conditions with the Proposed Development. This can include the introduction of new receptors and resources into an area, or new development schemes that have the potential to change the baseline, where these form committed developments. Committed developments are identified at **Appendix 2A** (EIA Report Volume 4) and are defined as projects or activities that:

- Have a valid consent (whether under construction or not yet implemented).
- Do not require consent to be constructed or operated (such as permitted development) but where there is sufficient commitment to undertake the works.

2.7.1.3. The assessment scenarios that have been considered for the purposes of the EIA (and considered in this EIA Report) are as follows:

- Existing baseline (2021).
- Future baseline (No Development) (up to 2030).
- Future modified baseline – the existing Peterhead Power Station is anticipated to be used concurrently with the Proposed Development in times of high demand but at a lower capacity, operating with one gas turbine and one steam turbine (termed '1+1 mode'). This new operating regime will be considered as part of the future baseline for the Proposed Development.
- Construction – construction of the Proposed Development could (subject to the necessary consents being granted and an investment decision being made) potentially start as early as Quarter 4 2023 and last for approximately three to four years including a roughly 6-month commissioning period.
- Opening and/ or operation – assuming an approximate three to four year construction programme, the Proposed Development is unlikely to commence commercial operation before 2027 with timescales for commercial operation linked to the development of the Acorn Project Carbon Capture and Storage (CCS) Pipeline by Storegga (see below) into which the Proposed Development will connect. This is proposed to be secured via a Condition of the Section 36 Application. The assessment years have been chosen by specialists as the worst-case for each topic.
- Decommissioning – it is envisaged that the Proposed Development would have a design life of approximately 25 years. At the end of the expected design life, elements would be assessed for ongoing viability and, only if no longer viable, be decommissioned. It is therefore anticipated that, at the earliest, decommissioning of the Proposed Development

would be expected to commence at some point after 2052. This EIA Report has assumed that the Proposed Development could operate for longer than a 25-year design life, and in relevant chapters has considered and assessed the potential for operational impacts/ effects to continue beyond this timeframe. If the operating life were to be extended, the Proposed Development would be upgraded in line with the legislative requirements at that time.

2.7.2 THE ACORN PROJECT

2.7.2.1. For the purposes of this EIA Report, it is assumed that there will be an interface for construction activities between the Proposed Development and the Acorn Project which are likely to overlap for a short period.

2.7.2.2. Whilst the Peterhead CCS project is seeking to connect to the proposed Acorn carbon capture cluster, the two do not form a single project; they are being developed by different entities and this Proposed Development could potentially connect to other clusters should they be developed in the future. The potential environmental effects of the development and operation of the Acorn cluster are therefore considered as cumulative effects from that scheme rather than intra-project effects.

2.7.2.3. The Applicant notes that to date there is little publicly available information on the potential effects of the Acorn scheme to enable a detailed appraisal of cumulative effects and assumes that any such effects will be considered within the subsequent planning application to be made by third parties for the Acorn project. However, the Applicant also notes that a screening opinion has been issued by Aberdeenshire Council for the Acorn project indicating that it is not EIA development. Therefore, by definition, it is not envisaged by that developer or the Council that there will be any significant environmental effects arising from the Acorn project and consequently it is considered that there will be no significant inter-project cumulative effects with the Proposed Development.

2.7.2.4. In most cases the assessment years for environmental topics are 'self-selecting', as they simply reflect the anticipated dates on or periods within which certain activities are predicted to take place.

2.8. DEVELOPMENT DESIGN, IMPACT AVOIDANCE AND MITIGATION

2.8.1 OVERVIEW

2.8.1.1. The design of the Proposed Development has been influenced by the findings of environmental appraisals and the EIA process. Therefore, the Proposed Development has had several measures incorporated into the concept design, to avoid or minimise environmental impacts. These include measures needed for legal compliance, as well as measures that implement the requirements of best practice guidance documents. The assessments have been undertaken based on these measures being implemented (i.e. they are 'embedded mitigation').

2.8.1.2. The key aspects where the design has evolved are described in **Chapter 6: Consideration of Alternatives** (EIA Report Volume 2).

2.8.1.3. Implementation of the impact avoidance and minimisation measures relied on in the assessment are set out in **Appendix 21A: Schedule of Operational Commitments** (EIA Report Volume 4) and where relevant, these are proposed to be secured in the Section 36

Application, for example through the setting of. specific maximum AOD heights or specifying mitigation measures via a Requirement.

2.8.1.4. Once the likely effects were identified and quantified, consideration was given to any further mitigation (over and above anything identified within the Development Design and Impact Avoidance sections of each topic chapter) that may be required to mitigate any significant adverse effects identified. The residual effects (after the implementation of mitigation) were then assessed and presented in each topic chapter. The likely significant residual effects are summarised in **Chapter 21: Summary of Likely Significant Residual Effects** (EIA Report Volume 2).

2.9. IMPACT ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

2.9.1 OVERVIEW

2.9.1.1. Impacts are defined as changes arising from the Proposed Development, and consideration of the result of these impacts on environmental receptors enables the identification of associated effects, and their classification (major, moderate, minor and negligible, and adverse, neutral or beneficial). Each effect has been classified both before and after mitigation measures have been applied. Effects remaining after implementation of mitigation are referred to as 'residual effects'.

2.9.1.2. The classification of effects is undertaken with due regard to the following:

- Extent (local, regional or national) and magnitude of the impact;
- Duration (whether short, medium or long-term);
- Nature (whether direct or indirect, reversible or irreversible);
- Performance against environmental quality standards and in the context of relevant legislation, standards and accepted criteria;
- Number of receptors affected;
- Sensitivity of receptors;
- Compatibility with environmental policies; and
- Professional experience and judgement of the assessor.

2.9.1.3. Further details are provided in each topic chapter of EIA Report Volume 2.

2.9.1.4. Where it has not been possible to quantify effects, qualitative assessments have been undertaken, based on available knowledge and professional judgment. Where any uncertainty exists, this has been noted in the relevant technical chapter in the 'Limitations or Difficulties' section.

2.9.1.5. To enable comparison between technical topics and aid understanding of the EIA findings, standard terms are used wherever possible to classify effects throughout this EIA Report (major, moderate, minor and negligible), and effects are also described as being adverse, neutral or beneficial. Where the quality standards for each technical discipline result in deviations in the standard assessment methodology, these are described in the relevant chapters, as applicable.

2.9.1.6. Definitions of the standard terms are provided below:

- Negligible – imperceptible effect to an environmental resource or receptor;
- Minor – slight, very short or highly localised effect;

- Moderate – limited effect (by extent, duration or magnitude);
- Major – considerable effect (by extent, duration or magnitude) of more than a local scale or in breach of recognised acceptability, legislation, policy or standards;
- Adverse – detrimental or negative effects to an environmental resource or receptor;
- Neutral – effects to an environmental resource or receptor that are neither advantageous nor detrimental; and
- Beneficial – advantageous or positive effect to an environmental resource or receptor.

2.9.1.7. Moderate and major effects are generally considered to be 'significant' for the purposes of the EIA Regulations.

2.9.1.8. Each of the technical chapters provides further description and definition of the assessment criteria relevant to each topic. Where possible, this has been based upon quantitative and accepted criteria (for example British Standards), together with the use of value judgement and expert interpretation to classify effects.

2.9.1.9. The sensitivity of the baseline conditions is assessed according to the relative importance of existing environmental features on or near to the Proposed Development Site, or by the sensitivity of receptors which could potentially be affected by the Proposed Development. Criteria for the determination of sensitivity or of importance or value of receptors are established based on approved guidance, legislation, statutory designation and / or professional judgement. The magnitude of potential effects on environmental baseline conditions is identified through consideration of the Proposed Development, taking into account the scale or degree of change from the existing baseline as a result of the effect. Consideration is given to the duration and reversibility of the effect as well as consideration of relevant legislative or policy standards or guidelines.

2.9.2 SIGNIFICANCE CRITERIA

2.9.2.1. In general, the classification of an effect is based on the magnitude of the impact and sensitivity or importance of the receptor, using the matrix shown in Table 2.1. Where there are deviations away from this matrix (due to the technical guidance for a specific assessment topic), this is highlighted within the relevant technical chapter and the reason for the variation explained.

Table 2-1: Classification of effects

Magnitude of Impact	Sensitivity / Importance of Receptor			
	High	**Medium**	**Low**	**Very Low**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Minor	Negligible	Negligible	Negligible

2.9.2.2. In the context of the Proposed Development, short-term effects are those associated with the site preparation and construction and/ or decommissioning phases, which cease when construction or decommissioning works are completed. Medium and long-term effects are those associated with the completed, operational Proposed Development, which last for the duration

of the operational phase and in some cases, beyond this. Effects may also be permanent (irreversible) or temporary (reversible) and direct or indirect.

2.9.2.3. Effects on areas on the scale of the Aberdeenshire local authority area, or Peterhead and Boddam areas (or similar scale across local authority boundaries) are considered to be at a regional level, whilst effects that cover different parts of the country, or Scotland as a whole, are considered to be of a national level. Smaller scale effects are considered to be at a local level.

2.10. CUMULATIVE EFFECTS

2.10.1 INTRODUCTION

2.10.1.1. As required by the EIA Regulations, consideration is given to the potential for cumulative effects to arise because of the Proposed Development.

2.10.2 INTRA-PROJECT CUMULATIVE EFFECTS

2.10.2.1. Intra-Project cumulative effects (or the in-combination effects) between environmental disciplines are inherently considered in each discipline chapter (**Chapters 8 to 19** EIA Report Volume 2). For example, topic areas such as hydrology and biodiversity or noise and vibration and biodiversity cannot be considered in isolation since changes affecting one topic area also have the potential for implications for other topic areas. The EIA Report identifies potential interactions between environmental topic areas where relevant.

2.10.2.2. An exception to this is the inter-relationship of effects on human receptors where, for example, a receptor may experience visual effects, noise effects and air quality effects at the same time. Please refer to 'Combined Amenity Effects' below for further information on this.

2.10.3 INTER-PROJECT CUMULATIVE EFFECTS

2.10.3.1. The impact of the Proposed Development has been considered in conjunction with the potential impacts from other projects or activities which are reasonably foreseeable in terms of delivery. These are 'inter-Project' cumulative effects. This includes projects that have been submitted for planning or Electricity Act consent but have not yet been approved or that already have planning permission or consent but are not yet operational that are located within a geographical scope where environmental impacts could act together to create a more significant overall effect on a receptor and where sufficient environmental information is available. The method for identifying the other projects or activities for consideration in the assessment of inter-project cumulative effects is provided at **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4). The list of other projects or activities to be considered has been agreed with Aberdeenshire Council and can also be viewed at **Appendix 2A** (EIA Report Volume 4).

2.10.3.2. Inter-Project cumulative effects have been considered in each discipline chapter (**Chapters 8-19** EIA Report Volume 2) and are summarised in **Chapter 20: Combined Amenity Effects and Summary of Inter-Project Cumulative Effects** (EIA Report Volume 2).

2.10.4 COMBINED 'AMENITY' EFFECTS

2.10.4.1. Combined 'amenity' effects are those resulting from a single development, in this case the Proposed Development, on any one human receptor that may collectively cause a greater effect

(such as the combined effects of noise and air quality/dust impacts during construction on local residents).

2.10.4.2. An assessment of combined amenity effects is provided in **Chapter 20: Combined Amenity Effects and Summary of Inter-Project Cumulative Effects** (EIA Report Volume 2).

2.11. TRANSBOUNDARY EFFECTS

2.11.1 APPROACH

2.11.1.1. An initial transboundary screening exercise for the Proposed Development under Regulation 29 of the EIA Regulations has been undertaken. The screening exercise concluded, on the basis of the information available from the Applicant at scoping stage, that the Proposed Development is not likely to have a significant effect either alone or cumulatively on the environment in any European Economic Area (EEA) state.

2.11.1.2. The nearest EEA states are the Republic of Ireland at over 450km west and Norway at over 500km east of the Proposed Development Site. Taking into account the potential pollution impact pathways through air, land and water, and the effects predicted to arise from the Proposed Development, set out in **Chapter 8: Air Quality, Chapter 11: Biodiversity and Nature Conservation** and **Chapter 12: Water Environment and Chapter 13: Flood Risk** (EIA Report Volume 2) within their respective spatial scopes, the likelihood of significant effects on the environment of another EEA state is considered negligible. Therefore, significant transboundary effects associated with the Proposed Development are not anticipated.

2.12. REFERENCES

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The Control of Major Accident Hazards Regulations 2015. UK Statutory Instruments 2015/483. Available online: https://www.legislation.gov.uk/uksi/2015/483/contents/made

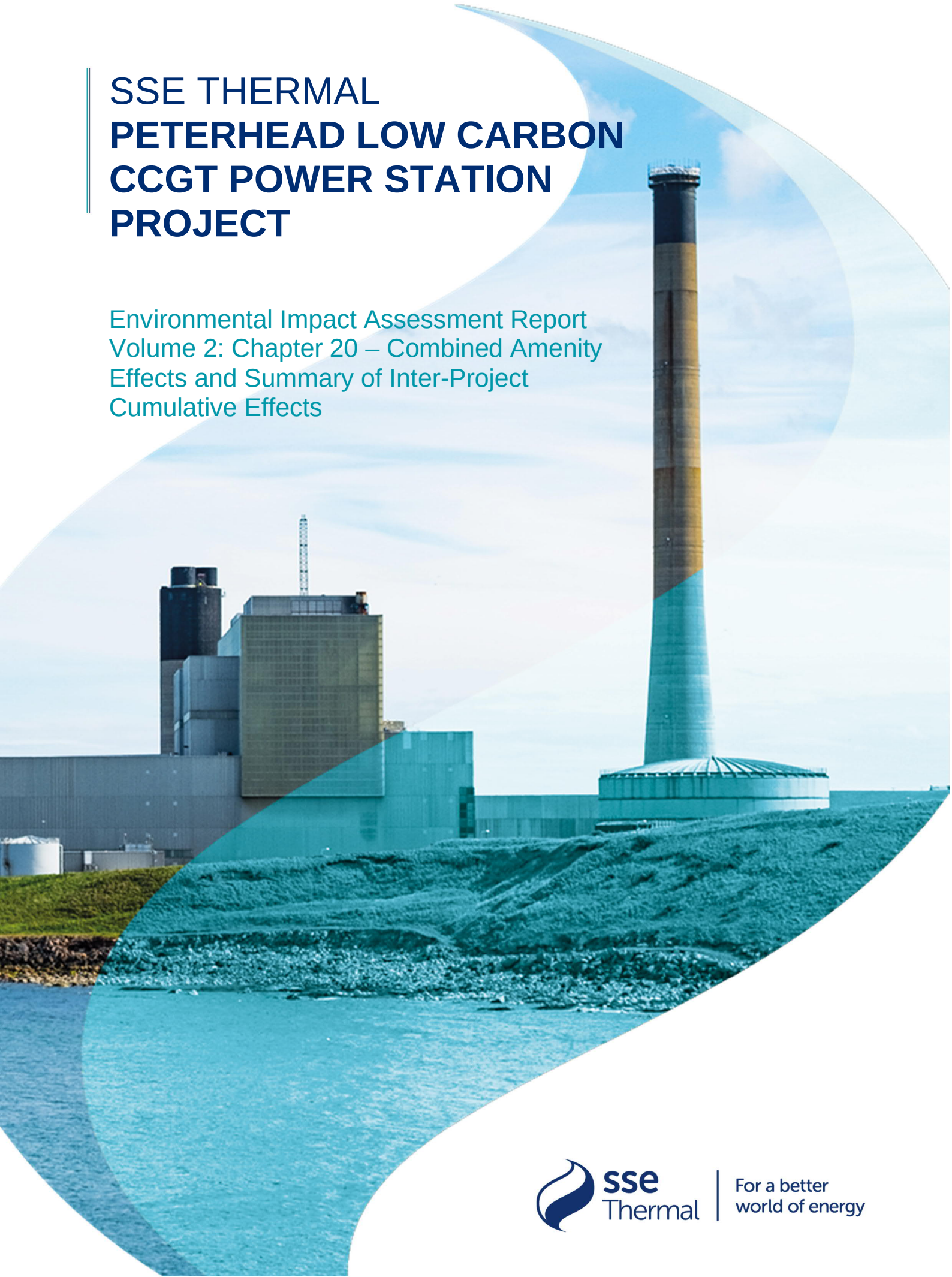
Planning Inspectorate (2019) Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects, Version 2, August 2019. Available online: https://infrastructure.planninginspectorate.gov.uk/legislation-andadvice/advice-notes/.

Scottish Environment Protection Agency (SEPA) (2017), IED-PPC-TG4 – Pollution Prevention and Control (PPC) Technical Guidance: A practical guide for Part A activities.

SSE THERMAL

PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 20 – Combined Amenity Effects and Summary of Inter-Project Cumulative Effects



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CONTENTS

TABLES

20. Combined Amenity Effects and Summary of Inter-Project Cumulative Effects

20.1. INTRODUCTION

20.1.1 INTRODUCTION

20.1.1.1. This chapter of the Environmental Impact Assessment Report (EIA Report) provides an assessment of the combined amenity effects, i.e.: potential effects on human receptors because of more than one type of impact from the Proposed Development.

20.1.1.2. This chapter also summaries the likely cumulative effects with other projects or activities in the surrounding area (i.e.: the inter-project cumulative effects).

20.2. COMBINED AMENITY EFFECTS ASSESSMENT

20.2.1 ASSESSMENT METHODOLOGY

20.2.1.1. The assessment of combined effects considers whether an individual human receptor has the potential to be affected by more than one type of impact because of the Proposed Development. Any effects arising from the interaction of effects on individual receptors which have already been assessed within the specialist environmental assessments are not repeated here; these are intra-project cumulative effects and are inherently considered in each discipline chapter (**Chapters 8-19** EIA Report Volume 2). As such, this section considers only the potential combined effects on human receptors.

20.2.1.2. Each of the specialist environmental assessments reported in **Chapters 8 - 19** (EIA Report Volume 2) has identified effects which may occur as result of the Proposed Development, ranging from negligible or minor (not significant) to moderate and major (significant). Multiple effects upon one or more common receptors could theoretically interact or combine, to result in a combined effect which is either different or the same as the effects individually.

20.2.1.3. The types of impacts that could be experienced by human receptors and which have the potential to interact are noise and vibration, traffic and transport, air quality, and visual effects during both construction and operation.

20.2.1.4. Only individual effects of minor or greater significance are considered for the purpose of this combined amenity affects assessment.

20.2.1.5. When considering combined amenity effects, the mitigation measures as set out in **Chapters 8 - 19** (EIA Report Volume 2) (including embedded mitigation measures built into the Proposed Development's design (**Appendix 21A** EIA Report Volume 4) and measures embedded in the Framework CEMP (**Appendix 5A** EIA Report Volume 4) must be taken into account. Therefore, only residual effects (post-mitigation) are considered.

20.2.1.6. The Air Quality chapter of the EIA Report (**Chapter 8** EIA Report Volume 2) considers the impact of several pollutants generated by the construction of the Proposed Development on human health receptors within proximity to the Proposed Development Site, as well as dust emissions. The assessment concluded that during the construction phase, all receptors would likely experience a negligible (not significant) effect. Therefore, construction air quality effects are not considered further in this combined amenity effects assessment.

20.2.1.7. The Noise and Vibration chapter of the EIA Report (**Chapter 9** EIA Report Volume 2) considers the impacts of noise and vibration at representative receptors surrounding the Proposed Development Site. The assessment concluded that during construction there will be negligible vibration impacts at all representative receptors. For this reason, construction vibration is not considered any further in this combined amenity effects assessment. The operational equipment at the Proposed Development Site will comprise precision rotating machinery, which will be monitored and maintained in a high state of balance. Therefore, this type of equipment would not pass significant levels of vibration into the ground. Taking this into account, and the distances between the proposed indicative locations of equipment and residential receptors, it is not anticipated that vibration levels will be significant. Therefore, further detailed assessment of operational vibration from the Proposed Development Site was scoped out of the Noise and Vibration chapter and is not considered any further in this combined amenity effects assessment.

20.2.1.8. The Traffic and Transport chapter of the EIA Report (**Chapter 10** EIA Report Volume 2) considers a range of different traffic-related effects on roadside receptors, including severance, pedestrian amenity, fear and intimidation, highway safety and driver delay. There is potential for receptors located close to the road network to experience combined effects from traffic (severance, pedestrian amenity, highway safety etc.) during construction of the Proposed Development. However, the construction traffic assessment does not identify any significant effects on roadside receptors (severance, pedestrian amenity, fear and intimidation or highway safety); all are assessed as negligible. Therefore, construction traffic effects are not considered any further in this combined amenity effects assessment. During the operation phase, traffic and transport effects are precited to be negligible (not significant); for this reason, operational traffic and transport effects are not considered any further in this combined amenity effects assessment.

20.2.1.9. Transient receptors using the Core Paths are not identified as being sensitive for the air quality or noise and vibration assessments and have not been assessed in those assessments; therefore, construction and operation effects on Core Paths are not considered any further in this combined amenity effects assessment as there is only the potential for visual effects in isolation.

20.2.1.10. Table 20.1 below summarises the combined effects of the Proposed Development during construction and Table 20.2 summarises the combined effect during operation. Whilst there is the potential for combined effects at some receptors during the construction and operational phases, it is considered that the significance of combined effects would be no greater than the significance of any individual effect; the mitigation measures and commitments identified in the Framework CEMP (**Appendix 5A** EIA Report Volume 4) and the embedded mitigation measures built into the Proposed Development's design (**Appendix 21A** EIA Report Volume 4) remain appropriate and no further measures are proposed because of the combined amenity effects assessment.

Table 20-1: Potential for significant combined effects (construction)

Receptors	Location	Noise Significance of Effect	Visual Significance of Effect	Combined Effect
V - VP6 **N - R1**	Harbour Street, Boddam	Day: Negligible / Minor adverse Night: Minor adverse	Minor adverse	**Minor adverse**
N - R2 **V - VP6 (as representative receptor)**	Claymore Crescent, Boddam	Day: Negligible / Minor adverse Night: Minor adverse	Minor adverse	**Minor adverse**
N - R4 **V – Millbank**	Millbank (Cottage)	Day: Negligible / Minor adverse Night: Minor adverse	Moderate adverse	**Moderate adverse**
N - R4 **V – Millbank Farm**	Millbank Farm	Day: Negligible / Minor adverse Night: Minor adverse	Moderate adverse	**Moderate adverse**
N – R5 **V – Denend Croft / Gateside / Hjaltland**	Denend Croft / Gateside / Hjaltland	Day: Negligible /Minor adverse Night: Minor adverse	Minor adverse	**Minor adverse**
N – R7 **V – Bevailey**	Bevailey	Day: Minor adverse Night: Minor adverse	Moderate adverse	**Moderate adverse**
N – R8 **V - Sandford Bungalow**	Sandford Bungalow	Day: Negligible / Minor adverse Night: Minor adverse	Moderate adverse	**Moderate adverse**
N – R9 **V – New Mill of Sandford**	New Mill of Sandford	Day: Minor adverse Night: Minor adverse	Moderate adverse	**Moderate adverse**

***N = Noise Receptor, V = Visual Receptor**

Table 20-2: Potential for significant combined effects (operation)

Receptors	Location	Air Quality Significance of Effect	Noise Significance of Effect	Visual Significance of Effect	Combined Effect
V - VP6 **N - R1** **AQ - OR8**	Harbour Street, Boddam	N-Amines: Moderate adverse (potentially significant)	Day and Night: Negligible / Minor adverse	Minor adverse	**Moderate adverse**
N - R2 **V - VP6 (as representative receptor)** **AQ – OR7**	Claymore Crescent, Boddam	N-Amines: Moderate adverse (potentially significant)	Day and Night: Negligible / Minor adverse	Minor adverse	**Moderate adverse**
V - VP7 **AQ - OR6**	A90/Station Road/Boddam Recreation Park	N-Amines: Moderate adverse (potentially significant)	Day and Night: No greater than Negligible / Minor adverse	Minor adverse	**Moderate adverse**
N – R3 **AQ – OR5**	The Old Manse	N-Amines: Minor adverse (potentially significant)	Day and Night: Negligible / Minor adverse	N/A - No assessment undertaken due to screening (no views)	**Minor adverse**
N - R4 **V – Millbank** **AQ – OR4**	Millbank Cottage	N-Amines: Negligible	Day and Night: Negligible / Minor adverse	Minor adverse	**Minor adverse**
N - R4 **V – Millbank Farm** **AQ – OR4**	Millbank Farm	N-Amines: Negligible	Day and Night: Negligible / Minor adverse	Moderate adverse	**Moderate adverse**

Receptors	Location	Air Quality Significance of Effect	Noise Significance of Effect	Visual Significance of Effect	Combined Effect
N – R5 **V – Denend Croft/Gateside/Hjaltland** **AQ – OR3**	Denend Croft / Gateside / Hjaltland	N-Amines: Moderate adverse (potentially significant)	Day and Night: Negligible / Minor adverse	Minor adverse	**Moderate adverse**
N – R7 **V – Bevailey** **AQ – OR2**	Bevailey	N-Amines: Negligible	Day and Night: Negligible / Minor adverse	Minor adverse	**Minor adverse**
N – R8 **V - Sandford Bungalow** **AQ – OR1**	Sandford Bungalow	N-Amines: Negligible	Day and Night: Negligible / Minor adverse	Moderate adverse	**Moderate adverse**
N – R9 **V – New Mill of Sandford**	New Mill of Sandford	N-Amines: Moderate adverse (potentially significant)	Day and Night: Negligible / Minor adverse	Moderate adverse	**Moderate adverse**

***AQ = Air Quality Receptor, N = Noise Receptor, V = Visual Receptor**

20.3. SUMMARY OF INTER-PROJECT CUMULATIVE EFFECTS

20.3.1 INTRODUCTION

20.3.1.1. Schedule 4 paragraph 5 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 states the need for cumulative impacts to be considered at a project level. The effects of the Proposed Development are assessed in combination with other projects or activities that are either existing under construction or currently going through the consenting process. Other projects have been identified through a search of the Aberdeenshire Council Planning Portal and confirmed with Aberdeenshire Council Planning Officers. Cumulative effects have been considered for each of the environmental topics. The cumulative assessment considers any existing environmental considerations and any areas of particular environmental importance such as designated sites and landscapes. The cumulative assessment considers the effects from the Proposed Development in conjunction with other projects or activities in the surrounding area (inter-project cumulative effects).

20.3.1.2. The method for identifying the other projects or activities for consideration in the assessment of inter-project cumulative effects is provided at **Appendix 2A** (EIA Report Volume 4). The list of other projects or activities to be considered has been agreed with Aberdeenshire Council and can also be viewed at **Appendix 2A** (EIA Report Volume 4).

20.3.1.3. The following sections provide a summary of the potential cumulative effects already described in detail within each of the technical chapters (**Chapter 8 – 19**, EIA Report Volume 2).

20.3.2 AIR QUALITY

20.3.2.1. There is a potential impact on local air quality from emission sources which have either received or may receive, planning permission or other consent, but have yet to come into operation within the vicinity of the Proposed Development. It is not considered that any of the identified schemes would have cumulative combustion or CCP pollutant emissions that need to be assessed with the Proposed Development's emissions. No further consideration of cumulative impacts has therefore been carried out for the operational assessment.

20.3.3 NOISE AND VIBRATION

20.3.3.1. There is the potential for short term, temporary construction related cumulative impacts to noise sensitive receptors within the vicinity of the Proposed Development due to an overlap in construction programmes with nearby other developments. However, the likelihood of adverse cumulative construction noise effects is considered to be low due to the distance between the potential construction sites. Additionally, any impact of changes in construction traffic noise levels on the A90 is considered to be low.

20.3.3.2. Increase in noise levels during operation are equal to those identified without the contribution from nearby other developments, which are typically perceptible under normal environmental conditions. Therefore, operational cumulative effects are not considered significant.

20.3.4 TRAFFIC AND TRANSPORT

20.3.4.1. The cumulative assessment was covered within TEMPRO to incorporate the future baseline, with the identified other developments being covered within background traffic growth, and therefore there is not a separate cumulative effects assessment.

20.3.5 BIODIVERSITY AND NATURE CONSERVATION

20.3.5.1. There is the potential for permanent loss of similar habitat across the areas of development to be used by the Proposed Development and other nearby developments, which therefore may support the same species. However, due to the distance between the other schemes and the Proposed Development, lack of ecological features present at some of the other development site, and proposed landscaping plans of other developments, there are no adverse cumulative effects predicted.

20.3.6 WATER ENVIRONMENT

20.3.6.1. There is the potential for short term, temporary construction related cumulative impacts on watercourses within proximity to the Proposed Development, namely from pollutants generated during construction. However, provided appropriate standard and good practice mitigation is implemented at all sites, through their respective CEMPs and as per the conditions of the relevant planning permission, environmental permits and licences, as is being proposed for this development, the cumulative risk can be effectively managed and there would not be a significant increase in the risks to any waterbodies. As such, there would be no additional cumulative impacts during construction.

20.3.6.2. It is assumed that drainage strategies would be / have been produced for all schemes within the surrounding area which have the potential for cumulative impacts with reference to the relevant policies and guidance documents. The Proposed Development will be designed to ensure no long-term deterioration in surface or groundwater quality. Attenuation and treatment will be provided for runoff from the Proposed Development prior to discharge to Sandford Bay. As such provided all of the additional schemes discussed in **Chapter 12: Water Environment** (EIA Report Volume 2) implement mitigation and best practice measures, then then no significant cumulative effects are anticipated.

20.3.7 FLOOD RISK

20.3.7.1. There is potential for overlap of the construction phase of the projects outlined in **Appendix 2A** (EIA Report Volume 4) and the Proposed Development. In this case it is possible that increased runoff from construction areas could exacerbate existing pluvial flooding issues at the substation and along the A90 to Stirling Village and Boddam. However, provided that standard and good practice mitigation is implemented on the above construction sites to manage surface water runoff, the cumulative risk can be effectively managed and there would not be a significant increase in the risk of pluvial flooding. As such, there would not be any additional cumulative impacts during construction on this basis.

20.3.7.2. Provided that all the mitigation measures, such as SuDS, are implemented for all schemes listed in **Appendix 2A** (EIA Report Volume 4), then the cumulative impacts from the Proposed Development and the above schemes will not lead to any significant effects.

20.3.8 GROUND CONDITIONS

20.3.8.1. Th only scheme from **Appendix 2A** (EIA Report Volume 4) likely to have a significant effect is application reference APP/2019/0982. However, with mitigation proposed in **Chapter 14: Ground Conditions** (EIA Report Volume 2) no significant residual effects are anticipated, and no cumulative effects are anticipated.

20.3.9 LANDSCAPE

20.3.9.1. There is potential for schemes within the vicinity of the Proposed Development which are operational, under construction, consented and at application stage awaiting determination to have a cumulative impact with the Proposed Development at some stage, either at construction or operation.

20.3.9.2. The potential for these additional schemes to have a cumulative landscape and cumulative visual effect with the Proposed Development has been assessed and it has been determined that there would be no additional effect to what was concluded for the non-cumulative assessment, meaning that the presence of the other developments will not exacerbate any potential negative effects during construction or operation of the Proposed Development.

20.3.9.3. The sequential effects for users of the A90 as a result of a cumulative effect with the Proposed Development and other developments would remain as minor adverse, in line with the non-cumulative assessment as the Proposed Development would be visible from similar sections of the A90 to the existing Peterhead Power Station.

20.3.10 CULTURAL HERITAGE

20.3.10.1. The assessment of archaeological potential presented in **Chapter 16: Cultural Heritage** (EIA Report Volume 2) and in **Appendix 16A** (EIA Report Volume 4) has demonstrated that the majority of the Proposed Development Site has been previously disturbed and any archaeological remains that were once present have been removed. Consequently, there is no potential for cumulative and combined effects to below ground archaeological assets within the Proposed Development Site.

20.3.10.2. The committed developments listed in **Appendix 2A** (EIA Report Volume 4) have been reviewed and assessed for any cumulative effects on the setting of designated and non-designated heritage assets, taking into consideration the effects from the Proposed Development and the nature of the assets identified. No potential for significant cumulative effects has been identified.

20.3.11 SOCIO-ECONOMICS

20.3.11.1. There is likely to be overlap between construction of some of the schemes in **Appendix 2A** (EIA Report Volume 4) and construction of the Proposed Development. However, it is unlikely that there will be significant pressure placed on the availability of the construction workforce required for the Proposed Development and other schemes mentioned in **Appendix 2A** (EIA Report Volume 4). It is anticipated there would be no change to the impact on core paths because of the cumulative effects of the Proposed Development and other schemes within the surrounding area. It is not anticipated that other schemes considered would have any additional impact on local tourism and recreation attractions. As such, there would not be any additional cumulative impacts during construction.

20.3.11.2. It is anticipated that there will not be any cumulative impact on employment during the operation of the Proposed Development. Even if other schemes are being constructed or operated during the operation of the Proposed Development, it is anticipated that there will be sufficient employment available to fill the operational jobs and this will not be impacted by the presence of the other schemes considered. There is no direct operational impact on the core paths and tourism and recreation amenities in proximity to the Proposed Scheme, and it is not anticipated that the presence of the other schemes will change this impact. As such, it is expected that the cumulative impacts from the Proposed Development and the schemes listed

in **Appendix 2A** (EIA Report Volume 4) will not lead to any additional / exacerbated negative effects during operation of the Proposed Development

20.3.12 CLIMATE CHANGE AND SUSTAINABILITY

20.3.12.1. It is not possible to define a study area for the assessment of cumulative effects of greenhouse gas (GHG) emissions nor to undertake a cumulative effects assessment, as the identified receptor is the global climate and effects are therefore not geographically constrained. Consequently, consideration of the effects of the Proposed Development together with other developments on GHG emissions is not considered to be applicable.

20.3.13 MAJOR ACCIDENTS AND DISASTERS (MA&DS)

20.3.13.1. It is expected that the cumulative schemes would not result in any new significant major accident risks that the Proposed Development would be susceptible to during construction. Any combined risks with the Proposed Development would be tolerable if as low as reasonably practicable (ALARP) and not significant.

20.3.13.2. During the operation of Proposed Development, cumulative risks relating to major accidents and disasters may arise in-combination with the operation of the cumulative schemes are the same as those identified in paragraph 19.9.2.1 of **Chapter 19: Major Accidents and Disasters** (EIA Report Volume 2).

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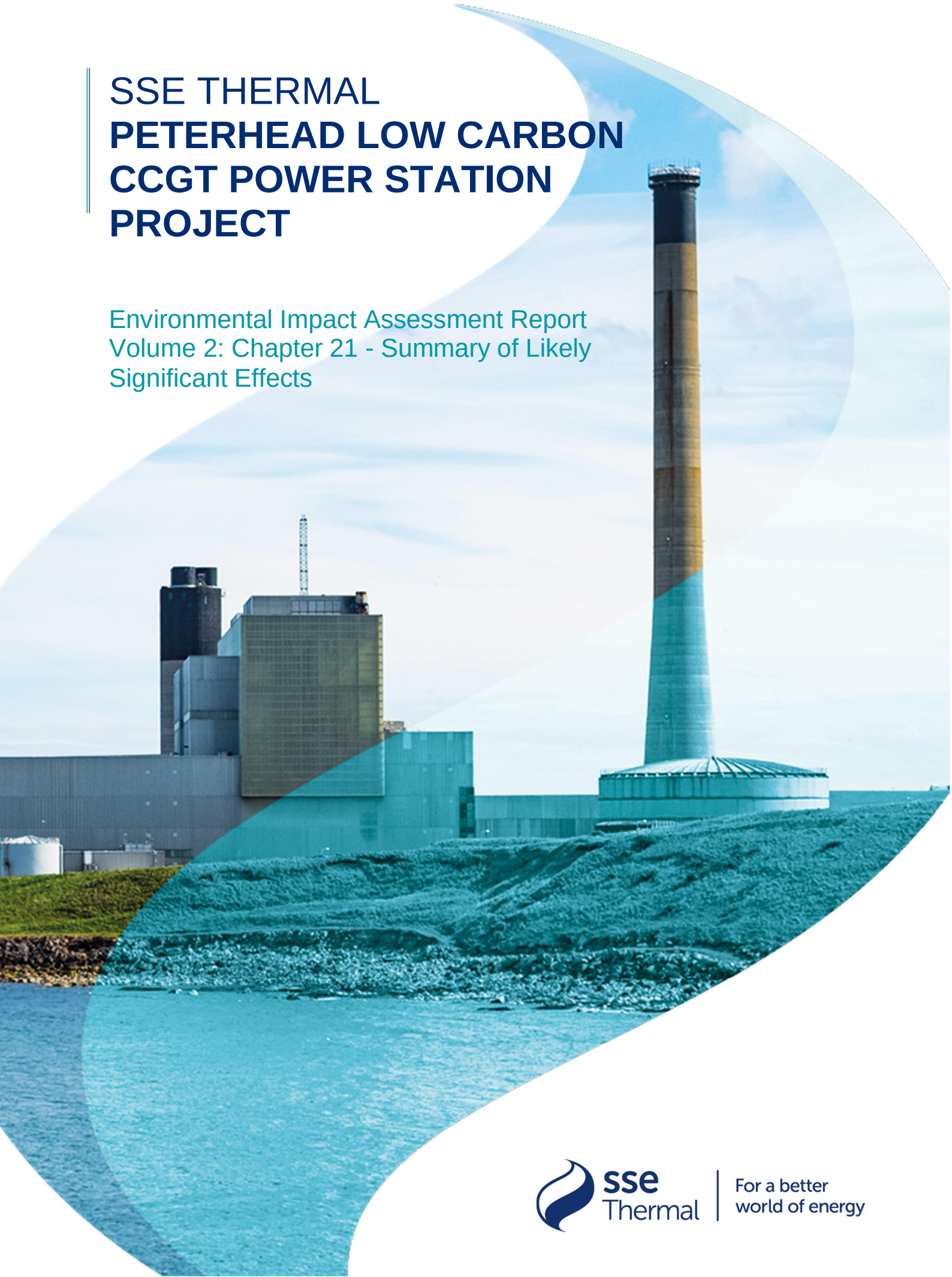

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20. Summary of Likely Significant Residual Effects

20.1. INTRODUCTION

20.1.1 INTRODUCTION

20.1.1.1. This chapter of the Environmental Impact Assessment Report (EIA Report) summaries the likely cumulative effects with other schemes in the surrounding area and assessed the potential for combined effects on any one receptor because of the Proposed Development.

20.1.1.2. **Chapters 8 to 19** of this EIA Report (Volume 2) have considered the potential environmental impacts and effects of the Proposed Development. This chapter summarises those adverse and beneficial environmental effects that are considered to be significant (i.e. moderate and major effects).

20.1.1.3. Mitigation measures are either embedded within the design, or construction. Details of these are provided within the technical **Chapters 8 to 19** (EIA Report Volume 2). Where technical topics identify construction mitigation measures, these are highlighted within **Appendix 5A Framework CEMP** (EIA Report Volume 4). A Schedule of Operational Commitments is provided in **Appendix 21A** (EIA Report Volume 4) which highlights mitigation measures to be put in place during the operation of the Proposed Development. Once these measures have been put in place, the residual effect remains, which is reported within Table 20.1 below.

20.2. SUMMARY OF SIGNIFICANT ENVIRONMENTAL EFFECTS AND PROPOSED MITIGATION MEASURES

20.2.1 INTRODUCTION

20.2.1.1. Table 20.1 summarises the significant environmental effects of the Proposed Development that have been identified, following implementation of the embedded mitigation or impact avoidance measures included in the design of the Proposed Development (as detailed in **Chapters 8** to **19** EIA Report Volume 2), where relevant).

20.2.2 APPROACH

20.2.2.1. For each topic, the reasonable worst-case scenario is assessed, including the construction programme scenario and design parameters. Further details on the reasonable worst case (or 'Maximum Design Parameters') are set out in **Chapter 4: The Proposed Development** (EIA Report Volume 2). The specific worst-case for each assessment is described in **Chapters 8** to **19** (EIA Report Volume 2) as appropriate. Effects have been assessed for the construction, operation (including maintenance) and decommissioning scenarios.

20.2.2.2. As outlined in **Chapter 2: Assessment Methodology** (EIA Report Volume 2), for the purposes of this EIA an effect is considered to be 'significant' if it is assessed to be moderate (adverse or beneficial) or major (adverse or beneficial). Minor or negligible effects are only references in this chapter where a 'significant' (moderate or major) effect has been reduced to a 'no significant' effect following mitigation.

20.2.2.3. To provide further clarification on the nature of the effects, each has been identified for the purposes of this summary as:

- Short term (St) – effects occurring only over a short period of time, e.g. an effect that only lasts for the duration of the construction period, or one that lasts for only part of the operational phase;
- Medium term (Mt) – effects occurring for the duration of the Proposed Development's operation, but which cease when operations cease; or
- Long term (Lt) – effects occurring beyond the operation of the Proposed Development, for example the permanent loss of habitat associated with the Proposed Development.
- Temporary (T) – effects that are not permanent because the effect would no longer occur if the impact was removed within the relevant timescale (for example the visual amenity impact of construction structures would be described as St, T as the impact does not continue when the structures are removed);
- Permanent (P) – effects that remain and cannot be readily reversed within the relevant timescale (for example an environmental feature that is lost and cannot be replaced until after decommissioning would be Mt, P. In the event that is could not be replaced at all, this would be Lt, P); and
- Direct (D) – effects that result from a direct impact, for example, the loss of ecological habitat; or
- Indirect (In) – also known as secondary effects, effects that result indirectly, for example, increased traffic could indirectly impact on air quality.

Table 20-1: Summary of Likely Significant Residual Effects

Development stage	Environmental Effect (following development design and impact avoidance measures)	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Classification of residual effect after mitigation	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
Chapter 8: Air Quality					
Construction	No significant effects are predicted to occur.				
Operation	No significant effects are predicted to occur.				
Decommissioning	No significant effects are predicted to occur.				
Chapter 9: Noise and Vibration					
Construction and Decommissioning	No significant vibration effects or noise effects due to construction traffic are predicted to occur at all receptors.				
Construction and Decommissioning	No significant daytime noise effects on residential NSRs R1-R6 and R8 are predicted to occur.				
Construction and Decommissioning	Daytime working in the vicinity of NSR R7 and R9 predicted to result in adverse effects in the short-term during construction. This effect is primarily due to the short distance between the	**Moderate/ Major adverse** (significant)	Further detailed assessment and CEMP once contractor appointed	Up to **Minor adverse** (not significant)	St, T, D

Development stage	Environmental Effect (following development design and impact avoidance measures)	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Classification of residual effect after mitigation	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
	closest of the properties in this NSR group to the noise source.				
Construction and Decommissioning	Evening/nighttime noise effects on all residential NSRs	**Moderate/major adverse** (significant)	Further detailed assessment and CEMP once contractor appointed	**Minor adverse** (not significant) on the basis that mitigation is employed such that the BS 5228 ABC noise limits are met and the **Chapter 9 Section 9.7** (EIA Report Volume 2) mitigation guidance is followed.	St, T, D
Operation	No significant effects are predicted to occur.				
Chapter 10: Traffic and Transport					
Construction	No significant effects are predicted to occur.				
Operation	No significant effects are predicted to occur.				
Decommissioning	No significant effects are predicted to occur.				
Chapter 11: Biodiversity and Nature Conservation					

Development stage	Environmental Effect (following development design and impact avoidance measures)	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Classification of residual effect after mitigation	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
Construction	No significant effects are predicted to occur to ecological features.				
Construction/ Decommissioning	Disturbance to barn owls nesting during construction/decommissioning should the species breed within the outbuildings at Sandford Lodge	**Temporary moderate adverse** (significant)	Provision of two nest boxes prior to commencement of construction	**Negligible** (not significant)	St, T, In
Operation	No significant direct effects on habitats and species are predicted to occur.				
Operation	Also, refer to **Chapter 8**: **Air Quality** (EIA Report Volume 2) in relation to effects of ammonia, nutrient nitrogen deposition, and acid deposition at habitats sites.				
Decommissioning	No significant effects are predicted to occur.				
Chapter 12: Water Environment					
Construction	No significant effects are predicted to occur.				
Operation	No significant effects are predicted to occur.				
Decommissioning	No significant effects are predicted to occur.				
Chapter 13: Flood Risk					

Development stage	Environmental Effect (following development design and impact avoidance measures)	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Classification of residual effect after mitigation	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
Construction	No significant effects are predicted to occur.				
Operation	No significant effects are predicted to occur because of flooding of local roads and residential properties because of the Proposed Development.				
Operation	Existing Power Station and Proposed Development - High	High	**Major adverse** (significant)	Removal of Den of Boddam culvert on Millbank Garage property Raising of Proposed Development platform	**Minor adverse** (not significant)
Decommissioning	No significant effects are predicted to occur.				
Chapter 14: Ground Conditions					
Construction	No significant effects are predicted to occur.				
Operation	No significant effects are predicted to occur.				
Decommissioning	No significant effects are predicted to occur.				
Chapter 15: Landscape and Visual Amenity					

Development stage	Environmental Effect (following development design and impact avoidance measures)	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Classification of residual effect after mitigation	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
Construction, Operation and Decommissioning	No significant effects on landscape character or the wider Special Landscape Area are predicted to occur				
Construction, Operation and Decommissioning	Effect on the site landscape elements	**Moderate adverse** (significant)	n/a	**Moderate adverse** (significant)	Construction and decommissioning St, T, D Operation Lt, P, D
Construction, Operation and Decommissioning	No significant effects at Viewpoints 1, 2, 3, 5, 7, 9, 10 and 11, and for residential receptors at Denend Croft, Gateside and Hjaltland are predicted to occur.				
Construction, Operation and Decommissioning	Adverse visual amenity effects for residents at Viewpoint 6 (receptors in Boddam (Harbour Street), and receptors on the northern half of the core path)	**Minor - residents** **Moderate adverse - core path users** (significant)	A Landscape and Biodiversity Management and Enhancement Plan (LBMEP) accompanies the Section 36 application which presents proposals for planting, although such planting would not reduce the significance of visual effects at these locations.	**Minor - residents** **Moderate adverse - core path users** (significant)	As above.

Development stage	Environmental Effect (following development design and impact avoidance measures)	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Classification of residual effect after mitigation	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
Construction, Operation and Decommissioning	Adverse visual amenity effects for residents at Viewpoint 4, Viewpoint 8; Residential receptors at: Sandford Villa, Newmill of Sandford; and Sandford Bungalow.	**Moderate adverse** (significant)	As above.	**Moderate adverse** (significant)	As above.
Construction and Decommissioning	Adverse visual amenity effects at Residential receptors at Bevailey and Millbank.	**Moderate adverse** (significant)	As above.	**Moderate adverse** (not significant)	Construction and decommissioning St, T, D
Chapter 16: Cultural Heritage					
Construction	Category B listed Sandford Lodge	**Moderate adverse** (significant)	Landscaping and bund formation to screen Sandford Lodge	**Moderate adverse** (significant)	Lt/ P/ In
Construction	Previously unrecorded archaeological sites	**Moderate adverse** (significant)	Consultation with the Aberdeenshire County Archaeologist confirmed no archaeological monitoring works are required due to the degree of previous ground disturbance and the consequently low potential for	**Moderate adverse** (significant)	Lt/ P/ D

Development stage	Environmental Effect (following development design and impact avoidance measures)	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Classification of residual effect after mitigation	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
			unrecorded remains to be present.		
Operation	No significant effects are predicted to occur.				
Decommissioning	No significant effects are predicted to occur.				
Chapter 17: Socio-economics, Tourism and Recreation					
Construction	The effect of direct, indirect and induced employment created by the construction phase of the Proposed Development on the Wider Impact Area's economy.	**Major beneficial** (significant)	As no significant adverse effects have been identified, no mitigation is required.	**Major beneficial** (significant)	St/T/D
Construction	No significant adverse effects are predicted to occur in relation to tourism and recreation.				
Operation	No significant effects are predicted to occur.				
Decommissioning	No significant effects are predicted to occur.				
Chapter 18: Climate Change and Sustainability					
Construction	No significant effects are predicted to occur.				

Development stage	Environmental Effect (following development design and impact avoidance measures)	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Classification of residual effect after mitigation	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
Operation	The effect of operating the Proposed Development on the global climate.	**Major adverse** (significant)	When considered in relation to the sole operation of the existing Peterhead power station	**Major beneficial** (significant)	Lt/ P/ D
Decommissioning	No significant effects are predicted to occur.				
Chapter 19: Major Accidents and Disasters					
Construction	No significant effects are predicted to occur.				
Operation	No significant effects are predicted to occur.				
Decommissioning	No significant effects are predicted to occur.				
Chapter 20: Cumulative and Combined Effects					
Construction	No new combined or cumulative significant effects are predicted to occur.				
Operation	No new combined or cumulative significant effects are predicted to occur.				
Decommissioning	No new combined or cumulative significant effects are predicted to occur.				

Note: Lt = long term, Mt = medium term, St = short term, P = permanent, T = temporary, D = direct, and In = indirect.

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3. The Site and Surrounding Area

3.1. SITE LOCATION

3.1.1 SITE LOCATION

3.1.1.1. The Proposed Development Site comprises land within and adjacent to the boundary of the existing Peterhead Power Station site near Peterhead, Aberdeenshire and falls within the administrative area of Aberdeenshire Council. The Proposed Development Site encompasses the operational Peterhead Power Station owned and under control of the Applicant. The location of the Proposed Development Site, which is approximately centred on national grid reference (NGR) 412597, 842972 is shown in **Figure 1.1: Site Location** (EIA Report Volume 3).

3.1.1.2. The Proposed Development Site boundary is shown on **Figure 3.1**: **Proposed Development Site Boundary** and **Figure 3.2: Aerial Photo of Proposed Development Site** (EIA Report Volume 3). The final Proposed Development Site boundary for the purposes of the Section 36 Application, including land for associated connections and temporary land required during construction of the Proposed Development, has been refined through ongoing studies and taking into account the responses to the Applicant's consultation.

3.1.1.3. This Chapter is supported by **Figure 3.1** to **Figure 3.4** (EIA Report Volume 3).

3.2. THE PROPOSED DEVELOPMENT SITE AND EXISITING LAND-USE

3.2.1 OVERVIEW

3.2.1.1. The Proposed Development Site encompasses an area of approximately 89 hectares (ha) and is situated within the existing Peterhead Power Station and land under the control of the Applicant.

3.2.1.2. The Proposed Development Site is divided into the following areas of permanent and temporary land use (described in more detail in **Chapter 4: Proposed Development** (EIA Report Volume 2):

- CCGT and CCP area;
- Electrical Connection Area to the existing Scottish and Southern Electricity Network (SSEN) 275kV Substation;
- Land within the existing Peterhead Power Station site for the purposes of facilitating connections to the Proposed Development for natural gas supply, and other necessary infrastructure (including connection to the existing seawater cooling outfall and intake);
- Construction Laydown Areas;
- New right-hand turn onto Gatehouse Road from the A90 junction.
- Upgrade to Sandford Lodge access track to become a construction site access and a permanent secondary access throughout operation for emergency access and egress; and
- Landscaping and Biodiversity Provision.

3.3. PROPOSED DEVELOPMENT SITE TOPOGRAPHY

3.3.1 TOPOGRAPHY

3.3.1.1. The Proposed Development Site and surrounding land has an uneven topography, varying from 9-45m Above Ordnance Datum (mAOD), with the landform generally sloping downwards from west to east towards the coast. According to the National LIDAR maps, the areas occupied by the existing Peterhead power station and the redundant HFO tanks lie at lower elevations (approximately 10-15m AOD) than their immediate surroundings (approximately 25m AOD). The remainder of the Site lies at elevations between approximately 30m and 40m AOD, with the highest point of 45m AOD located in the north-western area of the Proposed Development Site. The electrical substation located in the western portion of the Proposed Development Site lies at an elevation of approximately 40m AOD.

3.3.1.2. The existing Proposed Development Site topography has seen a considerable amount of material movement associated with previous developments within the wider Peterhead Power Station site. These were notably the two existing mounds, to the south bordering Boddam and to the north-west, which have created varying elevations across the Proposed Development Site.

3.4. HISTORY OF THE PROPOSED DEVELOPMENT SITE AND SURROUNDING AREAS

3.4.1 OVERVIEW

3.4.1.1. The existing Peterhead Power Station is a 1.18GW flexible gas-fired plant, using natural gas, that first became operational in 1982. The power station originally had two conventional steam generating Rankine Cycle fired boilers (Unit 1 and Unit 2). The boilers were coupled to two 660MW Steam Turbine Generators.

3.4.1.2. From 1998-2000 a repowering project was undertaken to convert Peterhead Power Station into an efficient CCGT power station. The current power station consists of three gas turbines, each with an associated Heat Recovery Steam Generator (HRSG). The steam from the HRSGs is routed to the original Unit 1 steam turbine; these three gas turbines and the steam turbine are together referred to as ‘Block 1’, which has a net capacity of 1.18GW.

3.4.1.3. The existing power station abstracts cooling water from Boddam Harbour to the south-east, and discharges cooling water via an outfall discharging into Sandford Bay to the north-east.

3.4.1.4. All electrical output from Peterhead Power Station is exported to the existing network via the existing 275kV Substation located to the west of the Proposed Development Site.

3.5. KEY ENVIRONMENTAL FEATURES

3.5.1 OVERVIEW

3.5.1.1. When undertaking an EIA, it is important to understand which receptors should be considered as part of the assessment. Several environmental receptors relevant to the EIA have been identified within 5km of the Proposed Development Site, as shown on **Figure 3.4** (EIA Report Volume 3). However, as described in **Chapter 2** (Section 2.5 EIA Report Volume 2), the study area differs for each environmental topic with the widest spatial scope considered to be 15km;

the relevant study area is detailed in the corresponding topic chapter of the EIA Report. Where distances are quoted in this EIA Report, the distance is defined (unless otherwise stated) as the shortest distance between the receptor and the closest point of the boundary of the Proposed Development Site.

3.5.1.2. Key receptors for each topic area have been identified as part of the assessment process and details are included in the relevant technical chapters (**Chapters 8 - 19** EIA Report Volume 2). A summary is also provided below.

3.5.2 SURROUNDING LAND-USE

3.5.2.1. Beyond the Proposed Development Site (and the current Peterhead Power Station Site), land uses are predominantly arable land to the west, with the town of Peterhead approximately 1.5km north and the village of Boddam approximately 30m south.

3.5.2.2. The Proposed Development Site is located within an area of arable land, predominantly grassland with areas of scattered trees and small blocks of woodland, which is currently tenanted by SSE for farming. The coastal area of Boddam Harbour is located approximately 300m south-east and Sandford Bay is located approximately 300m east of the Proposed Development Site.

3.5.3 RESIDENTIAL RECEPTORS

3.5.3.1. The nearest settlement is the village of Boddam which is adjacent to the Proposed Development Site boundary, approximately 600m south of the proposed CCGT and CCP area to the nearest house. The village of Stirling is approximately 200m south of the Proposed Development Site boundary and approximately 840m south west of the proposed CCGT and CCP area to the nearest house.

3.5.3.2. Other settlements nearby include: Burnhaven (850m) and Peterhead (1.5km) to the north of the Proposed Development Site and Stirling Village (250m) to the south. There are a small number of individual dwellings located in the surrounding rural areas. Sandford Lodge is a disused building located within the Proposed Development Site at the north east portion of the site. The closest residential and other sensitive receptors to the Proposed Development Site are summarised below and are shown on **Figure 9.1** (EIA Report Volume 3):

- Residential properties on Harbour Street, Boddam (noise and vibration receptor 1);
- Residential properties on Claymore Crescent, Boddam (noise and vibration receptor 2);
- The Old Manse (noise and vibration receptor 3) is immediately adjacent to the Proposed Development Site, south of the existing Peterhead Power Station access road. As a result of screening from landform and woodland, receptors at this property are not anticipated to gain views of the Proposed Development and as such have not been considered further in the Landscape and Visual Impact Assessment (LVIA) chapter of the EIA Report (**Chapter 15** EIA Report Volume 2);
- Millbank and Millbank Farm (noise and vibration receptor 4) immediately south of the A90 and immediately adjacent the southern boundary of the Proposed Development Site;
- Denend Croft, Gateside, and Hjaltland (noise and vibration receptor 5) approximately 200m south west of the Proposed Development Site's western boundary, west of the A90;
- Newton of Sandford Cottage (noise and vibration receptor 6); this property was demolished in 2021 as part of the adjacent 400kV substation works and has subsequently been removed from this EIA as a receptor;

- Bevailey (noise and vibration receptor 7); this property is scheduled for demolition as part of the adjacent 400kV substation works. However, at the time of assessment (in this EIA), the property was not yet demolished and has therefore been retained as a receptor;
- Sandford Bungalow (noise and vibration receptor 8) immediately west of the Proposed Development Site and opposite the Sandford Lodge access track; and
- New Mill of Sandford (noise and vibration receptor 9 immediately north of the Proposed Development Site and north of Sandford Lodge.

3.5.3.3. Potential effects on residential receptors are considered in all relevant chapters including **Chapter 8: Air Quality, Chapter 9: Noise and Vibration, Chapter 10: Traffic and Transport and Chapter 14: Landscape and Visual Amenity** (EIA Report Volume 2). Potential combined amenity effects on residential receptors are summarised in **Chapter 20: Combined Amenity Effects and Summary of Inter-Project Cumulative Effects** (EIA Report Volume 2).

3.5.4 ECOLOGICAL RECEPTORS

3.5.4.1. Designated nature conservation sites within 15km of the Proposed Development Site are presented in Table 3-1 and shown in **Figure 11.2** (EIA Report Volume 3).

Table 3-1: Statutory Ecological Designations within 15km (shown by distance from the Proposed Development Site)

Designation	Reason(s) for Designation	Relationship to the Proposed Development
Buchan Ness to Collieston Coast SPA	Encompassing 15km of south-east facing cliffs, this SPA is designated for breeding seabirds. The qualifying features of the SPA are: The breeding seabird assemblage, which regularly includes in excess of 20,000 individuals; • Breeding kittiwake *Rissa tridactlya*; • Breeding guillemot *Uria aalge*; • Breeding herring gull *Larus argentatus*; • Breeding shag *Phalacrocorax aristotelis*; and, • Breeding fulmar *Fulmarus glacialis*.	The Proposed Development is immediately adjacent to the boundary of Buchan Ness to Collieston Coast SPA, which encompasses the southern half of Sandford Bay. The cooling water intake and outfall are within the SPA boundary.
Buchan Ness to Collieston SAC	The sole qualifying feature of this site is vegetated sea cliffs.	The northern boundary of the Buchan Ness to Collieston SAC is approximately 750m south-east of the boundary of the Proposed Development Site. Depending on the position of the emissions stack of the Proposed Development, the distance to the Buchan Ness to Collieston SAC may be greater, up to 1.4km. The Proposed Development Site and the SAC are separated by the settlement of Boddam.

Designation	Reason(s) for Designation	Relationship to the Proposed Development
Bullers of Buchan Coast SSSI	This SSSI underlies both the Buchan Ness to Collieston Coast SPA and the Buchan Ness to Collieston SAC. The notified biological features are therefore a combination of the interest features of those sites, and are: • Breeding seabird assemblage; • Breeding kittiwake; • Breeding guillemot; • Breeding shag; and, • Maritime cliffs. The SSSI also has geological interest, but this is not relevant to this Chapter.	The boundary of the Bullers of Buchan Coast SSSI is coincident with the boundary of the Buchan Ness to Collieston SAC between its northern extent and Cruden Bay.
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	The boundary of the SPA encompasses the estuary of the River Ythan, the Sands of Forvie on the east bank of the estuary, the eutrophic Meikle Loch and a marine component covering the area between Aberdeen and Cruden Bay. The qualifying features of the SPA are: • Breeding common tern *Sterna hirundo*; • Breeding little tern *Sterna albifrons*; • Breeding sandwich tern *Sterna sandvicensis*; • Non-breeding waterfowl assemblage, which regularly includes in excess of 20,000 individuals; • Non-breeding eider *Somateria mollissima*; • Non-breeding lapwing *Vanellus vanellus*; • Non-breeding redshank *Tringa totanus*; and, • Non-breeding pink-footed goose *Anser brachyrhynchus.*	Situated approximately 7.1km south-south-west of the Proposed Development Site. There is direct connectivity through the marine environment between the two, with the SPA encompassing a large area of the sea from Cruden Bay southwards.
Collieston to Whinnyfold Coast SSSI	This SSSI also underlies the Buchan Ness to Collieston Coast SPA and the Buchan Ness to Collieston SAC. Similar (but not identical) to the Bullers of Buchan Coast SSSI, the notified biological features of this site are: • Breeding seabird assemblage; • Breeding fulmar; • Breeding guillemot;	The boundary of the Collieston to Whinnyfold Coast SSSI is coincident with the boundary of the Buchan Ness to Collieston SAC between Cruden Bay and Collieston, at its southern most extent. At closest, the SSSI is approximately 9.6km south-west from the Proposed Development Site.

Designation	Reason(s) for Designation	Relationship to the Proposed Development
	• Breeding kittiwake; • Breeding razorbill *Alca torda*; • Sea wormwood *Seriphidium maritimum*; and, • Maritime cliffs. The SSSI also has geological interest, but this is not relevant to this Chapter.	
Rora Moss SSSI	The sole notified feature of this site is raised bog. Rora Moss is the second largest lowland raised bog in Aberdeenshire.	Situated approximately 10.8km north-west of the Proposed Development Site. The intervening landscape is predominantly agricultural, although the SSSI is surrounded to the south by conifer plantation woodland.
Loch of Strathbeg SSSI	Loch of Strathbeg SSSI is designated for a range of habitats and species, as well as geological interests (which are not considered here). The notified biological features of the SSSI are: • Eutrophic loch; • Fen meadow; • Open water transition fen; • Saltmarsh; • Sand dunes; • Breeding bird assemblage; • Non-breeding goldenye *Bucephala clangula*; • Non-breeding greylag goose *Anser anser*; • Non-breeding pink-footed goose; and, • Non-breeding whooper swan *Cygnus cygnus*.	The southernmost boundary of the SSSI is approximately 13.6km north of the Proposed Development Site. There is a direct connection between the two via the marine environment, with the boundary of the SSSI covering coastal habitats and offshore several islands.
Meikle Loch and Kippet Hills SSSI	The notified biological features of the Meikle Loch and Kippet Hills SSSI are: • Non-breeding greylag goose; and, • Non-breeding pink-footed goose. The SSSI also has geological interest, but this is not relevant to this Chapter.	Meikle Loch and Kippet Hills SSSI is situated approximately 13.9km south-west of the Proposed Development Site. The intervening land use is predominantly agricultural, with some blocks of woodland.

Designation	Reason(s) for Designation	Relationship to the Proposed Development
Loch of Strathbeg SPA	Loch of Strathbeg SPA is composed of a shallow freshwater loch with surrounding wetland, dune and grassland communities. The SPA is contained within the Loch of Strathbeg SSSI. The qualifying features of the SPA are: Breeding sandwich tern; Non-breeding waterfowl assemblage, which regularly includes in excess of 20,000 individuals; • Non-breeding goldeneye; • Non-breeding greylag goose; • Non-breeding pink-footed goose; • Non-breeding barnacle goose *Branta leucopsis*; • Non-breeding whooper swan; and, • Non-breeding teal *Anas crecca*.	Situated approximately 14.7km north-north-west of the Proposed Development Site. Separated by the town of Peterhead and St Fergus Gas Terminal and intervening agricultural land.
Loch of Strathbeg Ramsar site	The qualifying features of the Loch of Strathbeg Ramsar site are similar, but not identical, to those of the Loch of Strathbeg SPA: • Eutrophic loch; • Non-breeding waterfowl assemblage; • Non-breeding greylag goose; • Non-breeding pink-footed goose; and, • Non-breeding whooper swan.	Loch of Strathbeg Ramsar site is entirely coincident with the Loch of Strathbeg SPA.
Ythan Estuary and Meikle Loch Ramsar site	The Ythan Estuary and Meikle Loch Ramsar site largely overlaps the Ythan Estuary, Sands of Forvie and Meikle Loch SPA, but does not include the marine component. The qualifying features of the Ramsar site are: • Breeding sandwich tern; • Non-breeding waterfowl assemblage; and, • Non-breeding pink-footed goose.	The nearest part of the Ramsar site is Meikle Loch, which is approximately 14.9km south-west of the Proposed Development Site.

3.5.4.2. There is one locally designated non-statutory conservation site within 2km of the Proposed Development. The Skelmuir Hill, Stirling Hill and Dudwick Local Nature Conservation Site (LNCS) is directly adjacent the Proposed Development Site, on the west side of the A90 road, and south of the existing electricity substation.

3.5.4.3. The potential effects of the Proposed Development on designated ecological sites and other ecological receptors are considered in **Chapter 11: Biodiversity and Nature Conservation** (EIA Report Volume 2), with supporting information provided in **Chapter 8: Air Quality, Chapter 9: Noise and Vibration** and **Chapter 12: Water Environment and Chapter 13: Flood Risk** (EIA Report Volume 2).

3.5.5 TRAFFIC AND TRANSPORT

3.5.5.1. The Proposed Development Site lies to the east of the A90, and can be accessed using Gatehouse Road, an access road which leads directly onto the A90. At the point where the access road meets the A90, it is a single carriageway road which continues north towards Peterhead and Fraserburgh. To the south, the A90 leads towards Ellon and Aberdeen; parts of the southern section are dual carriageway. Gatehouse Road runs around the outside of Peterhead Power Station and facilitates the movement of traffic within the current power station site.

3.5.5.2. Access to the Proposed Development Site during construction (HGVs) and operation would be via the existing Gatehouse Road access. A secondary access to the Proposed Development Site during construction (HGVs) and operation (emergency access only) would be via the existing Sandford Lodge access track. Both accesses will be subject to improvements including widening of the Sandford Lodge access track and A90 junction and a new dedicated right turn in at Gatehouse Road/A90 junction. Access to the Proposed Development Site for Abnormal Indivisible Loads will use the Sandford Lodge access track. Construction workers will use the existing Gatehouse Road access.

3.5.5.3. Plans showing the highway network in the vicinity of the Proposed Development Site are presented in the Transport Assessment (**Appendix 10A** EIA Report Volume 4).

3.5.5.4. Three core paths are located within and adjacent to the Proposed Development Site:

- Footpath ECPP-202-03: a path of 450m in length located along the road leading to Sandford Lodge located within the Proposed Development Site. This path will be temporarily diverted for the duration of the construction period to facilitate works to the Sandford Lodge access track as well as construction vehicle movements. The core path will then be reinstated upon completion of the proposed works;
- The Aberdeenshire Coastal Path (ECPP-7LD-01-24) running from Boddam to Peterhead is located along the eastern boundary of the Proposed Development Site. This path runs through the north-eastern section of the Proposed Development Site. A section of this path around the existing outfall will be temporarily diverted to facilitate works to the outfall structure. It will then be reinstated upon completion of the proposed works; and
- Footpath ECPP-215-04: a 3.11km path located along the A90 immediately adjacent to the Proposed Development Site and partly running within the Proposed Development Site where the red line boundary is extended across the A90 to the west to include the electrical substation and at the A90 junction with the Sandford Lodge access track. This core path will not be affected by the Proposed Development.

3.5.5.5. Other Core Paths within the surrounding area include:

- Footpath ECPP-215-02 is located approximately 500m north-west of the Proposed Development Site at its closest point, at the Invernettie roundabout.

3.5.6 AIR QUALITY RECEPTORS

3.5.6.1. There are no Air Quality Management Areas (AQMAs) within the surrounding area. The closest AQMAs to the Proposed Development Site are the three declared in the Aberdeen City Council administrative area for NO_2 and PM_{10}, approximately 40km to the south of the Proposed Development Site, and therefore it is not considered that the Proposed Development will impact upon the air quality within any AQMAs.

3.5.7 GEOLOGICAL AND HYDROGEOLOGICAL RECEPTORS

3.5.7.1. As outlined in the Phase 1 Geo-Environmental Site Assessment (**Appendix 13A** EIA Report Volume 4), the local geology is characterised by approximately 8m to 20m of Hatton Till Formation (diamicton clay, sand and gravel) with occasional marine beach deposits of gravel, sand and silt at 3m thickness. These superficial deposits overlie the Peterhead Pluton Formation which shows evidence of weathering. The main buildings area of the existing power station, the former HFO tank area and the unused area north-west of the Proposed Development Site are underlain by Made Ground.

3.5.7.2. Scottish Environment Protection Agency (SEPA, 2021a) classifies the underlying geology as a low productivity aquifer and it is described by the British Geological Society (BGS) as having '*small amounts of groundwater in the near surface weathered zone and secondary fractures and rare springs*'. According to the SEPA Water Environment hub (2021b), the quality of groundwater in the area is classed as 'good'.

3.5.7.3. Groundwater levels within the historical borehole records indicate generally a discontinuous presence of groundwater. Boreholes and trial pits dated from the 1970s encountered groundwater at depths from 0.45m to 11m bgl, within the superficial deposits; however, most of the investigation points were found to be dry.

3.5.8 HYDROLOGICAL AND FLOOD RISK RECEPTORS

3.5.8.1. The Proposed Development Site is located between two river catchments, the River Ugie approximately 4km north and the Water of Cruden approximately 7km south. There are the following surface water bodies within the Proposed Development Site and surrounding area:

- Sandford Bay and the coastal waters up to one nautical mile offshore are designated under the Water Framework Directive (WFD) as implemented in Scotland as the Ugie Estuary to Buchan Ness (Peterhead) coastal water body;
- Invernettie Burn – this burn is situated around 1km away to the north and is a relatively short watercourse (approximately 4km long) running west to east and discharging into the North Sea (northern shore of Sandford Bay) on the southern edge of the Invernettie area of southern Peterhead near to a wastewater treatment works;
- Den of Boddam Burn – flows from south-west to north-east and for approximately 3km before it reaches the boundary of Peterhead Power Station. The current route upstream of the Power Station and the A90 this watercourse enters a culvert and is routed across the area of the former HFO tanks before flowing into the North Sea north of the existing cooling water outfall; and
- Numerous ditches and ponds.

3.5.8.2. Areas in the centre and east in the Proposed Development Site are identified by SEPA Flood Map (SEPA, 2020) as being at medium risk to fluvial and pluvial flooding. Medium risk is classified as having a 0.5% chance of flooding each year, showing parts of the existing Power Station together with the access route and the junction of the A90 into the site to be at risk of flooding during extreme fluvial and pluvial flood events.

3.5.8.3. Due to the coastal position of the Proposed Development Site, the predominant drainage trend is west to east towards the coast. A comprehensive drainage system exists at the current Peterhead Power Station providing separation of potentially contaminated from uncontaminated drainage.

3.5.9 CULTURAL HERITAGE RECEPTORS

3.5.9.1. There is one Category B listed building within the Proposed Development Site boundary; Sandford Lodge [LB16364], and one Category C listed building associated with Sandford Lodge, comprising its Walled Garden [LB16365]. The lodge and garden were constructed as miniature mansion house and grounds in approximately 1800. The Aberdeenshire HER records the non-designated extent of the grounds [NK14SW0073], which extend south from the lodge further into the Proposed Development Site. There are no other designated assets within the Proposed Development Site as shown on **Figure 3.4** (EIA Report Volume 3).

3.5.9.2. There are several non-designated heritage assets recorded in the Aberdeenshire Historic Environment Record (HER) within the Proposed Development Site, most of which relate to the postmedieval and modern land use of the site before the existing power station was constructed. A number of these are linked to agriculture and include several former farmsteads [NK14SW0079, NK14SW0081, NK14SW0080, and NK14SW0078], all of which are now assumed to have been demolished. The former Free Church of Scotland manse is also located adjacent to the western boundary of the Site [NK14SW0085] and is now in use as a private house.

3.5.9.3. The other non-designated asset within the Proposed Development Site is the earthwork bank known as the Den of Boddam which was built to accommodate a railway line to transport prisoners from Peterhead Prison, to the stone quarries to the south of the Proposed Development Site [NK14SW0061].

3.5.9.4. Outside the Proposed Development Site boundary, there are several designated assets including a large number of Category C listed buildings, three Category B listed buildings and one Category A listed building located within the Boddam Conservation Area. The conservation area is approximately 315m south-east of the Proposed Development Site, at its closest extent. The Category A listed building is Buchan Ness Lighthouse [LB16367]. The Category B listed buildings are the Masonic Lodge No. 1087 at 5-9 Rocksley Drive [LB16337], 12A Earl's Court [LB13889], and 1 Queen's Road [LB16346]. The Category C listed buildings are largely domestic buildings located within the core of the 19th century planned streets on Queen’s Road and Rocksley Drive.

3.5.9.5. To the north of the Proposed Development Site, there are Category B listed 18th century Windmill Tower at Glenugie Distillery [LB16363], approximately 0.7km north of the Proposed Development Site, and the Category B listed Reform Tower in Meethill [LB16362] located approximately 1.15km north of the Proposed Development Site.

3.5.9.6. Boddam Castle scheduled monument [SM3252] lies within 1km of the Proposed Development Site to the south of Boddam. A second scheduled monument, Boddam Den, flint mining complex [SM6137], is located approximately 1.15km south-west of the Proposed Development Site and comprises a well preserved prehistoric industrial site extending along both sides of the Den.

3.5.9.7. Several non-designated assets have also been recorded outside the Proposed Development Site on the Aberdeenshire HER, most of which date to the post-medieval period.

3.5.10 LANDSCAPE AND VISUAL RECEPTORS

3.5.10.1. Parts of the coastline to the north of Peterhead, and to the east and south of Boddam are within the North East Aberdeenshire Coast Special Landscape Area (SLA). SLAs are local level designations identified and afforded policy protection through local development plans and supplementary guidance.

3.5.10.2. The Proposed Development lies within Landscape Character Type (LCT) 11: Fragmented Rocky Coast. Key characteristics of this LCT include its fragmented rocky coastline with dramatic coastal features, such as rugged cliffs, and broken islets; and the steep rugged slopes which give way to coastal fields and grassland. Within the study area the settlements of Peterhead and Boddam, together with the Peterhead Power Station, operational quarry at Boddam, and the A90 have an influence on the character of this LCT.

3.5.10.3. Potential visual receptors likely to experience views of the Proposed Development include:

- Nearby settlements of Peterhead to the north and Boddam to the south, and more distant settlements of Rora in the north and Hatton in the south;
- Scattered clusters and isolated properties and farmsteads inland and around Peterhead, and on distant higher ground;
- Users of recreational routes and core paths, including along the coast; and
- Visitors to other places of interest, such as Slains Castle ruins and Craigewan Links.

3.5.10.4. Further information can be found in **Chapter 14: Landscape and Visual Amenity** (EIA Report Volume 2).

TOURISM AND RECREATION RECEPTORS

3.5.10.5. There are a variety of visitor attractions and amenities located in Peterhead and Boddam. Key local visitor attractions and community facilities in the vicinity of the Proposed Development are set out within Table 3.2 below.

Table 3-2: Visitor Attractions and Amenities

Receptor	Location	Approximate Distance to the Proposed Development Site
Hotels within Boddam	Boddam	170m south-east
Misty Sea Angling / Boat Trips	Boddam	340m south-east
Loopty Lou's Soft Play centre	Boddam	350m south
Buchanness Lighthouse Holidays	Boddam	700m south-east
Boddam Castle	Boddam	800m south
Peterhead Prison Museum	Peterhead	1.1km north
Reform Tower	Peterhead	1.2km north
Peterhead Sailing Club	Peterhead	1.5km north

Receptor	Location	Approximate Distance to the Proposed Development Site
Peterhead Bay Marina Holiday Park	Peterhead	1.8km north
Old St Peter's Church	Peterhead	2.6km north
Longhaven Cliffs Nature Reserve	Longhaven	2.7km south-west
Keith Inch Castle	Peterhead	2.7km north-east
Hotels and guest house accommodation within Peterhead	Peterhead	2.7km – 4.7km north and north-east
The Peterhead Trail	Peterhead	2.8km north-east
Abruthnot Museum	Peterhead	3km north-east
Balmoor Stadium	Peterhead	3.3km north
Buchanhaven Heritage Centre	Peterhead	3.6km north
Peterhead Golf Club	Peterhead	4km north
Bullers of Buchan Geological Features	Located along coast line north of Cruden Bay	4.6km south-west
Cairn Catto	Near Longside	5km west
Inverugie Castle	Inverugie	5.2km north-west

3.5.10.6. Further details can be found in **Chapter 17: Socioeconomics, Tourism and Recreation** (EIA Report Volume 2).

3.6. REFERENCES

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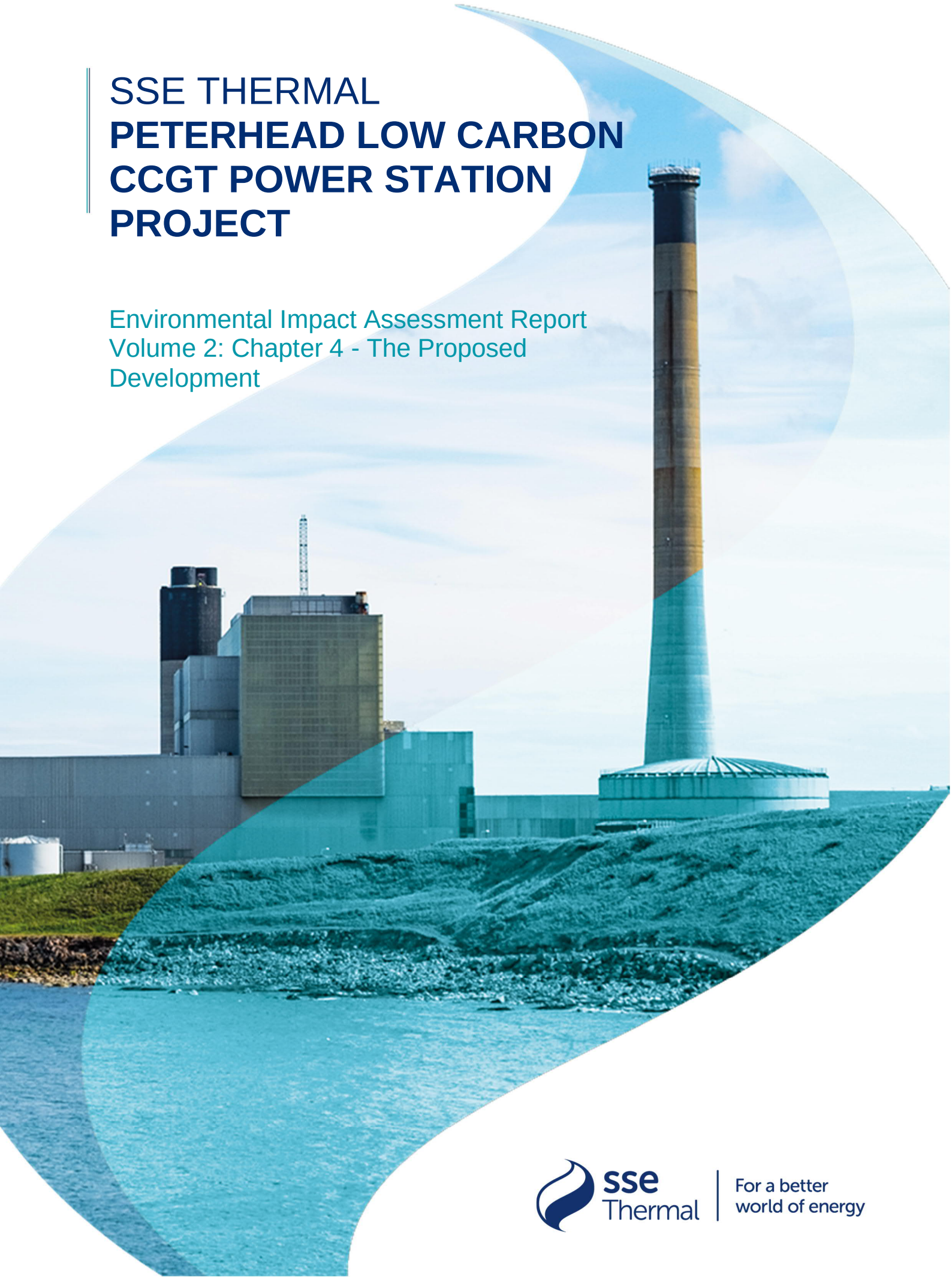
SSE THERMAL

PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 4 - The Proposed Development



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4. The Proposed Development

4.1. INTRODUCTION

4.1.1 OVERVIEW

4.1.1.1. The Proposed Development comprises the construction, operation, and maintenance of a low carbon Combined Cycle Gas Turbine (CCGT) generating station with a capacity of up to 910MW electrical output to be located on land in the vicinity of the existing Peterhead Power Station near Boddam in Aberdeenshire (the Proposed Development Site).

4.1.1.2. The low carbon CCGT generating station will be fuelled by natural gas and includes works to existing cooling water, natural gas and electrical grid connections. It will be designed and built to operate with a post-combustion carbon capture plant (CCP) installed and will typically be operated as a dispatchable low carbon generating station (operating flexibly to meet market demands). A schematic of the Proposed Development is shown in **Plate 4.1**.

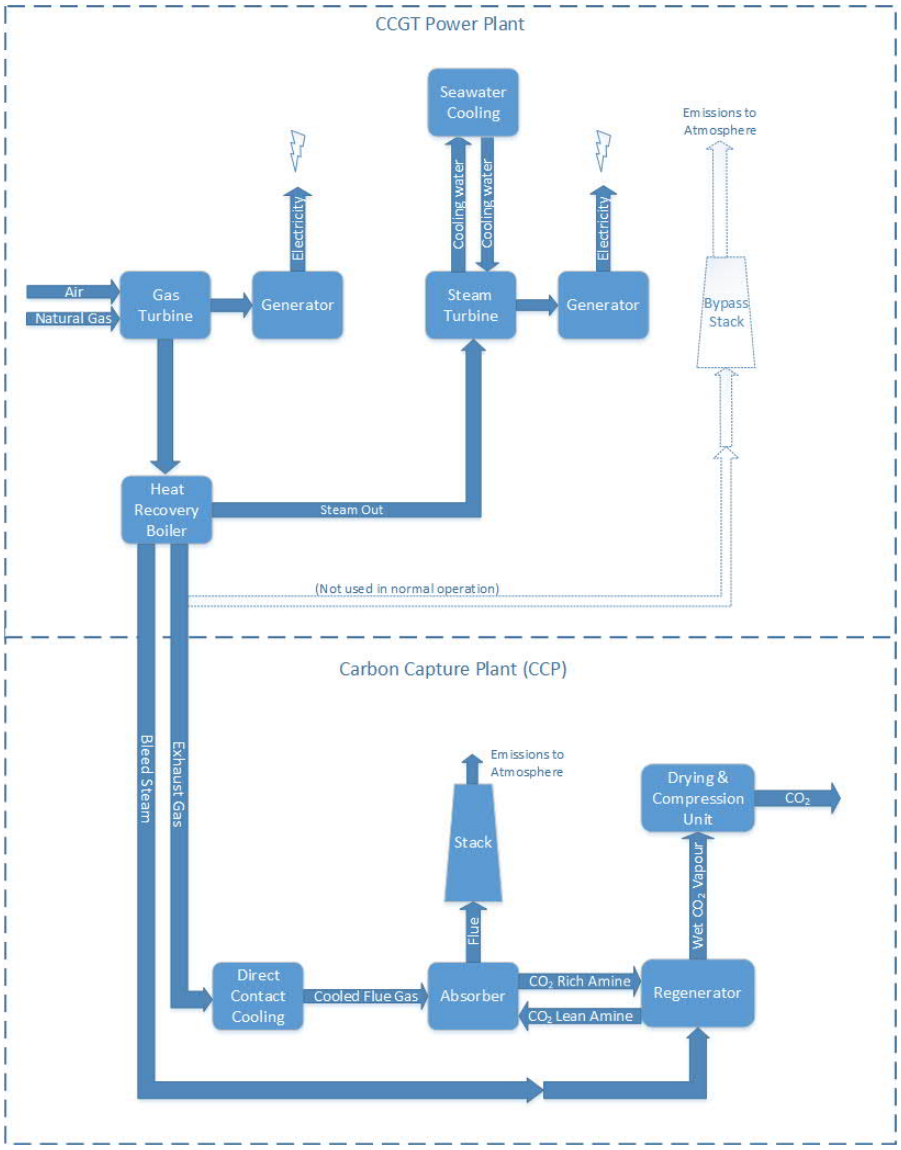

Plate 4-1: The Proposed Development

4.1.1.3. The Proposed Development will be ready to connect into the Acorn Carbon Capture and Storage (CCS) Project for transportation and permanent storage of carbon dioxide.

4.1.1.4. The Project will only be built with a clear route to decarbonisation, by equipping it with post-combustion CCP technology. An indication of the likely approach to development of this third-party infrastructure is described in Section 4.3.

4.1.1.5. The UK Government published the Ten Point Plan for a Green Industrial Revolution in November 2020, this included commitment to deploy Carbon Capture, Usage and Storage (CCUS) in two industrial clusters by the mid-2020s (Track-1), and a further two clusters by 2030 (Track-2) with an ambition to capture more than 10 $MtCO_2$ per year by 2030 (Department for Business, Energy & Industrial Strategy, 2020). In October 2021 the Scottish Industrial Cluster, of which the Proposed Development is part, was announced as a reserve cluster for Track-1. This means that the Proposed Development and the wider Scottish Cluster are expected to either receive funding support as part of Track-2, or brought forward to Track-1 should either of the other Track-1 clusters not progressed according to Track-1 requirements.

4.1.1.6. The Applicant continues to engage with the UK Government on the importance of the Scottish Cluster and the need for all clusters across to the UK to be decarbonised to be able to reach the net zero target.

4.1.1.7. The existing Peterhead Power Station will remain available to operate in a reduced capacity alongside the operation of the CCP enabled Proposed Development. The existing Peterhead Power Station is expected to only operate if grid demand cannot be fulfilled through the Proposed Development. The existing power station will not need to be decommissioned or demolished to allow the Proposed Development to be constructed and operated, although some ancillary structures will need to be removed to provide the necessary footprint for the Proposed Development.

4.2. PROPOSED DEVELOPMENT

4.2.1 ELEMENTS OF THE PROPOSED DEVELOPMENT

4.2.1.1. The Proposed Development includes the following elements:

- New carbon capture enabled electricity generating station fuelled by natural gas and with a gross electricity generating capacity of up to 910MW comprising:
  - A single CCGT unit;
  - A single CCP;
  - Tie-ins to water, gas and electricity connections and CO_2 compression and export infrastructure; and
  - Supporting facilities including administration and control buildings, workshops, stores, water storage tanks and permanent laydown areas for operation and maintenance activities.
- New gas pipework and connections to convey natural gas fuel to the CCGT from the existing gas pressure reduction station (PRS) located within the Proposed Development Site.
- Electricity transmission infrastructure, including new cable routing to connect the CCGT to the existing Peterhead electrical substation located across the A90 on the western boundary of the Site.

- An additional new electrical substation that may be required at the Site to interface between the CCGT and electrical transmission infrastructure.
- Connection to the existing seawater cooling system including a new section of cooling water pipework to the Proposed Development and connection to the existing pumphouse which abstracts water at Boddam Harbour
- Use of an existing outfall and associated pipework for the discharge of returned cooling water and treated wastewater to Sandford Bay.
- Public water connection pipeline from the existing water supply to the Proposed Development to provide potable water.
- Above ground CO_2 compression and export infrastructure comprising an above ground installation (AGI) including gas purification and drying and staged compression facilities, together with outlet metering.
- New permanent accesses to the Proposed Development Site comprising:
  - Temporary diversion of Footpath ECPP-202-03 to allow for the upgrade works to and the use of the Sandford Lodge access track during construction; ;
  - Upgrade works, including a dedicated right hand turn lane on the A90 northbound, to the junction of the A90 with Gatehouse Road to allow access for construction traffic;
  - Construction of a new gatehouse on the upgraded Sandford Lodge access track and relocation of the existing gatehouse from Gatehouse Road to serve the Site (both off the A90); and
  - Construction of a temporary gatehouse on Gatehouse Road (off the A90) to the existing Power Station to be used during the construction phase of the Proposed Development.
- Diversion of the culverted Den of Boddam Burn.
- Temporary localised diversion of the Aberdeenshire Coastal Path (ECPP-7LD-01-24) at the existing Peterhead Power Station cooling water outfall.
- Temporary construction and laydown areas and contractor facilities, including materials and plant storage and laydown areas; generators; concrete batching facilities; vehicle and cycle parking facilities; pedestrian and cycle routes and facilities; offices and staff welfare facilities; security fencing and gates; external lighting; roadways and haul routes (including the maintenance and improvement of existing haul route between construction laydown areas; wheel wash facilities; and signage.
- Landscaping, planting and biodiversity enhancement measures and security fencing and boundary treatment.
- Surface water drainage systems, including works to existing drainage systems.
- Electrical, gas, potable water supply, foul water drainage and telecommunications infrastructure connections, and works to alter the position of such services and utilities connections.
- Hard standings and hard landscaping.
- Soft landscaping, including bunds and embankments.
- External lighting, including lighting columns.
- Closed circuit television cameras and columns and other security measures.
- Site establishment and preparation works, including site clearance, earthworks and excavations; construction access; alteration of services and utilities; and works for the protection of buildings and land.
- Vehicle parking and cycle storage facilities.
- Accesses, roads and pedestrian routes.
- Temporary works associated with the maintenance of the authorised development.

4.2.1.2. Each part of the Proposed Development is described in further detail below. The maximum (and where relevant minimum) dimensions of each component are detailed in Section 4.3 of this chapter.

4.2.1.3. The CCGT, CCP and associated facilities are referred to as the 'CCGT and CCP area' in the EIA Report. Further details of the Proposed Development (including the implementation of the 'Rochdale Envelope' and the three indicative Proposed Development Site layout options) are set out in Section 4.3 of this chapter. The areas of the Proposed Development Site described above are shown in **Figure 3.3** (EIA Report Volume 3) and the proposed CCGT and CCP area are shown in **Figure 4.1- 4.3** (EIA Report Volume 3). Please also refer to **Chapter 6: Consideration of Alternatives** (EIA Report Volume 2) for details as to why more detail is provided in **Figure 4.1** (EIA Report Volume 3) (Option 1) than for Options 2 and 3 (**Figures 4.2 and 4.3** (EIA Report Volume 3).

4.2.1.4. Several design aspects and features of the Proposed Development cannot be confirmed until the detailed design of the Proposed Development has been completed in the pre-construction phase. For example, the building sizes and location may vary, depending on the Engineering, Procurement and Construction (EPC) contractor selected and their specific configuration and selection of plant and equipment. It is also important that the consent retains appropriate flexibility to allow for evolving development of CCGT and CCP technology in the period between preparing the Application and starting construction.

4.2.1.5. A pre-Front-End Engineering Design (FEED) design has been undertaken for the Proposed Development. In addition, two potential EPC contractors have been engaged to provide technology-specific layouts, which use the same principal project components as the pre-FEED design within the same overall footprint, although the configuration, orientation and sizing of structures do differ. Therefore, there are three indicative design layouts that could be developed, as shown in **Figures 4.1 - 4.3** (EIA Report Volume 3). These lie within the same overall development footprint shown in **Figure 3.3** (EIA Report Volume 3). To retain flexibility but also present a worst-case assessment of environmental effects, these three differing layout options have therefore been considered in the EIA, further information is provided in Section 4.3.17 (Rochdale Envelope and Design Parameters) of this chapter.

4.2.1.6. Rationale for the need to retain flexibility in certain parameters is outlined in this chapter and also in **Chapter 6: Consideration of Alternatives** (EIA Report Volume 2). As such, this EIA Report presents a reasonable worst-case assessment of the potential impacts of the Proposed Development.

4.2.1.7. Construction of the Proposed Development is described in **Chapter 5: Construction Programme and Management** (EIA Report Volume 2). As discussed above, at this stage in the project development, a detailed construction programme is not available as this is normally determined by the EPC contractor(s) which has/ have not yet been appointed; however, an indicative construction programme is presented within **Chapter 5: Construction Programme and Management** (EIA Report Volume 2) on which the potential environmental effects of the Proposed Development have been assessed.

4.2.1.8. Construction of the Proposed Development could (subject to the necessary consents being granted) start as early as Quarter 4 2023. Assuming an approximate three-to-four-year construction programme followed by a period of commissioning, the Proposed Development is unlikely to commence commercial operation before 2027 with timescales for commercial operation linked to throe development of the Acorn Project proposals facilitated by Storegga, and their partners Harbour Energy and Shell to which the Proposed Development will connect.

4.2.1.9. The Applicant is collaborating with the Acorn project who have confirmed their intention to facilitate a CO_2 transport pipeline connecting the Peterhead power station Site to an offshore storage site. Further information on the proposed operation is provided in Section 4.3.5. and 4.3.6.

4.2.1.10. It is envisaged that the power generation and carbon capture elements of the Proposed Development will have a design life of approximately 25 years. At the end of the design life, these elements would be assessed for ongoing viability and only if no longer viable, be decommissioned as outlined in Section 4.5 below. It is therefore anticipated that, at the earliest, decommissioning of the Proposed Development would be expected to commence at some point after 2053. This EIA has assumed that the Proposed Development could operate for longer than a 25-year design life and has therefore considered and assessed the potential for operational impacts/ effects to continue beyond this timeframe. If the operating life were to be extended, the Proposed Development would be upgraded in line with the legislative requirements at that time.

4.2.1.11. A combined heat and power (CHP) Assessment has been prepared to accompany the Application. This considers the feasibility of installing CHP and concludes that:

- The Proposed Development meets the BAT tests outlined in the CHP-R Guidance. It therefore will be designed and built as 'CHP-Ready' to supply any identified viable heat load up to a potential maximum of 82MWth based on the heat export feasibility study. This will allow for the future implementation of CHP if and when identified heat loads become economically viable when considered alongside the proposed operating regime of the Proposed Development.
- The CHP assessment has indicated that there are several theoretical identified heat users within a 15km radius of the Proposed Development Site. Although there are large heat loads which relate to domestic, small industrial and education within this search area, none of these offer economically viable opportunities for a heat network.
- CHP is therefore not proposed to be installed from the outset; however, the Proposed Development will be CHP-Ready with sufficient space allocated for future retrofit of a heat offtake within the Proposed Development Site should that be required. This is considered to be BAT for plant such as the Proposed Development.
- The Applicant is committed to carrying out a periodic ongoing review of CHP potential. This commitment may be secured through condition.

4.2.1.12. The electrical, steam, steam condensate and water circuits between the power generation and CCP will be integrated as far as is reasonably practicable to reduce energy use. For example, steam will be extracted from the steam turbine and will be returned to the CCGT feedwater system for re-use.

4.3. COMPONENTS OF THE PROPOSED DEVELOPMENT

4.3.1 INTRODUCTION

4.3.1.1. This section provides further detail on the components of the Proposed Development within the Proposed Development Site. A detailed description of the different areas of the Proposed Development Site is provided within **Chapter 3: The Site and Surrounding Area** (EIA Report Volume 2) and these are illustrated on the accompanying **Figure 3.3: Indicative Site Layout** (EIA Report Volume 3).

4.3.2 THE CCGT AND CCP AREA

4.3.2.1. The CCGT and CCP area will comprise a single high efficiency CCGT unit and associated CCP to be developed on the Proposed Development Site shown in **Figure 3.3** and **Figures 4.1 - 4.3** (EIA Report Volume 3).

4.3.2.2. The design assessed in this EIA Report is based on a range of most likely CCGT equipment to be used and most likely licensor designs for the CCP. This means that there may be a range of electrical output of the Proposed Development depending on the technology selected. Therefore, at this stage in the design, the largest unit currently commercially available has been selected as the conservative basis for assessments unless otherwise stated.

4.3.2.3. The maximum electrical power generation will be seasonally dependent, for example the CCGT is anticipated to generate maximum electricity in the winter when air density is at its highest. In abated mode, (when the CCP is in operation), the net output (comparing to unabated mode) is likely to be reduced due to a) the LP steam diversion to the CCP; and b) depending on whether CCP auxiliary loads are supplied from terminals of one of two generators instead via 132kV import connection from the Peterhead 275/132kV substation (optional, to be confirmed). Alternatively, the electrical connection to the 275kV SSEN substation could be used to supply low voltage electricity. If an electrical connection to the 275kV SSEN substation is not used, and a 132kV import connection is not used, the range of carbon-abated electrical export is likely to be in the range of around 750 MWe to 840 MWe. The technology selected for the CCGT will also influence the electricity output.

4.3.2.4. Power import connections to the CCP will either be derived from the CCGT output directly or via a 132kV connection from the transmission system.

4.3.2.5. As described in Section 4.4, there may be some occasions when the CCGT operates in a higher output which cases an unabated mode (without carbon capture), ranging from around 840 MWe to over 870 MWe. Since power outputs increase with cooler ambient temperatures, the maximum outputs for any chosen configuration can periodically be higher than this.

4.3.2.6. The Proposed Development indicative layout is shown in **Figure 4.1: Option 1 Indicative Layout** (EIA Report Volume 3) and comprises an integrated power generation and carbon capture train encompassing:

- A gas turbine;
- A heat recovery system generator (HRSG);
- A steam turbine;
- Gas and steam turbine buildings;
- Gas turbine air intake filters;
- Natural gas pressure regulating station (PRS) and conditioning facilities;
- Selective catalytic reduction (SCR) equipment for the removal of nitrogen oxides from the flue gas;
- CCP comprising a direct contact cooler (DCC) and associated pumps, one or two absorber column(s) for carbon capture and solvent regenerator/CO_2 stripper enabling re-concentration of the solvent and separation of captured CO_2;
- CO_2 treatment plant, including low/ medium pressure compression and metering equipment.
- Cooling infrastructure, comprising seawater cooled condenser and associated pipework to existing abstraction and discharge points, plant and buildings including CCP closed cooling water/seawater HX;
- Natural gas conditioning, let down and metering equipment and instrumentation and electrical building;

- Stack(s) for the discharge of treated flue gas from the absorber column(s) plus a stack to discharge emissions to air from the HRSG if required;
- A continuous emissions monitoring system (CEMS);
- Transformers (for the import and export of electricity) with associated potential new substation; and
- Facilities required in connection with the above including: an auxiliary boiler, an emergency diesel generator, and associated diesel storage tanks; water treatment plant; wastewater treatment plant; ancillary equipment (including air compressors, pumps, chemical storage, above ground demineralised and fire water storage tanks and associated infrastructure).

4.3.2.7. The Proposed Development Site will also include:

- Two permanent gatehouses, one temporary gatehouse, security building and staff parking;
- Permanent plant laydown area for operation and maintenance activities;
- Administration, control and stores buildings;
- A surface water drainage system comprising pond(s) and/ or a tank or similar; and
- Potential additional on-site intermediate electrical substation.

4.3.2.8. The administration/ control building(s) would contain the main reception, offices, control room, electrical equipment and staff welfare facilities. Stores building(s) would be required for operation and maintenance activities and storage of materials. There would be provision for approximately 178 car parking spaces with the provision of electric charging points.

4.3.2.9. Each of the main components of the Proposed Development Site is described below.

4.3.3 POWER GENERATION AND ASSOCIATED STACK(S)

4.3.3.1. Natural gas that has been conditioned to the required temperature and pressure in the Natural Gas Connection will be combusted in the CCGT. The gas turbine selected will be provided with dry low NO_x (DLN) burners to minimise the formation of NO_x.

4.3.3.2. Following combustion in the gas turbine, the hot product gases expand across the blades of the turbine causing it to rotate and drive an electrical generator. The gas turbine exhaust gases are passed through the HRSG to recover the useful heat to produce steam (at various pressures) which is used to generate further power via a separate steam turbine, and for heating of process streams within the CCP.

4.3.3.3. The flue gases will then be further treated with SCR to further remove NO_x to the required emissions limits and to reduce the NO_x levels entering the absorber. The SCR will be supplied with urea or aqueous ammonia feedstock to treat the flue gas NO_x which will be converted into nitrogen and water vapour in the flue gas.

4.3.3.4. During normal (abated) operation, the flue gases will enter the integrated CCP. However, during outages of the CCP, it will be possible to discharge exhaust gases through a dedicated stack above the HRSG building, which will be fitted with Continuous Emissions Monitoring Systems (CEMS) instrumentation.

4.3.3.5. Spent steam exhausting from the steam turbine will be cooled and condensed with the condensate returned to the steam-water cycle of the HRSG for continued re-use. Water used within this steam-water cycle will be demineralised to minimise the build-up of residual dissolved solids in pipework arising from the continuous evaporation and condensing of water within the cycle. To further manage this, it will be necessary to purge a small amount of the recirculating water (known as 'boiler blowdown') intermittently. Boiler blowdown water removed from the cycle will be replaced with fresh demineralised water.

4.3.3.6. The condensation of steam exiting the steam turbine will be achieved using the existing sea water cooling system which maximises the efficiency of the CCGT due to the cold water cooling medium.

4.3.3.7. An emergency diesel generator is required in order to provide a short-term source of electricity, in the event of a simultaneous loss of power generation and external power supply, to provide power for emergency and safety critical equipment until external power can be re-established.

4.3.4 CARBON CAPTURE PLANT AND ASSOCIATED STACK(S)

4.3.4.1. The CCGT unit will be served by a dedicated and fully integrated CCP as shown in **Plate 4.1** and will include:

- Flue gas pre-treatment, including cooling/scrubbing;
- Flue gas blower;
- One or two CO_2 absorption column(s) (absorber) and associated stack(s);
- CO_2 removal column (stripper/ regenerator);
- Ancillary equipment (including heat exchangers, air compressors, pumps, chemical storage, water treatment plant and associated inter-connecting pipework).

4.3.4.2. The CCP will be designed to be capable of capturing at least 90% and up to 95% of the CO_2 emitted from the generating station, with a minimum average capture efficiency of at least 90%. There is, however, the potential for the capture rate to be higher. At full load, this could equate to the capture of just over two million tonnes of CO_2 per year, dependent upon the turbine equipment chosen and the running hours ('load factor') of the generating station.

4.3.4.3. Prior to introduction into the absorber column, the flue gases from the generating station will be cooled to the optimal carbon capture plant design temperature (approximately 35°C) by using a Direct Contact Cooler (DCC) that quenches the hot flue gases with a fine water spray in a column using indirect cooling by the seawater cooling system. Cooled water is returned to the DCC in a closed loop cycle.

4.3.4.4. Once cooled, the flue gases from the generating station will be introduced to one or two absorber column(s). In the column(s), the flue gases will be passed through a solvent that will remove the CO_2 from the gas stream. The solvent to be used is the subject of ongoing technical studies but is assumed to be an aqueous solution of amines. The alkaline nature of the solvent will mean that it will selectively absorb acidic gases such as CO_2.

4.3.4.5. Even with the use of SCR technology, it will not be possible to entirely remove NO_x or other impurities from the flue gases from the generating station which include the residual oxygen from combustion. Therefore, some ongoing degradation of the solvent is to be expected, which will be managed by solvent reclaiming.

4.3.4.6. The reclaiming process concentrates the residual impurities which will be purged from the process. The capture solvent loop will normally be operated in a neutral balance of water i.e. without continuous make-up consumption or effluent production (other than the reclaimer solvent mentioned above). However, provision will be made for an occasional purge of liquid if excess condensation and therefore accumulation occurs in the process.

4.3.4.7. A flue gas washing unit will be located within the absorber column(s) to remove entrained solvent and degradation products from the flue gases. The CO_2 lean flue gases (treated flue gas) will then be treated to remove entrained mist droplets.

4.3.4.8. A flue gas heater may be required in the absorber column(s). If installed, waste heat from the steam condensate stream will be used to increase thermal buoyancy of the treated, washed flue gas, before release from the top of the absorber column(s) via dedicated stack(s) for dispersion to the atmosphere.

4.3.4.9. CO_2 rich solvent from the absorber(s) will pass from the bottom of the absorber column(s) to a stripper column for regeneration. The stripper column uses heat (steam) to release the CO_2 from the solvent. The hot CO_2 lean solvent then leaves the stripper column and is recirculated via a heat exchanger, back to the top of the absorber column(s).

4.3.4.10. The carbon dioxide gas exiting the top of the stripper column will be passed through a condenser to remove water and solvent vapours. The carbon dioxide stream will then pass to the carbon dioxide conditioning/ compressor unit.

4.3.5 CARBON DIOXIDE CONDITIONING AND MEDIUM PRESSURE COMPRESSOR UNIT

4.3.5.1. The gaseous carbon dioxide stream from the CCP will be saturated with water and will contain traces of oxygen which will need to be reduced in a gas conditioning facility to achieve a specification agreed with Storegga and partners prior to export to the Acorn Project and gathering network.

4.3.5.2. It is envisaged that the captured carbon dioxide stream will be cooled and partly compressed before the trace oxygen and water are removed. Following treatment, the carbon dioxide stream will be compressed to pipeline pressure for export, measured in a metering station and transferred into the Acorn Project pipeline.

4.3.6 CARBON DIOXIDE EXPORT PIPELINE

4.3.6.1. The Proposed Development Site has been sited to connect into the Acorn Project pipeline; the Acorn pipeline does not form part of this Proposed Development. It is expected the Acorn Project will make use of existing gas pipelines (the Miller and Goldeneye pipelines) and infrastructure to transport CO_2 directly to the Acorn CO_2 storage site below the Central North Sea for safe storage. The Applicant continues to engage with Storegga in relation to the interface location within the Proposed Development Site, taking into consideration technical and environmental opportunities and constraints. **Chapter 20: Combined Amenity Effects and Summary of Inter-Project Cumulative Effects** (EIA Report Volume 2) provides a summary of cumulative impacts and effects of the construction and operation of the carbon dioxide export pipeline.

4.3.6.2. The development of the Acorn Project is being progressed under a separate planning application by Storegga and is not included in the Section 36 Application. The Proposed Development includes the necessary equipment to enable a connection into this infrastructure.

4.3.6.3. Adjacent to the CCP, the conditioned and dehydrated carbon dioxide produced from the CCP would be compressed to an agreed pressure and after metering, discharged into the carbon dioxide transport network. Power will be supplied to the compressor from the Proposed Development. No on-site storage of compressed carbon dioxide is proposed.

4.3.6.4. The offshore transport and storage elements will be separately consented and do not form part of the Proposed Development – including the offshore section of the carbon dioxide export pipeline, the carbon dioxide store itself and the associated carbon dioxide injection wells and offshore infrastructure.

4.3.7 OTHER CONNECTIONS

Natural Gas (Fuel) Connection and Treatment Infrastructure

4.3.7.1. Natural gas will be used as the fuel for the operation of the CCGT. Subject to agreement with National Grid Gas Transmission, natural gas will be supplied via a tie-in to the high-pressure gas transmission network on the Proposed Development Site.

Electricity Connections

4.3.7.2. The existing electrical infrastructure in the area comprises 132 kV and 275 kV underground cables that serve existing substations. Operation of the CCP will require a power import connection, this will either be derived from the CCGT output or via a 132kV connection from the transmission system.

4.3.7.3. To export electricity from the Proposed Development, engagement is ongoing with SSEN to identify the preferred connection option including any upgrades to existing switchgear or other existing equipment that may be required. The Proposed Development will require a direct connection to the transmission system and will connect to the existing SSEN 275kV Substation directly to the west of the Proposed Development Site. The connection between the Proposed Development and substation would comprise buried 275kV electrical cables which would be installed mainly through open trench techniques with a section of Horizontal Directional Drilling (HDD) cabling under the A90. This connection is referred to as the 'Electrical Connection Area to 275kV Substation' (as shown on **Figure 3.3** EIA Report Volume 3). An additional on-site electrical substation may be required to interface between the Proposed Development and transmission system infrastructure.

4.3.7.4. Responsibilities regarding grid connection will be agreed with SSEN. If the point of connection will be in the existing substation, it will be upon the Applicant to provide most of the grid connection elements (cables, cable sealing ends, disconnectors, circuit breakers, protection panels etc.).

4.3.7.5. No new overhead lines are proposed as part of the works required for the Proposed Development.

Cooling Water and Wastewater Connection Works

4.3.7.6. The Proposed Development Site will require a source of cooling water (CW) for heat rejection purposes. Process water will also be required to provide make-up to the steam-water cycle. There will also be a requirement for water for domestic and sanitary use.

4.3.7.7. The Proposed Development will utilise the existing cooling water (CW) system at the Peterhead Power Station, using the intake at Boddam Harbour and the existing outfall at Sandford Bay. New on-Site pipe work will be required to connect to the Proposed Development, and existing pumps would need to be replaced.

4.3.7.8. The CW system will comprise use of the existing seawater intake, existing intake tunnel and surge chamber, existing coarse and fine screening, new main CW pumps, new piping from the pumps to the Proposed Development, new CW heat exchangers and new piping to the existing outfall to return the extracted water back to the sea.

4.3.7.9. The Applicant is proposing to re-use existing assets and pipework associated with the existing Peterhead Power Station for the discharge of treated effluent to Sandford Bay. Interconnecting pipework would extend from the Proposed Development Site to connect to this infrastructure.

4.3.7.10. Several potential sources of wastewater may arise from the Proposed Development including (but not limited to):

- Neutralised effluent streams from the demineralisation plant;
- Blowdown from the CCP and CCGT;
- Treated effluent from the CCP;
- Uncontaminated surface water;
- Treated surface water incident on process areas, that may be contaminated with oils or amines.

4.3.7.11. Effluent discharges would be treated on Site and would be regulated by the Scottish Environment Protection Agency (SEPA) through the Pollution Prevention and Control (PPC) Permit required for the operation of the Proposed Development. Surface water will be appropriately segregated and treated prior to discharge. Specific details regarding control of discharges are set out in **Chapter 12: Water Environment** and **Chapter 13: Flood Risk** (EIA Report Volume 2) and in the conceptual drainage strategy in **Appendix 13A: Flood Risk Assessment** (EIA Report Volume 4).

Domestic and Sanitary Effluent

4.3.7.12. The existing foul drainage network used on the power station site will be utilised for the Proposed Development. Domestic foul water will be treated by a new on-site treatment package, and the treated water discharged through the existing foul water outfall.

Public Water Connection

4.3.7.13. The Proposed Development will add a new connection to the existing water supply which serves the existing Peterhead Power Station.

4.3.8 CHEMICAL STORAGE

4.3.8.1. Chemicals will be required to be transported to, stored and used by the Proposed Development. The Proposed Development Site will therefore contain chemical storage facilities including a road tanker unloading area (refer to **Figure 4.1** EIA Report Volume 3).

4.3.8.2. Where any substance could pose a risk to the environment through its uncontrolled release (e.g. surface water drains), the substance will be stored within appropriate containment facilities including impermeable concrete surfaces and appropriately designed and sized bunds.

4.3.8.3. The inventory of materials to be stored on the Proposed Development Site will be developed through the detailed design. However, where storage of hazardous materials, individually or in-combination exceeds the relevant thresholds, separate permissions will be sought from the Health and Safety Executive (HSE) and local planning authority as appropriate for their storage, under the Town and Country Planning (Hazardous Substances) (Scotland) Regulations 2015 (HMSO, 2015a) and Control of Major Accident Hazards Regulations 2015 (COMAH) (HMSO, 2015b) regimes. All chemical storage will be regulated by the Scottish Environment Protection Agency (SEPA) through a PPC Permit that will be required for the operation of the Proposed Development.

4.3.9 HEAVY GOODS VEHICLE MOVEMENTS

4.3.9.1. Access to the Proposed Development Site during construction (HGVs) and operation would be via the existing Gatehouse Road access and the existing Sandford Lodge access track from the A90. Both accesses will be subject to improvements including widening of the Sandford Lodge access track/A90 junction and a new dedicated right turn in at Gatehouse Road/A90 junction. Construction and operational traffic movements are detailed within the Transport Assessment (TA) (**Appendix 10A** EIA Report Volume 4). It is anticipated that during the operational phase of

the Proposed Development, HGV movements at the Proposed Development Site will be approximately 10 in and 10 out per day. These figures include movements associated with delivery of consumables and removal of waste products.

4.3.9.2. The air quality, noise and transport assessments (**Chapters 8, 9** and **10** respectively, EIA Report Volume 2) consider the worst-case traffic profile relevant to that topic, which are associated with construction – a detailed assessment of the operational phase of the Proposed Development has been screened out of requiring further assessment as the vehicle numbers generated would be considerably lower than the screening threshold for a more detailed assessment (e.g. >200 vehicles per day).

4.3.9.3. Construction traffic movements are described in **Chapter 5: Construction Programme and Management** (EIA Report Volume 2).

4.3.9.4. Abnormal indivisible loads (AIL) will need to be brought into the construction site over the construction period and will use the upgraded Sandford Lodge access track. It is expected that the larger abnormal loads will be delivered to Peterhead Port using either north base (Smith Quay) or south base (ASCO).

4.3.10 LANDSCAPING AND BIODIVERSITY

4.3.10.1. An Outline Landscaping and Biodiversity Management and Enhancement Strategy (**Appendix 11H** EIA Report Volume 4) has been prepared to accompany the Application. This document sets out the principles of habitat creation, management and enhancement and of landscape design that will be adopted in the detailed design process and the areas of the Proposed Development Site allocated for this purpose, as well as the existing areas of planting to be retained, protected and managed.

4.3.11 SECURITY FENCING AND GATES

4.3.11.1. Security systems would be provided in respect of the Proposed Development Site. This would include paladin (or similar) fencing, intruder alarms and may include turnstiles (or similar) to manage access.

4.3.11.2. Closed-circuit television (CCTV) and other security measures are anticipated to be required for security purposes at the Proposed Development Site.

4.3.12 CORE PATH DIVERSIONS

4.3.12.1. During construction two core path diversions are anticipated to facilitate the construction of the Proposed Development. Footpath ECPP-202-03 located along the Sandford Lodge access track will be temporarily closed and a diversion provided during construction to ensure pedestrian safety and continued access to the coastal path. An alternative footpath route has been identified and is shown in **Figure 4.4** (EIA Report Volume 3).

4.3.12.2. Works to the existing Power Station cooling water outfall structure will require a temporary diversion of the Aberdeenshire Coastal Path (ECPP-7LD-01-24). The objective will be to maintain continued public access to this path while creating a localised temporary diversion to ensure user safety. No other core paths will be affected because of the Proposed Development. An alternative footpath route has been identified and is shown in **Figure 4.5** (EIA Report Volume 3).

4.3.12.3. Details of the temporary core path diversions, including their management and timings for reinstatement, will be agreed with the Local Planning Authority prior to the commencement of the Proposed Development.

4.3.13 EARTHWORKS

4.3.13.1. Earthworks are required at the Proposed Development Site for site levelling and slope design to create a finished platform level for the generating station of between 9m and 11m AOD. Based on modelling of the site, it is anticipated approximately 800,000m^3 of rock and soils may need to be excavated and relocated. The material excavated will comprise made ground, fine grained glacial till, course-grained glacial till and granite. The excavated granite will be processed within the Proposed Development Site and re-used as part of the Proposed Development construction. The made ground, fine-grained glacial till and course-grained glacial till will be used to level and profile the proposed platform areas and relocated to the permanent bund location. It is anticipated that a proportion of the made ground could be contaminated and may therefore need to be appropriately disposed of offsite. The exact extent and nature of contamination is not known and will be subject to ground investigation during the pre-construction phase however for the purposes of EIA, it is estimated that up to 20% of made ground may be contaminated.

4.3.14 DEN OF BODDAM BURN

4.3.14.1. The Den of Boddam Burn is a culverted watercourse running through the Proposed Development Site that discharges into Sandford Bay near Furrah Head. Due to this, it is proposed to divert the culvert from its existing route and to the north around the Proposed Development Site and then to tie-in with the existing discharge location into Sandford Bay, as shown in **Figure 4.6** (EIA Report Volume 3). The possibility of turning the culvert into an open watercourse has also been considered as part of this EIA; the proposed culvert diversion is described in further detail **Chapter 12: Water Environment** and **Chapter 13: Flood Risk** (EIA Report Volume 2).

4.3.15 DEMOLITION

4.3.15.1. The demolition of the buildings which previously housed gas turbines (GTs) 3 and 4 and ancillary structures, the existing demineralised water tank, fire water break tank and the existing oil pump house are required as part of the Proposed Development. Details are given below.

Gas Turbine 3 and 4

4.3.15.2. The building for GT 3 and 4 at Peterhead Power Station is composed of two sections measuring 43.5m x 49.2m and 40m x 22m on plan. The superstructure is a steel portal frame with large span trusses sitting on a reinforced concrete ground slab. Upper floors are reinforced concrete on a composite deck with reinforced concrete connecting each level. Concrete blocks compose all internal walls. The exterior of the superstructure is clad with aluminium sheeting, profiled in some areas. All plant was removed from the structure in 2012 except the main crane, which is assumed to be fabricated steel.

4.3.15.3. The demolition of this structure will be targeted and controlled. The exterior cladding and roof, excluding structural members, will be removed first. This allows complete access to all portions of the structure. The non-structural concrete block cavity walls throughout will be removed next. Following this, the suspended composite floors will be removed by using an excavator with appropriate attachment to break the concrete into smaller portions for removal. Once only the

frame is left this will be broken by long-reach excavator from the top down and cut into sections for removal. Foundations will be excavated to a depth appropriate to the proposed reuse of this area of the site, broken up and all material removed from site.

Demineralised Water Tank

4.3.15.4. The water tank is understood to be a braced steel plate tank founded on a reinforced concrete ring-beam foundation. The tank will be cut into sections for removal using a long-reach excavator with appropriate attachment from the top down. Foundations will be excavated, broken up and all material removed from site.

Existing Oil Pump House

4.3.15.5. The redundant fuel oil pump house measures 9.3m x 7.5m on plan. The form of construction comprises a structural steelwork frame with profiled aluminium cladding to the upper floor, above a reinforced concrete partially retaining lower ground floor / basement level. The cladding and steel-framed superstructure will be removed first, using a method similar to that described for the GT3 & 4 building. The reinforced concrete basement will then be sequentially broken up and removed.

4.3.16 'ROCHDALE' ENVELOPE AND DESIGN PARAMETERS

4.3.16.1. As set out in Section 4.2 of this chapter, the detailed design of the Proposed Development is not yet finalised and will be completed in the pre-construction phase. The 'Rochdale Envelope' provides a solution for increased project flexibility where there are good reasons why the details of the whole project are unavailable before the application is submitted. In such circumstances, this approach is widely used under several consenting regimes.

4.3.16.2. Section 4.4 of the Scottish Government Planning Advice Note 1/2013 - Environmental Impact Assessment (PAN 1/2013) states that *"by applying the principles of an approach commonly known as the 'Rochdale Envelope' it is possible to undertake an environmental assessment which takes account of the need for flexibility in the future evolution of the detailed project proposal, within clearly defined parameters. In such cases, the level of detail of the proposals must be sufficient to enable a proper assessment of the likely environmental effects, and any resultant mitigation measures – if necessary, considering a range of possibilities. Assumptions should also be clearly stated."*

4.3.16.3. PAN 1/2013 Annex A (further reading) refers to (subsequently updated July 2018) National Infrastructure Planning Advice Note 9 (Rochdale Envelope). For ease of reference (and acknowledging that this is a Section 36 Application and therefore the Planning Act 2008 does not directly apply), Planning Advice Note 9 advises that *"the assessment should establish those parameters likely to result in the maximum adverse effect (the worst-case scenario) and be undertaken accordingly to determine significance."* The advice note also *states "where the Applicant chooses to follow a parameters-led assessment to establish the worst-case scenario for the ES, they should ensure that the applicable parameters are explained and clearly set out."*

4.3.16.4. The Rochdale Envelope approach for the Proposed Development is based on assessing the potential impacts of a realistic worst-case scenario under which the assessment of the project is defined by an 'envelope' of theoretical constraints. For example, although the detailed design of the absorber or the absorber stack(s) cannot yet be specified, their 'envelopes' can be defined by a maximum footprint (including height); this would enable the design of the project to vary within these parameters without rendering the findings of the EIA invalid. The evolution of the Proposed Development to date is outlined in **Chapter 6: Consideration of Alternatives** (EIA Report Volume 2).

4.3.16.5. Table 4.1 sets out the maximum dimensions (parameters) for the main components of the Proposed Development which have been used as the basis for the various technical assessments. Although design work is ongoing, maximum and minimum parameters have been devised to enable the EIA to progress in the absence of the final design information and to enable the compilation of a robust assessment, based on a reasonable and appropriate worst-case option. These are the largest possible dimensions of any of the three designs being considered.

Table 4-1: Rochdale Envelope and maximum design parameters

Component	Maximum Length (m)	Maximum Width (m)	Maximum Height (m) above ordnance datum (AOD)
Minimum design level (final ground height) within the Site for CCGT / CCP infrastructure and administration / control buildings			9
Maximum design level (final ground height) within the Site for CCGT / CCP infrastructure and administration / control buildings			11
Gas Turbine Hall	22	50	43
Steam Turbine Hall	50	40	46
HRSG Building	28	50	67
HRSG Stack	Up to 8m diameter		96
Carbon Dioxide Stripper	Up to 15m diameter		64
*Single Absorber (Options 1 and 3 only)	16	43	99
*Single Absorber Stack (Options 1 and 3 only)	Up to 6.7m diameter		130
*Twin Absorber (Option 2 only)	Up to 19m diameter		77
*Twin Absorber Stacks (Option 2 only)	Up to 6.7m diameter		98

* For all options, the stack(s) would be constructed on top of the absorber – therefore, the maximum (m AOD) height shown for the stack(s) includes both the absorber and the stack(s) together.

4.3.16.6. Three indicative layout options have been considered as part of this EIA and are shown in **Figures 4.1 to 4.3** (EIA Report Volume 3). The worst case from these layouts has been assessed for each discipline in **Chapters 8 to 19** (EIA Report Volume 2) and the worst-case option may vary within each discipline chapter. The exact positions of major equipment for both the CCP and CCGT, including the absorber stack, cannot be fixed until the detailed design

stage as they will depend on the final layout chosen and plant optimisation. In determining the worst-case assumptions for the basis of assessment, consideration has been given to both a single large absorber stack (with a maximum height of 130m AOD – presented in Option 1 and Option 3 only) and the option of smaller twin absorber stacks (each with a maximum height of 77m AOD).

4.4. PROPOSED DEVELOPMENT OPERATION

4.4.1 OPERATIONAL MODES

4.4.1.1. The Proposed Development is designed to be able to operate in either baseload or in a flexible (dispatchable) mode in the future.

4.4.1.2. Baseload mode power refers to power generation that generally runs continuously throughout the year and whereby the CCGT plant is operated at stable power output levels. Dispatchable mode generation refers to highly flexible operation when the Proposed Development will be on demand and dispatched according to market conditions and needs, generally to provide electricity when intermittent renewable technologies cannot meet demand.

4.4.1.3. A CCGT power station capable of running in both baseload and dispatchable modes is:

- Able to provide robust utility scale power throughout the year;
- Responsive to daily and seasonal demand fluctuation (provides flexible power);
- Able to address renewables intermittency (in particular wind and solar) by replacing the electricity supplied by renewables at time of low renewable generation capacity;
- Able to adapt to a changing market in the future (i.e. an increase in renewables capacity).

4.4.1.4. It is anticipated that on commissioning, the Proposed Development will initially operate in baseload mode i.e. generation that generally runs continuously throughout the year so that the plant is operated at stable power output levels. Continuous and stable carbon dioxide production and export is preferred during this period to minimise changes to injection rates into the offshore underground storage reservoir. Operating in baseload mode could involve up to 20 start-up/ shutdown cycles per year.

4.4.1.5. After a period of baseload operation, and after carbon dioxide levels within the Acorn Project Pipeline and transport network have grown and stabilised, there is the opportunity for the Low Carbon CCGT Power Station to be able to operate in dispatchable mode, i.e. being able to export power into the day-ahead market to match the anticipated intermittency of renewable power in the future power market. Operating in dispatchable mode could, in principle, involve up to 200 start-up/ shutdown cycles per year or more. However, operations in baseload mode are considered the worst-case in terms of environmental impacts based on mass emission rates of pollutants and have therefore been assessed in the EIA Report, as set out in **Chapter 8: Air Quality** (EIA Report Volume 2).

4.4.1.6. In the event of CCP outages, for example, it could be necessary to operate the Proposed Development for a short period of time in unabated mode, with exhaust gases from the CCGT being routed via the HRSG stack. These occurrences are expected to be infrequent.

4.4.1.7. The combustion emissions (NO_x and CO, including ammonia (NH_3) from the SCR) associated with operating in abated or unabated mode would be subject to the same emission limit values and therefore the associated release rates would be comparable. Emissions from the CCGT plant when operating in unabated mode would be released at a higher temperature (approximately 75ºC compared with circa 35-60ºC when abated i.e. from the carbon capture

process) and therefore have improved thermal buoyancy, and consequentially dispersion, resulting in a level of impact that is no worse than for the carbon capture mode of operation. The HRSG stack is only expected to be used infrequently and would be sized appropriately to ensure that this is the case.

4.4.1.8. The existing Peterhead Power Station will remain available to operate in a reduced capacity alongside the operation of the CCP enabled Proposed Development. The existing Peterhead Power Station is expected to only operate if grid demand cannot be fulfilled through the Proposed Development.

4.4.2 HOURS OF OPERATION

4.4.2.1. The facility will be designed to be able to operate 24 hours per day, 7 days per week with programmed offline periods for maintenance.

4.4.3 STAFF

4.4.3.1. Operation of the Proposed Development is anticipated to employ up to approximately 50 full time operational roles. Plant operative staff will typically work on a two 12-hour shift pattern, with the first shift between 07:00 - 19:00 and the second between 19:00 - 07:00. Administrative staff will typically work an office-hour pattern of 08:30 – 18:00. Temporary and contractor employees associated with maintenance activities would also be employed, as required.

4.4.4 PROCESS INPUTS

4.4.4.1. The Proposed Development will use various raw materials during operation. Except for natural gas and water, these will predominantly be delivered to the Proposed Development by road tanker. Storage capacity at the Proposed Development Site has been designed to reflect the process requirements and delivery capability.

4.4.4.2. Materials including chemicals to be stored and used within the Proposed Development Site will be subject to control via the PPC Permit, COMAH Licence (if applicable) and other necessary consents required, and are anticipated to include the following process chemicals:

- Solvent that will remove the carbon dioxide from the gas stream in the CCP. The solvent to be used is the subject of ongoing technical studies but is assumed to be an aqueous solution of amines. The CCP includes equipment for reclaiming used solvent within the process, but make-up will be required.
- Sodium hydroxide and sulphuric acid for pH control and treatment within the CCP;
- Power plant treatment chemicals (oxygen scavenger, SCR reagent (ammonia or urea) and phosphate);
- Capture plant treatment chemicals (sodium hydroxide, sulphuric acid and triethylene glycol – insulating gas for HV electrical systems);
- Water treatment plant chemicals (biocides, antiscalants, sulphuric acid, sodium hydroxide, phosphoric acid, polyelectrolyte, molasses);
- Hydrogen for generator cooling and deoxygenation of product carbon dioxide stream.
- Cooling tower chemicals (biocides, bio dispersants, corrosion inhibitors).

4.4.4.3. Other chemicals required for routine cleaning, maintenance and emergency firefighting uses include:

- Distillate fuel;
- Nitrogen (natural gas system and other equipment purge);

- Cleaning chemicals;
- Acetylene (metal cutting);
- Inert fire-fighting gases;
- Lubricating oils;
- Carbon dioxide for purging of electrical generators for maintenance purposes.

4.4.4.4. To reduce the risks of contamination to processes and surface water, all liquid chemicals stored on site will be kept in bunded controlled areas with a volume of 110% of storage capacity and be appropriately segregated.

4.4.5 OPERATIONAL DISCHARGES AND ABSTRACTIONS

4.4.5.1. The operational discharge and abstraction will be within the current PPC Permit and Controlled Activities Regulation (CAR) license. Further details are provided in **Chapter 12: Water Environment** (EIA Report Volume 2).

4.4.6 MAINTENANCE

4.4.6.1. The objective of plant maintenance is to ensure the Proposed Development including utility connections operates safely and reliably. Inspection and maintenance activities have informed the Proposed Development Site footprint and layout. Areas for permanent laydown and turnaround areas for maintenance are included in the Proposed Development Site layout as shown on **Figure 3.3** (EIA Report Volume 3).

4.4.6.2. Routine maintenance will be planned and scheduled via the maintenance management system with major overhauls occurring approximately once every two to five years depending on the nature of plant operations in that period. These maintenance activities will require additional contractors to work on-site. The contractors will access the Proposed Development Site via the main entrance off the A90 at Gatehouse Road.

4.4.6.3. The maintenance strategy to be adopted will use established methods such as Risk Based Inspection (RBI) and Reliability Centred Maintenance (RCM) to support the required facility availability. RBI is the process of developing a scheme of inspection based on the knowledge of failure, assessing the combination of the likelihood of failure and the consequences of such a failure. RCM is a process that ensures maintenance tasks are performed in an efficient, cost-effective, reliable, and safe manner, through the use of preventative or predictive maintenance tasks. Therefore, to support the maintenance strategy for the Proposed Development Site facilities, each major equipment item will be provided with appropriate access and overhaul laydown areas and the internal road layout will be designed to enable free movement for cranes and heavy lifting equipment.

4.4.6.4. It is anticipated that an integrated Operations and Maintenance (O&M) team will have responsibility for daily operations, including troubleshooting and effecting minor repairs on the Proposed Development Site. Major and specialist O&M interventions (turnarounds, CCGT scheduled maintenance and turbine overhauls, etc) are likely to be outsourced and major equipment items serviced by original equipment manufacturers (OEM).

4.4.6.5. If required, pipeline inspection plans will be prepared and Pipeline Inspection Gauge (‘pig’) launching and receiving facilities for intelligent ‘pigging’ operations will be considered.

4.4.6.6. It is intended that major maintenance activities be harmonised around the longest or most constrained outages.

4.4.7 HAZARD PREVENTION AND EMERGENCY PLANNING

4.4.7.1. The Applicant aims to protect human health by safely and responsibly managing activities on the Proposed Development Site. A Health and Safety Plan covering the works, commissioning and operation of the Proposed Development will be prepared by the Applicant. For design and construction, a competent and adequately resourced Construction (Design and Management) (CDM) Coordinator and Principal Contractor will be appointed. The Applicant will ensure that its own staff, its designers and contractors follow the Approved Code of Practice (ACoP) laid down by the CDM Regulations 2015.

4.4.7.2. Written procedures clearly describing responsibilities, actions and communication channels will be available for operational personnel dealing with emergencies. Procedures will be externally audited, and contingency plans written in preparation for any unexpected complications.

4.4.7.3. The inventory of materials to be stored on the Proposed Development Site will be finalised through the detailed design. However, where storage of hazardous materials, individually or in-combination exceeds the relevant thresholds, separate permissions will be sought from the HSE and local planning authority for their storage, under the COMAH and Hazardous Substance Consent regimes respectively. The project is currently working on the basis that lower tier COMAH will apply to the Site operations as a minimum, but this will only be confirmed during detailed design once all chemicals required have been identified along with the quantities which exist within the Proposed Development site. All chemical storage will be regulated by the SEPA through a PPC permit that will be required for the operation of the Proposed Development.

4.4.7.4. Carbon dioxide is not harmful to human health at low concentrations, it is not flammable, and it will not support combustion. As the concentration of carbon dioxide in air rises, the hazardous effects on people and the environment increase. However, compared with other materials conveyed via major pipelines in the UK, such as natural gas and ethylene, the risks of harm (e.g. of asphyxiation or freeze burns) is relatively low. The key risk relates to its toxicity at elevated concentrations and potential to act as an asphyxiant gas in low lying locations or confined spaces should it displace air from these locations due to its density being higher than that of air. High pressure (dense phase) carbon dioxide adds additional risks, but the carbon dioxide captured, compressed and piped from the Proposed Development Site is not anticipated to be dense phase.

4.4.7.5. Guidance and best practice information for carbon capture technology and transport via pipeline is available from the HSE. Carbon dioxide is not currently defined as a dangerous substance under the COMAH Regulations 2015 and the status of the Proposed Development relating to the COMAH Regulations 2015 has not yet been confirmed. Guidance and best practice information for carbon capture and storage is, however, available from the HSE. The HSE does not currently provide Land Use Planning (LUP) advice for carbon dioxide capture, although for LUP purposes, HSE uses Dangerous Toxic Load (DTL) to describe a substance's airborne concentration and duration of exposure which would produce a particular level of toxicity in the general population. This advice has been considered in designing the Proposed Development including safety distances from high pressure carbon dioxide equipment on the Proposed Development Site.

4.4.7.6. The Proposed Development is using 'safety in design' principles to take into consideration safety issues and risks and to enable the ongoing design to reduce risks from the installation as a whole to as low as reasonably practicable (ALARP). As part of the layout evolution, the following safety in design mitigation hierarchy has been adopted:

- Eliminate a hazard; in preference to

- Control the hazard; in preference to
- Provide personal protective equipment (PPE).

4.4.7.7. Design mitigation at the current concept design stage includes consideration of potential carbon dioxide releases and includes, (but is not limited to):

- Careful equipment and material selection;
- Siting of higher pressure carbon dioxide equipment considering areas of potential exposure and prevailing wind direction;
- Incorporation of gas leak detection systems; and
- Consideration of venting arrangements.

4.4.8 ROUTINE AND EMERGENCY ACCESS / EGRESS

4.4.8.1. Permanent access to the Proposed Development Site during operation would be via the existing Gatehouse Road from the A90. A new permanent secondary access will be provided using the existing Sandford Lodge access road; this will be used for construction vehicle access during construction and then as emergency egress once operational.

4.4.8.2. As described in Section 4.2 of this chapter, a new security gatehouse and parking would be provided at the entrance to the Proposed Development Site at Gatehouse Road. The Proposed Development site includes a main car park, including a muster point in the event of emergency, a manned gatehouse and a control building which would be designed as a place of safety in the event of emergency. A security gatehouse will also be provided at the Sandford Lodge access track; whilst a temporary security gatehouse will be provided on the access road to the existing Peterhead Power Station (off the A90) to be used during the construction phase of the Proposed Development.

4.4.8.3. Three emergency access/egress points have been provided within the Proposed Development Site:

- Eastern Emergency Exit: A pedestrian and two-lane vehicular gated and unmanned exit located east of the Chemical Storage Area linking into the current existing Peterhead Power Station site road.
- South Main Access (Gatehouse Road): A pedestrian and two-lane vehicular access. This would be the main site access point for CCGT traffic which is controlled by a manned gatehouse.
- North Secondary Access (Sandford Lodge): A pedestrian and two-lane vehicular access. Primarily for Proposed Development specific site traffic.

4.4.8.4. The location of these access points is illustrated on **Figure 4.1** (EIA Report Volume 2).

4.4.9 EXTERNAL LIGHTING

4.4.9.1. The Proposed Development will require installation of external lighting. Before any lighting is installed, a lighting scheme will be submitted to the local planning authority for approval. The external lighting scheme will be designed in accordance with relevant standards, including the Guidance Notes for the Reduction of Obtrusive Light (2021) published by the Institution of Lighting Professionals, as appropriate.

4.4.9.2. The external lighting scheme will be designed to provide safe working conditions in all relevant areas of the Proposed Development Site whilst reducing light pollution and the visual impact on

the local environment. This is likely to be achieved using luminaires that eliminate the upward escape of light.

4.4.10 ENVIRONMENTAL MANAGEMENT

4.4.10.1. The Proposed Development will comply with the Pollution Prevention and Control (Scotland) Regulations 2012 under its PPC Permit so that any impacts of emissions to air, soil, surface and groundwater, to the environment and human health will be minimised and avoided where possible.

4.4.10.2. The Proposed Development Site will be operated in line with appropriate standards and the operator will implement and maintain an Environment Management System (EMS) which will be certified to International Standards Organisation (ISO) 14001. The EMS will outline requirements and procedures required to ensure that the Proposed Development is operating to the appropriate standard.

4.4.10.3. Sampling and analysis of pollutants will be undertaken where required including monitoring of exhaust emissions levels using CEMS, prior to discharge from the stacks, in accordance with the PPC Permit.

4.5. DECOMMISSIONING

4.5.1 DECOMMISSIONING

4.5.1.1. The power generation and carbon capture elements of the Proposed Development have a design life of approximately 25 years. At the end of their design life, it is expected that these elements of the Proposed Development may have some residual life remaining and the operational life may be extended. If the operating life were to be extended, the Proposed Development would be upgraded in line with the legislative requirements at that time. On this basis, decommissioning activities are currently anticipated to commence after 2053.

4.5.1.2. At the end of its operating life, it is anticipated that all above-ground equipment associated with the parts of the Proposed Development to be decommissioned will be decommissioned and removed from the Proposed Development Site. Prior to removing the relevant plant and equipment, all residues and operating chemicals will be cleaned out from the plant and disposed of in an appropriate manner.

4.5.1.3. The bulk of the relevant plant and equipment will have some limited residual value as scrap or recyclable materials, and the demolition contractor will be encouraged to use materials that could be recycled.

4.5.1.4. Prohibited materials such as asbestos, polychlorinated biphenyls (PCB), ozone depleting substances and carcinogenic materials will not be allowed within the design of the Proposed Development and so will not be present when it is decommissioned. Other materials recognised to pose a risk to health, but which are not prohibited, will be subject to a detailed risk assessment.

4.5.1.5. Prevention of contamination is a specific requirement of the PPC Permit for the operation of the Proposed Development and therefore it is being designed such that it will not create any new areas of ground contamination or pathways to receptors because of construction or operation. Once the relevant plant and equipment have been removed to ground level, it is expected that the hardstanding and concrete areas will be left in place. Any areas of the Proposed

Development which are to be decommissioned that are below ground level will be backfilled to ground level to leave a levelled area.

4.5.1.6. A Decommissioning Plan (including Decommissioning Environmental Management Plan (DEMP)) will be produced within the period specified in the relevant legislation in force at the time of cessation of operations and agreed with the SEPA as part of the PPC Permit and site surrender process. The DEMP will consider in detail all potential environmental risks and contain guidance on how risks can be removed, mitigated or managed. This will include details of how surface water drainage should be managed during decommissioning and demolition.

4.5.1.7. The Decommissioning Plan will include an outline programme of works. It is anticipated that it would take up to a year to decommission the Proposed Development, with demolition following thereafter, i.e. taking approximately two years to complete.

4.5.1.8. During decommissioning and demolition there will be a requirement for the provision of office accommodation and welfare facilities.

4.5.1.9. Any demolition contractor would have a legal obligation to consider decommissioning and demolition under the Construction Design Management (CDM) Regulations 2015, or the equivalent prevailing legislation at that time.

4.5.1.10. Decommissioning activities will be conducted in accordance with the appropriate guidance and legislation at the time of the Proposed Development's closure. All decommissioning activities will be undertaken in accordance with the waste hierarchy. Materials and waste produced during decommissioning and demolition will be stored in segregated areas to maximise reuse and recycling. All materials that cannot be reused or recycled will be removed from the Proposed Development Site and transferred to suitably permitted waste recovery/disposal facilities. It is anticipated that a large proportion of the materials resulting from demolition will be recycled and a record will be kept demonstrating that the maximum level of recycling and reuse has been achieved.

4.5.1.11. Upon completion of the decommissioning programme, including any remediation works that might be required, SEPA will be invited to witness a post-decommissioning inspection by site staff. All records from the decommissioning process will be made available for inspection by SEPA and other relevant statutory bodies, in accordance with the PPC Permit requirements.

4.5.1.12. In light of the control measures set out above that would form part of the proposed DEMP, decommissioning is not anticipated to present any significant environmental effects beyond those assessed for the construction phase of the Proposed Development and they are therefore not assessed separately in this EIA Report.

4.6. REFERENCES

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SSE THERMAL

PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 5 – Construction Programme and Management

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CONTENTS

TABLES

5. Construction Programme and Management

5.1. INTRODUCTION

5.1.1 INTRODUCTION

5.1.1.1. This chapter of the Environmental Impact Assessment Report (EIA Report) describes the construction phase of the Proposed Development. This includes information on the anticipated construction programme, timings and methods of working, where available.

5.1.1.2. At this stage, a detailed construction programme is not available, as this is normally determined by the Engineering, Procurement and Construction (EPC) contractor who has not yet been appointed. Where construction details cannot be confirmed at this stage, reasonable worst-case estimates have been made based on experience gained on similar developments and professional judgement.

5.1.1.3. All enabling and construction works will be undertaken in accordance with the Construction Design and Management Regulations (2015) (CDM Regulations).

5.2. CONSTRUCTION PROGRAMME

5.2.1 OVERVIEW

5.2.1.1. As described in **Chapter 4: The Proposed Development** (EIA Report Volume 2) construction of the Proposed Development could (subject to the necessary consents being granted and an investment decision being made) potentially start late 2023 or early 2024.

5.2.2 PROGRAMME

5.2.2.1. The Applicant would appoint one or more EPC contractors for construction of the combined cycle gas turbine (CCGT) and carbon capture plant (CCP). Additional contractors are likely to be appointed to undertake the proposed site clearance and minor highway works. An early works phase, including the A90 junction upgrade to the Sandford Lodge access track as well as the addition of a right-hand turn lane at the existing Gatehouse Road access junction, would be undertaken over an approximate 6-month period. Early works will also include establishment of construction compounds, site fencing, site clearance, including demolition of several redundant buildings that occupy the Proposed Development Site and civils earthworks, including clearing of unsuitable soil and reprofiling with clean in fill (where required). Construction activities for the main works phase would follow and are expected to be completed within approximately three years, followed by commissioning. Table 5.1 shows an indicative construction and commissioning programme. The below timeframes are indicative and could vary depending on which layout option is chosen.

Table 5-1: Indicative construction and commissioning programme

	Year One				Year Two				Year Three				Year Four			
	Quarter				Quarter				Quarter				Quarter			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Early Works including upgrades to Sandford Lodge access track and A90 Junction upgrade at Gatehouse Road / demolition																
Site enabling and preparation																
Groundworks																
Erection of main process equipment																
Gas and electrical connection																
Electrical and mechanical connections																
Above ground civil works																
Commissioning and testing																

5.2.2.2. It is common for much of the groundwork, for example piling and pouring of concrete slabs, to be completed prior to the erection of any above ground permanent structures. The completion of buildings and structural components, such as cladding and external civil works, usually continues whilst mechanical erection is ongoing. However, the detailed phasing of construction is the responsibility of the appointed EPC contractor(s) and may vary dependent on plant layout and procurement of key equipment. The indicative 4-year programme including commissioning is considered robust.

5.2.2.3. The Proposed Development is to the north of the existing Peterhead Power station on the former heavy fuel oil (HFO) tank farm. Remediation works may be required in this area due to contamination associated with the previous use, further information on this is provided in **Chapter 14: Ground Conditions** (EIA Report Volume 2).

5.2.2.4. Due to uncertainties in the market and Government investment decisions in carbon capture and storage (CCS), it is proposed that the Section 36 Application would be made on the basis that commencement of development can take place for up to seven years from the granting of consent. For this reason, a scenario whereby construction commences later in the programme, up to 2030 (seven years after the Section 36 Application could be granted) has also been considered as a reasonable worst-case for some technical assessments.

5.3. CONSTRUCTION APPROACH

5.3.1 OVERVIEW

5.3.1.1. The approach to construction will be defined during the detailed design stage. For the purposes of this EIA Report, it is assumed that key equipment such as the absorber tower will be modularised and pre-fabricated off site before being assembled on site. Modularised units, along with large specialist equipment are likely to require special transport considerations (called 'abnormal loads'). Off-site pre-fabrication will be supplemented by on-site construction of other components.

5.3.2 SMALL COMPONENTS AND MODULES

5.3.2.1. Small components and modules will be transported using the existing road network and it is anticipated the more significant modules will be transported by ship to Peterhead Port where they will be unloaded by temporary mobile cranes onto suitable haulage vehicles and transported into the Proposed Development Site using the abnormal indivisible load (AIL) route shown in **Appendix E Abnormal Load Assessment Report of Appendix 10A** (EIA Report Volume 4). The suitability of Peterhead Port to receive these loads will be assessed during detailed design.

5.3.3 CONSTRUCTION TRAFFIC

5.3.3.1. Construction traffic and road haulage will be directed along designated transport routes as outlined within the Framework Construction Traffic Management Plan (CTMP) (**Appendix 10B** EIA Report Volume 4). The Final CTMP will be prepared by the EPC Contractor(s) in accordance with the Framework CTMP and secured through Section 36 consent condition.

5.3.4 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

5.3.4.1. A Construction Environmental Management Plan (CEMP) will be prepared by the EPC Contractor(s) prior to construction. The submission, approval and implementation of this will also be secured through a condition of the Section 36 consent. A Framework CEMP accompanies the Application (**Appendix 5A** EIA Report Volume 4) and sets out the key measures to be employed to control and minimise the impacts on the environment. The Final CEMP will be prepared by the EPC Contractor(s) in accordance with the Framework CEMP.

5.4. CONSTRUCTION METHODS

5.4.1 CONSTRUCTION EQUIPMENT

5.4.1.1. For the purposes of this EIA Report (and in particular for the noise and vibration assessment presented in **Chapter 9: Noise and Vibration** (EIA Report Volume 2), reasonable worst-case estimates have been made of the types and numbers of plant and machinery likely to be used at the Proposed Development Site during the construction period, as well as the potential use of piling for foundations of the main structures.

5.4.2 EARLY WORKS

Site enabling and preparation

5.4.2.1. Initial civil earthworks will be required in the first phase of construction, including the clearing of unsuitable soil and reprofiling with clean in fill (where required). As far as reasonably practical, a material cut and fill balance would be used to minimise waste arisings requiring off-site disposal. However, given the anticipated ground conditions (which would be confirmed through a ground investigation), it is anticipated that some import/ export of materials may also be necessary to provide a suitable foundation platform for the Proposed Development Site.

5.4.2.2. An estimate of soil movements has been undertaken to ensure that the assessments made in technical chapters of this EIA Report consider a reasonable worst-case. It is anticipated that up to approximately 800,000m^3 of soils may need to be reprofiled across the CCGT and CCP area, Table 5.2 provides a summary of the expected excavated material based on evaluations undertaken to date. It is anticipated that 20% of the Made Ground excavated could be contaminated and will be taken off the Proposed Development Site to landfill, equating to around 93,000m^3 of material being taken off site for disposal. It is assumed all other excavated material will be used on the Proposed Development Site, either in the construction of other works such as access roads and hardstanding areas or in the creation of new landscape bunds. The site enabling and preparation period is anticipated to take 57 weeks,

Table 5-2: Summary of excavated material

Material	Volume excavated (m^3)
Made Ground	464,862
Coarse Grained Glacial Till	115,756
Fine Grained Glacial Till	68,805
Granite	149,965
Total	**799,388**

5.4.2.3. Any excess spoil generated during construction will be managed through the Site Waste Management Plan (SWMP) that would form part of the final CEMP. Spoil which cannot be re-used will be removed from site for re-use, treatment or disposal at a permitted facility. The re-use of excavated materials during construction will be governed by either a SWMP developed in accordance with relevant guidance including 'The Definition of Waste: Development Industry Code of Practice' (CL:AIRE, 2011), an environmental permit or a relevant exemption.

5.4.2.4. Where necessary, suitable measures will be put in place to prevent sediment being washed off-site, and the stockpiles will be visually monitored for wash away during and after periods of prolonged rainfall. Further details of the measures which would be implemented to control earthworks are included in the Framework CEMP.

5.4.2.5. Additionally, the Final CEMP will incorporate measures to prevent an increase in flood risk or pollution risk during the construction works. An indication of measures is provided in the Framework CEMP that accompanies the Application.

Demolition

5.4.2.6. The demolition of the buildings which previously housed gas turbines (GTs) 3 and 4, the existing demineralised water tank and the existing oil pump house are required as part of the

Proposed Development during the early works and enabling phase (refer to **Chapter 4: The Proposed Development**, Section 4.3.16: Demolition, EIA Report Volume 2, and **Figure 5.2** EIA Report Volume 3). Demolition will be undertaken in accordance with best practice techniques. Based on the scale of demolition required the use of explosives is not required; demolition will be achieved through machinery to take down the structures.

Sandford Lodge access track upgrade and A90 Junction works at Gatehouse Road

5.4.2.7. The Sandford Lodge access track will be utilised during the construction period by construction traffic, the access track will be widened and strengthened to allow for HGVs and other vehicles to utilise this access.

5.4.2.8. It is also proposed to add a right-hand turning lane at the Gatehouse Road junction with the A90 to allow for the increase in construction workers entering the Proposed Development Site at this location.

5.4.2.9. Whilst these works are ongoing temporary traffic management will be put in place. Site clearance and some vegetation clearance will also be required for the widening of the Sandford Lodge access track.

Temporary core path diversion

5.4.2.10. Footpath ECPP-202-03 located along the Sandford Lodge access track will be diverted to the north as shown in **Figure 4.4**, this temporary diversion during construction will facilitate pedestrian safety and continued access to the coastal path. The diversion will require a path to be created on the boundary of the field to the north of Sandford Lodge and will require steps and a handrail to be provided for the steeper areas of the slope where the diversion is proposed.

Den of Boddam Burn Diversion

5.4.2.11. The Den of Boddam Burn is a culverted watercourse which currently runs underneath the CCGT and CCP area. The watercourse will be diverted north to go around the Proposed Development and will then re-join the current discharge location into Sandford Bay, shown in **Figure 4.6** (EIA Report Volume 3).

5.4.3 CONSTRUCTION LAYDOWN

5.4.3.1. Proposed laydown areas required during construction, including equipment and material storage, site offices, batch concrete facilities, welfare facilities and car parking, environmental/ waste handling area and vehicle wheel wash area will be located at identified locations within the Proposed Development Site boundary dependent on the appointed EPC contractor's working methods. Laydown areas will be required in particular areas of the Proposed Development Site for the duration of construction, as set out in the construction programme (Plate 5.1).

5.4.3.2. Laydown requirements have been estimated using conservative assumptions to ensure that the areas assessed in this EIA Report represent a worst-case. Up to 15 ha of construction laydown is required for materials and plant storage and laydown areas; field-based fabrication and erection of components on-site, siting of concrete batching facilities; vehicle and cycle parking facilities and for works to the A90 junction at Gatehouse Road and Sandford Lodge access track upgrades. This includes areas for construction offices, contractor parking and construction staff welfare facilities. The proposed location of laydown areas is identified on **Figure 5.1** (EIA Report Volume 3).

5.4.3.3. Where required, laydown areas would be levelled to provide an even surface and underlain by semi-permeable surfacing, to allow surface water and rainwater to percolate through. No hazardous materials would be stored unbunded within the construction laydown areas. All construction laydown areas would be secured by security fencing and gates as appropriate.

5.4.3.4. Impacts relating to the handling, movement and temporary storage of soils will be controlled through the Final CEMP. Measures within the Final CEMP would include:

- A method statement for the works to include soil handling and storage proposals;
- A restoration specification; and
- A post-works survey to confirm condition.

5.4.3.5. All soils will be managed in accordance with the Defra Construction Code of Practice for the Sustainable Use of Soil on Development Sites (Defra, 2009) to minimise impacts on soil structure and quality. A Framework Soil Resources Plan is provided in the Framework CEMP.

5.4.3.6. Following site establishment, ground clearance and installation of underground utilities, foundation formation, rebar, and concrete placement activities would commence. Pre-cast concrete items will be used as far as reasonably practicable. Where cast in-situ concrete is required, ready-mix concrete from trucks as direct pours or concrete pumps may be utilised. A temporary concrete batching plant may also be required.

5.4.3.7. If water is encountered during below ground construction, suitable de-watering methods will be used. Any significant groundwater dewatering required will be undertaken in line with the requirements of The Water Resources (Scotland) Act 2013.

5.4.3.8. All works will comply with the safety clearances and requirements set out by the utility providers who have assets within the Proposed Development Site

5.4.4 MAIN CIVIL AND PROCESS WORKS

5.4.4.1. The contractor will prepare and level the site of the Proposed Development, followed by piling and excavation for main foundations for some of the larger elements of the Proposed Development e.g. turbine halls, Heat Recovery Steam Generator (HRSG), the compressors, the absorber, carbon dioxide scrubber and direct contact cooler columns.

5.4.4.2. It is anticipated that bored piles to a depth of approximately 10m into rockhead may be required for heavily loaded/ movement sensitive structures such as the absorber(s) and regenerator, the stacks, the HRSG building, turbine hall and compression facilities. Lightly loaded structures/ less critical plant are likely to be founded on shallow raft foundations, although this is subject to the result of the proposed ground investigation secured by a condition of the Section 36 Application.

5.4.4.3. A piling and penetrative foundation design method statement informed by a risk assessment would be undertaken in accordance with Environment Agency[1] Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention guidance (2001). This would be secured by a condition of the Section 36 Application and submitted to the local authority for approval, in consultation with the Scottish Environment Protection Agency (SEPA). All piling and penetrative foundation works would be carried out in accordance with the approved method statement to prevent contamination of the underlying soils and groundwater.

[1] Guidance used in the absence of equivalent guidance from SEPA.

5.4.4.4. The design of piles will be defined and assessed during the Front-End Engineering Design (FEED) study. The piling method will be designed to minimise the risk of disturbance to noise sensitive humans and ecological receptors as far as reasonably practicable. The piling methodology is proposed to be secured under a condition of the Section 36 Application.

5.4.4.5. The principal items of plant will be modular and delivered by ship to Peterhead Port offloading facility. The exact number and size/ weight is not known at this stage and is based on specific construction methodologies that will be confirmed during front end engineering design (FEED). However, around 35 - 40 such deliveries are expected over a 12 month period. The components will then be lifted using a mobile crane onto a hauled trailer and transported to the CCGT and CCP area along the existing temporary haulage route (Additional Abnormal Indivisible Load Route) for assembly. Building erection and plant installation will be carried out as concurrent activities, noting that not all buildings will be erected prior to the commencement of plant installation. Large plant may be first placed on foundations with steelwork erected around it.

5.4.4.6. It is anticipated that plant and equipment will be pre-fabricated where practicable, however, it is anticipated that larger equipment may need to be fabricated and erected onsite due to its anticipated size. The main items that could require special consideration due to their size or weight comprise:

- Flue gas blowers;
- Absorber column(s);
- Stripper column and drum;
- Carbon dioxide compressor and drying package;
- Storage tanks;
- Flue gas dampers; and
- Major transformers and associated electrical equipment.

5.4.4.7. It is unlikely that buildings will be prefabricated and so will require construction on-site.

5.4.5 CONSTRUCTION OF GAS CONNECTION

5.4.5.1. Natural gas supplied from the St Fergus Gas Terminal is currently received from the St Fergus pipeline at Peterhead's gas receiving facility located on the south-west corner of the Peterhead Power Station site. A new natural gas connection would link Peterhead Power Station's existing natural gas receiving infrastructure to the Proposed Development. The gas connection is shown on the Indicative Gas Supply Pipeline Connection Plans.

5.4.5.2. The natural gas pipeline connecting the gas receiving facility to the Proposed Development will run above ground on sleepers initially, followed by a transition to an overhead pipe bridge spanning across the northern site access road and HV electrical cable corridor. Alternatively, it could be constructed using an open-cut method if below ground construction is proposed, where feasible around existing underground service corridors. These works will generally be as follows:

- Fencing off works area and fit safety signage;
- Stripping and storing of topsoil;
- Facilitating a working area of around 36m wide to allow for temporary trackway, welding and soils storage;
- Excavation of a trench;

- Pipe laid (welding pipe sections together at grade level (pipe stringing), within approximately 1.2m below ground level; and
- Testing the pipe integrity, re-instating land drainage, and then backfilling subsoil, reinstating topsoil and re-planting to the original state as required.

5.4.6 CONSTRUCTION OF WATER SUPPLY CONNECTIONS

5.4.6.1. The Proposed Development will utilise the existing seawater intake located at Boddam Harbour south-east of the Proposed Development. To utilise the existing intake, cooling water pumps 2, 3 and 4 will be replaced and new pipework will be required. This new pipework will tie into the existing culvert 2 at the back wall of the valve chamber and will follow the external perimeter of the site before connecting into the Proposed Development. Most of the pipework will be below ground with a short section above ground to cross over the existing Peterhead Power Station outfall culverts.

5.4.6.2. In addition to cooling water connections, a connection would also be made within the CCGT and CCP area to provide a public water connection including works to the existing towns water pipelines and connections to the proposed fire and raw water storage tank.

5.4.7 WATER DISCHARGE CONNECTIONS

5.4.7.1. The Applicant is proposing to utilise the existing outfall for Peterhead Power Station for the discharge of cooling water and treated effluent to Sandford Bay. New pipework and an extension of the outfall structure will be required to connect the existing outfall. As with the cooling water supply, the pipework will be primarily below ground except to cross the existing outfall culverts.

5.4.7.2. A temporary diversion of Aberdeenshire Coastal Path (ECPP-7LD-01-24) around outfall will be required to maintain continued and safe public access whilst works are undertaken in the vicinity of the outfall.

5.4.8 ELECTRICAL CONNECTION

5.4.8.1. The proposed electrical connection consists of an Electrical Connection between the Proposed Development and existing 275kV Substation on the Peterhead power station site. This is likely to comprise a 275kV single circuit cable route and control system cables which will be installed primarily below ground.

5.4.8.2. An underground connection up to 132kV will potentially be constructed to supply the Proposed Development from the existing substation located to the west of the A90. The two corridors within which the electrical connections could run are shown on the Indicative Electrical Connection Plan.

5.4.8.3. Underground construction will require the use of an ‘open-cut’ method, whereby a trench will be excavated, and the cables laid below ground. This method will be applied where there is sufficient space and the work area is relatively flat. These works will generally be as follows:

- Fence off works area and fit safety signage;
- Strip and store topsoil (if required);
- A working area approximately 10m – 15m wide to allow for temporary trackway and soils storage;
- Excavation of a reinforced trench; and

- Cables laid at a depth of at least 1.1m on a bed of cement bound sand overlain by protective tiles and backfilling, including warning tape).

5.4.8.4. Where the electrical cabling crosses under the A90, HDD cabling will be required. An intermediate electrical substation may also be required along the route of the 275kV and if required the 132kV cable.

5.4.9 THE ACORN PROJECT - CARBON DIOXIDE EXPORT PIPELINE

5.4.9.1. The Proposed Development will connect to a third-party carbon dioxide pipeline under development by the Acorn project. The ownership and responsibility for construction of the pipeline lie with the Acorn developer, who confirm that the pipeline will extend to the Proposed Development Site boundary to facilitate the connection. It is understood that a planning application will be submitted by the Acorn developer for the construction of the proposed pipeline in due course.

5.4.10 CONSTRUCTION STAFF

5.4.10.1. It is estimated that there will be approximately 1,300 personnel contracted to work on the Proposed Development at the peak of construction. This figure is based on experience of other comparable developments and informs the transport assessment presented in **Chapter 10: Traffic and Transport** (EIA Report Volume 2) and **Appendix 10A: Transport Assessment** (EIA Report Volume 4). The peak of construction activity is anticipated between months 26 to 27 of the construction programme.

5.4.10.2. Further detail is presented in the Framework Construction Workers' Travel Plan (CWTP) which accompanies the Section 36 Application and will be secured through a condition in the Section 36 Application.

5.4.11 CONSTRUCTION WORKING HOURS

5.4.11.1. Core construction working hours would be 07:00 and 19:00 Monday to Friday (except bank holidays) and 08:00 and 13:00 on Saturdays. However, it is likely that some construction activities may need to be undertaken outside of these core working hours. This is principally because certain construction activities cannot be stopped, such as concrete pouring, but also potentially to manage the construction programme. Where on-site works are to be conducted outside the core hours, they would comply with any restrictions agreed with the local planning authority, in particular the control of noise and traffic. Twenty-four hour working for certain activities has therefore been assessed in **Chapter 9: Noise and Vibration** (EIA Report Volume 2) which sets out specific mitigation and control measures required to prevent disturbance from any activities outside of core working hours. Conditions in the Section 36 Application secure the working hours and the approach to exceptions to the core working hours. Any such works will be minimised and will be carefully managed to reduce effects on the local community.

5.4.12 CONSTRUCTION TRAFFIC AND SITE ACCESS

5.4.12.1. Access to the Proposed Development Site during construction (HGVs) would be via the existing Gatehouse Road access and the existing Sandford Lodge access track (both to be upgraded). Construction workers will use the existing Gatehouse Road access only.

5.4.12.2. Construction staff are anticipated to travel to the Proposed Development Site via the existing trunk road and local networks. Construction staff arriving by car will use on-site parking, likely

within the construction laydown Area C illustrated on **Figure 5.1** (EIA Report Volume 3). It is anticipated that during peak construction, construction park and ride facility within the Proposed Development Site may also be provided to facilitate construction worker movements around the Site.

5.4.12.3. The volume of construction HGV on the network is predicted to be at its maximum of around 120 two-way daily HGV movements (60 in and 60 out) from month 24 to month 35 of construction. This corresponds with the maximum construction worker trip generation in months 26 and 27. During month 3 to month 6 of the programme, construction HGVs on the network is predicted to be 112 two-way daily HGV movements (56 in and 56 out). This is associated with the removal of contaminated land off-site to landfill. During the remainder of the construction period 60 two-way daily HGV movements (30 in and 30 out) are expected from months 9 to 23 and from months 36 to 42 of construction and 10 two-way daily HGV movements (5 in and 5 out) from months 1 to 2 and 7 to 8 of the construction programme.

5.4.12.4. Combining construction workforce vehicle movements with construction HGV movements over the entire construction programme the overall peak is anticipated to occur in months 26 and 27 when 1,236 two-way vehicle movements are anticipated (1,116 two-way car/van movements and 120 two-way HGV movements per day). This has been benchmarked against the proposed Keadby 3 Low Carbon Gas Power Station in Keadby, North Lincolnshire which is of a similar scale (for which an Application for a Development Consent Order was submitted in June 2021). Further information on traffic volumes and routing is provided in **Appendix 10A: Transport Assessment** (EIA Report Volume 4).

5.4.13 STORAGE OF CONSTRUCTION PLANT AND MATERIALS

5.4.13.1. There will be temporary laydown areas positioned close to access roads on the CCGT and CCP area where any materials will be unloaded and then transported to the area of works. Some of these may need to be used for storage of materials for up to two years. At the end of each daily shift, unsecured small mobile plant will be returned to a secure overnight plant storage area, where drip trays will be utilised under the various types of plant, if required. Laydown areas/construction compounds for construction materials are illustrated on **Figure 5.1** (EIA Report Volume 3).

5.4.13.2. Storage areas for flammable/toxic or corrosive materials would be in a separate, locked, bunded and fenced area. Material data sheets would be available for all these materials and the Control of Substances Hazardous to Health (COSHH) assessments kept within the relevant risk assessment for the task, all subject to the Applicant's approval.

5.4.14 LIGHTING

5.4.14.1. Construction temporary site lighting is proposed to enable safe working on the construction site in the hours of darkness. Construction temporary lighting will be arranged so that glare is minimised outside the construction site. The appointed contractors will be responsible for establishing the required approach to and levels of lighting; a Lighting Strategy will be prepared and secured through condition.

5.4.14.2. Lighting will be designed so as not to cause a nuisance outside of the Proposed Development Site in relation to views from residential receptors or light disturbance to ecological receptors.

5.4.15 SECURITY

5.4.15.1. Security will be managed to ensure that security breaches are as low as reasonably practicable. The approach to security will include:

- Compliance with the Applicant's existing security policies, procedures and arrangements;
- Controlled vehicular access to the Proposed Development Site from the A90, including new gatehouses at the Sandford Lodge access track and Gatehouse Road;
- Perimeter fencing around the CCGT and CCP area and other work areas, with controlled pedestrian and vehicular access; and
- Closed circuit television surveillance and intruder alerts.

5.4.16 WHEEL WASH FACILITIES

5.4.16.1. A self-contained wheel wash will be installed and will be used during ground works by vehicles prior to exiting the construction site and prior to joining the public highway. For loads unable to use the fixed wheel wash, a localised wheel washing facility will be set up to cater for these, to minimise effects to the highway.

5.4.17 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP) AND SITE WASTE MANAGEMENT PLAN (SWMP)

5.4.17.1. The Applicant will require that the contractor produces and maintains a CEMP to control construction activities to minimise, as far as reasonably practicable, impacts on the environment. This is proposed to be secured by a condition in the Section 36 Application. A Framework CEMP has been produced to accompany the Application setting out the key measures to be employed during construction of the Proposed Development to control and minimise impacts on the environment. This includes industry best practice measures and specific measures set out in this EIA Report. The contractor's CEMP must be in accordance with the principles set out in the Framework CEMP.

5.4.17.2. The purpose of the CEMP is:

- To ensure nuisance levels as a result of construction activities are kept to a minimum;
- To comply with regulatory requirements and environmental commitments; and
- To ensure procedures are put into place to minimise environmental effects including a scheme for environmental monitoring and reporting, corrective actions and a notification scheme for handling any complaints received relating to construction impacts.

5.4.17.3. To manage and monitor waste, including any spoil generated on-site, during construction, a Framework SWMP has been developed as part of the Framework CEMP which allows for waste streams to be estimated and monitored and goals set with regards to reducing or recycling waste produced.

5.4.17.4. The SWMP will require that the contractor segregates the waste streams on-Site, prior to them being taken to a waste facility for recycling or disposal. All waste removal from Proposed Development Site would be undertaken by licensed waste carriers and taken to permitted waste facilities.

5.4.17.5. Construction best practice measures that will be adopted during the construction phase have been considered in the environmental assessments and are set out in the Framework CEMP. Construction works will be undertaken in accordance with the environmental commitments identified in **Chapters 8 to 19** (EIA Report Volume 2) and having regard to relevant legislation.

5.4.18 COMMISSIONING AND TESTING

5.4.18.1. Commissioning of the Proposed Development would include testing and commissioning of the process equipment to ensure that that all systems and components installed are in accordance with the requirements of the Applicant. This is anticipated to take approximately six to nine months. A commissioning plan will be required to be agreed with the Scottish Environment Protection Agency (SEPA) under the Pollution Prevention Control (PPC) Permit, which will specify monitoring and control procedures to be used and set out a schedule of commissioning and testing activities.

5.4.18.2. Commissioning and testing activities include both cold and hot testing as a structured process to include static, dynamic, energised, functional and performance testing. These activities will

generally commence using inert materials such as air, water and nitrogen and lubricants before progressing to pressurised operation using process fluids such a natural gas and steam. Diesel supplies may be required on-site for use in mobile generators to supply temporary power.

5.5. REFERENCES

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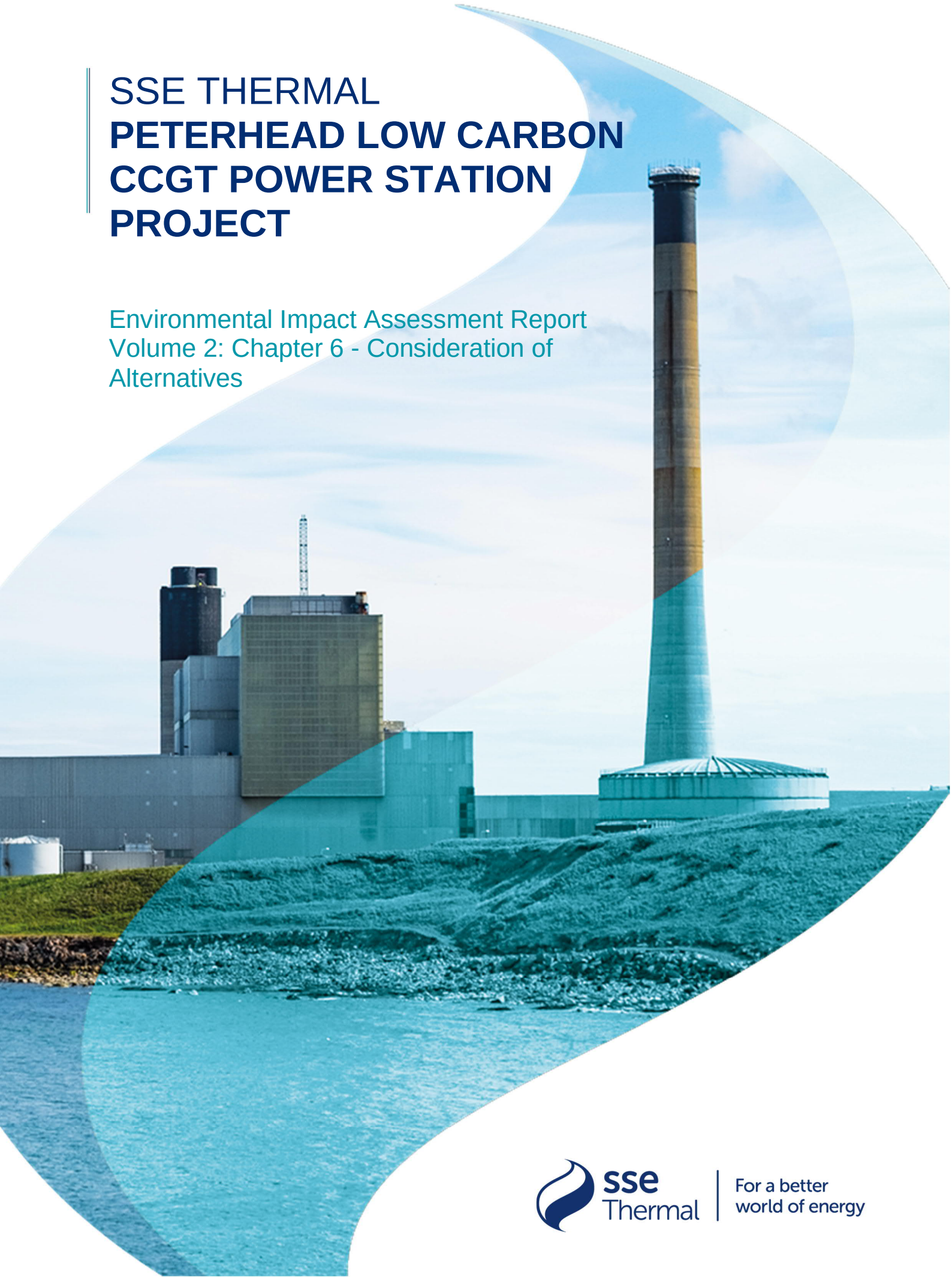
SSE THERMAL

PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 6 - Consideration of Alternatives



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CONTENTS

6. Consideration of Alternatives

6.1. INTRODUCTION

6.1.1 INTRODUCTION

6.1.1.1. This chapter of the Environmental Impact Report (EIA Report) sets out the alternatives that have been considered during the evolution of the Proposed Development and design process as presented in **Chapter 4: The Proposed Development** and **Chapter 5: Construction Programme and Management** (EIA Report Volume 2).

6.1.2 REQUIREMENT FOR CONSIDERATION OF ALTERNATIVES

6.1.2.1. The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the 'EIA Regulations') state in Schedule 4, para. 2 that an Environmental Impact Assessment Report (EIA Report) should contain *'A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects'*. This chapter recognises and fulfils this requirement in respect of the Proposed Development.

6.1.2.2. The design, including options for the location of construction laydown, has evolved through further engineering design work, in response to consultation feedback and with reference to additional surveys and technical studies that have been completed. Detailed design work will proceed as the project progresses through the Front-End Engineering Design (FEED) stage. Any changes that result from the FEED work will remain within the design parameters set out in the Section 36 Application.

6.2. THE NEED FOR THE PROPOSED DEVELOPMENT

6.2.1 OVERVIEW

6.2.1.1. The need for the Proposed Development is set out in **Chapter 7: Legislative Context and Planning Policy** (EIA Report Volume 2) and is in accordance with The Scottish Energy Strategy (2017) and the Clean Growth Strategy (Department for Business, Energy & Industrial Strategy, 2017). The alternative 'do-nothing' scenario is described in Section 6.6 including the reasons for the Applicant proceeding with the Proposed Development.

6.3. ALTERNATIVE SITES

6.3.1 SELECTION OF PETERHEAD POWER STATION SITE

6.3.1.1. The Peterhead Power Station site has been selected by the Applicant for the Proposed Development, as opposed to other potentially available sites for the following reasons:

- The Proposed Development Site is part of the Scottish Industrial Cluster as part of the UK Governments Carbon Capture, Usage and Storage (CCUS) programme. Discussions with Storegga and their Partners have determined that the proposed Acorn project carbon

dioxide pipeline can directly connect into the Proposed Development Site to enable the transport of captured carbon dioxide from the Proposed Development to permanent geological storage in the Central North Sea.

- There have been previous studies into implementing carbon capture and storage (CCS) at Peterhead Power Station confirming the feasibility of the site. In 2011, the UK Government selected Peterhead Power Station as a potential candidate for a pilot project of CCS in the UK. However, in 2015 the UK Government announced that the £1bn grant for developing new CCS technology was no longer available.
- The Proposed Development Site has excellent links to existing infrastructure including electrical grid, water, and gas. Specifically, it is possible for the electricity transmission infrastructure to connect the combined cycle gas turbine (CCGT) to the Scottish and Southern Electricity Network (SSEN) transmission system through the existing 275kV substation to the west of the Proposed Development Site. Water is also available given the proximity to both the Boddam Harbour and Sandford Bay. There are also good transport links via the A90 as well as waterborne options accessible from Peterhead Port which will be utilised for the movement of larger abnormal indivisible loads wherever feasible.
- The Proposed Development Site is a brownfield site which is considered more appropriate to redevelop for large scale power generation than a greenfield one.
- The Proposed Development Site is located within the boundary of the existing Peterhead Power Station site (and associated land within the ownership or control of the Applicant) and can draw on the existing skilled workforce and long history of power generation at the site, as well as utilise other synergies and efficiencies.

6.3.1.2. No other site was considered for the location of the Proposed Development.

6.4. ALTERNATIVE TECHNOLOGIES

6.4.1 LOW CARBON TECHNOLOGIES

6.4.1.1. The UK Government is currently developing its policy and investment framework to support low carbon technologies. Various low carbon solutions are being developed in the UK for dispatchable generating stations including fuel switching to hydrogen or the use of a post-combustion carbon capture plant (CCP). The possibility of using hydrogen was not considered as part of this application and in the EIA Scoping Report the Applicant confirmed that its preferred low carbon technology option would be a low carbon enabled Gas Generating Station equipped with CCP equipment. One reason for this is that the location of the Proposed Development would allow for connection into the emerging proposals for the Acorn Cluster carbon dioxide pipeline. Post combustion carbon capture is also the most technologically mature method of decarbonisation available for large scale power generation.

6.4.1.2. Several solvent licensors offer carbon capture systems, each having developed carbon capture solvents to optimise performance, in terms of carbon capture efficiency, minimising energy cost of solvent recovery and minimising environmental emissions. Many, but not all, solvents are based on amine solutions and amine-based carbon capture has therefore been included within the Proposed Development design considerations to minimise technology risks. The selection of the preferred licensor will be informed by an assessment of Best Available Techniques (BAT).

6.4.1.3. The final decision has not yet been made on the choice of vendor for the power station or licensor for the CCP equipment and solvent and will not be made until the detailed design stage of the project. Therefore, the design of the Proposed Development at this stage incorporates a degree of flexibility in the dimensions, configurations and locations of buildings and structures to

allow for the future selection of the preferred technology and contractor. To provide a robust assessment of the likely significant environmental effects of the Proposed Development, three layout options are considered in the EIA where appropriate, as set out in Chapter 1: Introduction. To retain flexibility in the design the maximum (or where relevant, minimum) parameters have been assessed within the differing layout options. As such, this EIA Report represents a reasonable worst-case assessment of the potential impacts of the Proposed Development at its current stage of design.

6.5. ALTERNATIVE DESIGN OPTIONS AND DESIGN EVOLUTION

6.5.1 INTRODUCTION

6.5.1.1. The Proposed Development has evolved through an iterative design process where the design has been progressed in parallel with the EIA process through consideration of engineering feasibility, environmental constraints and consultation responses. The evolution of the design and where appropriate the consideration of alternatives of the Proposed Development is set out in the following sections.

6.5.2 SCOPING

6.5.2.1. The Proposed Development Site was appraised to determine the optimal location of the principal infrastructure. Initial optioneering identified three broad areas within the existing Peterhead Power Station site boundary which could be used to locate the Proposed Development:

- Area 1: south of the site and existing power station, near Boddam;
- Area 2: west of site and existing power station, near the A90; and
- Area 3: north west of the existing power station, near the inlet of Sandford Bay.

6.5.2.2. Within each area, differing layouts of the permanent generation equipment were identified and reviewed, considering interactions with the existing power station, existing utilities, topography and ground conditions, in addition to proximity to environmental and social receptors. A significant factor to consider within the layout optioneering was the existing topography, which has seen a considerable amount of historic material movement associated with previous developments within the Peterhead site.

6.5.2.3. A total of nine different options were appraised across the three broad areas. From this, Option 4A was selected, which locates the CCGT and CCP and associated infrastructure to the north of the existing power station in Area 3, and the carpark, workshop and control building to the west of the existing power station in Area 2 as shown in **Figure 3.3** (EIA Report Volume 3). Option 4A was selected as it provides the lowest platform level of all options on an existing platform thus reducing visual impact, maintains the ability to separate the existing power station from the Proposed Development, allows for integration with the cooling water system and also has the greatest potential synergy with the Acorn Project. Options within Area 1 were discounted due to the proximity to Boddam and the significant distance from key connections. Other options proposed predominantly in Area 2 or Area 3 were discounted due to the need for extensive earthworks and diversion of existing facilities.

6.5.2.4. As part of the design iteration, a high-level environmental assessment was undertaken which included desk-based reviews of environmental constraints. The results of the desk-based analysis identified: the need for diversion and works to the Den of Boddam Burn which is culverted underneath the Proposed Development Site.

6.5.3 POST SCOPING

6.5.3.1. On receipt of the Scoping Opinion and following further environmental assessment including site surveys the following updates were made:

- Identification of construction laydown areas to accommodate material laydown, temporary construction office facilities and construction car parking. An optioneering exercise was conducted to consider the engineering and environmental feasibility of various areas around the Proposed Development Site. The Proposed Development Site boundary was updated to include a laydown area in the field to the north, reducing the impact of earthworks and avoiding disturbance to Sandford Lodge, its grounds and surrounding trees. The use of the Sandford Lodge walled garden had previously been considered as an option for temporary construction laydown, however this was discounted due to the impact this could have on the setting on both Sandford Lodge and its walled garden.
- The junction with the A90 and Sandford Lodge access track was included to facilitate works required to create an additional site access point to the Proposed Development.
- The field to the south of the existing electrical substation was included within the Proposed Development Site boundary to allow for consideration and comparison of different underground cable route corridors between the substation and the Proposed Development.

6.5.4 POST PUBLIC CONSULTATION

6.5.4.1. Two stages of public consultation have been undertaken for the Proposed Development, no scheme design changes were required as a result of the Stage one consultation received.

6.5.4.2. Following Stage Two public consultation, the design was updated based on the comments and feedback received from the local community and the landowners. A detailed description of the public consultation conducted, and a summary of the feedback received is provided in the Pre-Application Consultation (PAC) Report which accompanies the Section 36 Application. The following updates were made following feedback received during Stage Two consultation:

- A minor update to the Proposed Development Site boundary to exclude a small section of land not under the ownership of the Applicant.
- Diversion of Footpath ECPP-202-03 located along the Sandford Lodge access track: consultation and site survey confirmed the requirement to temporarily suspend access rights to the existing footpath during construction to ensure pedestrian safety and continued access to the coastal path. An alternative footpath route has been identified to ensure continued access and is shown in **Figure 4.4** (EIA Report Volume 3). The Proposed Development Site boundary has also been updated to include the area proposed for the diversion which crosses part of the Applicant's land holding.

6.5.5 DESIGN REFINEMENT AND SECTION 36 SUBMISSION DESIGN

6.5.5.1. As part of the on-going design process, consideration has been given to a range of design options consistent with Option 4A (see also **Figure 3.3** (EIA Report Volume 3)). Decisions taken regarding the concept design of the Proposed Development have, where relevant and possible, been informed by environmental appraisal and assessment work and by consultation with stakeholders.

6.5.5.2. Several aspects of the design have been determined during design refinement and are outlined below:

- A single CCGT unit and integrated CCP and associated infrastructure would be installed in to the north-west of the existing power station, whilst the carpark, workshop and control building would be located to the west of the existing Power Station. The Applicant would not build the CCGT without the CCP as the Applicant is fully committed to building a generating station which has a clear route to decarbonisation.
- The Applicant will work collaboratively with Storegga and their partners to facilitate installation and operation of a carbon dioxide above ground installation (AGI) to connect the Proposed Development's carbon dioxide compression equipment to the Acorn Project carbon capture and storage CCS Pipeline.
- There will be no bulk carbon dioxide storage within the Proposed Development Site.
- Once operational, in certain temporary scenarios (e.g. during CCP outages) it may be necessary to run the CCGT without carbon capture. The CCGT configuration will therefore allow the CCGT to run independently of the CCP with emissions exiting via the HRSG stack rather than via the CCP absorber stack.
- The existing seawater cooling infrastructure will be used by the Proposed Development including the intake at Boddam Harbour and the outfall at Sandford Bay.
- The main operational access to the Proposed Development Site will be to the west of the site, with access from the A90 using the existing access point at Gatehouse Road.
- Access during construction will be split between Gatehouse Road and the Sandford Lodge access track:
- Gatehouse Road will be used as an access for construction works and the proposed construction workers car park will be located at the southern end of the Proposed Development Site. Gatehouse Road loops round the existing Peterhead Power Station and therefore also facilitates movement around the Proposed Development Site. A right-hand turning lane at the A90 junction with Gatehouse Road has been incorporated into the design to reduce congestion on the A90 during construction.
  - The junction with the A90 and Sandford Lodge access track will be used for HGVs and abnormal loads coming to the site and will also be used to facilitate construction workers.
- Temporary diversion of the Aberdeenshire Coastal Path (ECPP-7LD-01-24) near the existing Peterhead Power Station outfall shown in **Figure 4.6** (EIA Report Volume 3). This has been diverted to allow for continued safe access for pedestrians for the duration of the works to the existing outfall.
- The Proposed Development Site boundary was updated to remove third party land south east of the existing electrical substation at Millbank Farm. This area was originally included to allow for flexibility for cable routing but as the design has progressed this is no longer required. The Proposed Development Site boundary has also been updated to include the entire field to the north of Sandford Lodge which is under the Applicants Ownership.
- As part of the design, the feasibility of turning the Den of Boddam Burn into an open watercourse where it passes through the Proposed Development Site was considered. Initial modelling has shown this is not a feasible option due to the topography of the Proposed Development Site, as the depth of the cut required to open up the watercourse would be too large; further details are provided in **Chapter 12: Water Environment** and **Chapter 13: Flood Risk** (EIA Report Volume 2).
- Multiple options for the culvert diversion have been considered (see **Appendix 13C** (EIA Report Volume 4), including options which would divert the culvert to the north of its current location. However due to the topography in this area, the cut required to achieve the fall to allow the culvert to flow would be too high and this would also cross sensitive utilities such

as the gas pipeline; due to this, these options are not considered viable. Another option looked at diverting the culvert to the south of its current route, closer to Boddam, however due to the topography and the electrical lines in the area this option is also not considered viable. The preferred option looks to keep the current alignment of the culvert but lower it further underground, to ensure it is not uncovered due to the earthworks required.

- Earthworks will be required for site levelling and slope design to create a finished platform level for the generating station of between 9m and 11m AOD AOD.

6.5.5.3. At this stage, three potential layout options have been considered and assessed as part of this EIA (shown in **Figures 4.1 to 4.3** (EIA Report Volume 3)) – a concept layout and two alternatives that have been developed by the early works of the FEED contractors. All three layout options are consistent with the Option 4A identified at the earlier scoping stage (see Section 6.5.2 of this chapter).

6.5.5.4. The final layout and the preferred vendor will be selected before the end of the FEED stage. Several options therefore remain under consideration for certain aspects of the Proposed Development, so these options have been included and assessed within this EIA Report including:

- The absorber tower could comprise either a single tower or two smaller towers and the towers could either be rectangular or cylindrical but would remain within the parameters outline in **Chapter 4: The Proposed Development** (EIA Report Volume 2);
- The Proposed Development is likely to use self-generated power to supply the CCP auxiliary plant and equipment. An alternative option may also be used, with low voltage supply from the existing 132kV substation;
- An intermediate electrical substation may be required to interface between the Proposed Development and transmission system infrastructure;
- Final stack heights and locations may change but would remain within the area designated for the CCGT and CCP shown on **Figure 3.3** (EIA Report Volume 3) and within the parameters listed in Table 4.1 in **Chapter 4: The Proposed Development** (EIA Report Volume 2);
- The size and location of laydown areas to be provided in the construction phase; and
- The need or otherwise for certain buildings and/ or enclosures.

6.6. THE DO-NOTHING ALTERNATIVE

6.6.1 OVERVIEW

6.6.1.1. It is considered that a ‘do nothing’ scenario is not appropriate given the established national need for new low carbon dispatchable energy generation to meet the UK’s Net Zero targets (refer to **Chapter 7: Legislative Context and Planning Policy Framework** EIA Report Volume 2).

6.6.1.2. A ‘do nothing’ alternative would mean that a gas-fired power station with carbon capture would not be developed, meaning that dispatchable low carbon generating plant would not be available to support the increased deployment of renewables onto the UK transmission system.

6.6.1.3. Another key disadvantage of a ‘do nothing’ scenario would be the lack of additional investment in the local economy since the Proposed Development would not be developed.

6.6.1.4. For these reasons the do-nothing scenario is not considered appropriate, although it has been assessed as part of the baseline conditions in the EIA presented in the topic specific chapters of this EIA Report (**Chapters 8 - 19** EIA Report Volume 2).

6.7. CONCLUSIONS

6.7.1 CONCLUSIONS

6.7.1.1. The Proposed Development Site was identified as being the most suitable for the following reasons:

- The location enables a connection to be developed to the proposed Acorn carbon capture cluster, taking captured carbon dioxide from the Proposed Development to an offshore storage site for permanent storage;
- Sufficient space is available within the Peterhead Power Station site to accommodate the required power generation and carbon capture equipment;
- The location enables connections to be developed to existing electrical, gas and water infrastructure;
- Existing connections can be made to the seawater abstraction in Boddam Harbour and the outfall in Sandford Bay can be utilised; and
- Previous studies have confirmed the feasibility of implementing carbon capture technology at the Proposed Development Site.

6.7.1.2. The proposed form and orientation of the Proposed Development has been outlined in the previous section, taking into account potential environmental effects, alongside other factors such as technical and commercial feasibility. The design has continued to evolve as the FEED work progresses and one of the three potential layout options (see **Chapter 8: Air Quality** (EIA Report Volume 2) for further details) will be further developed as part of the detailed design (in the event Section 36 consent is granted).

6.8. REFERENCES

Energy and Climate Change Directorate, 2017. The future of energy in Scotland: Scottish Energy Strategy. Available online: https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/pages/3/

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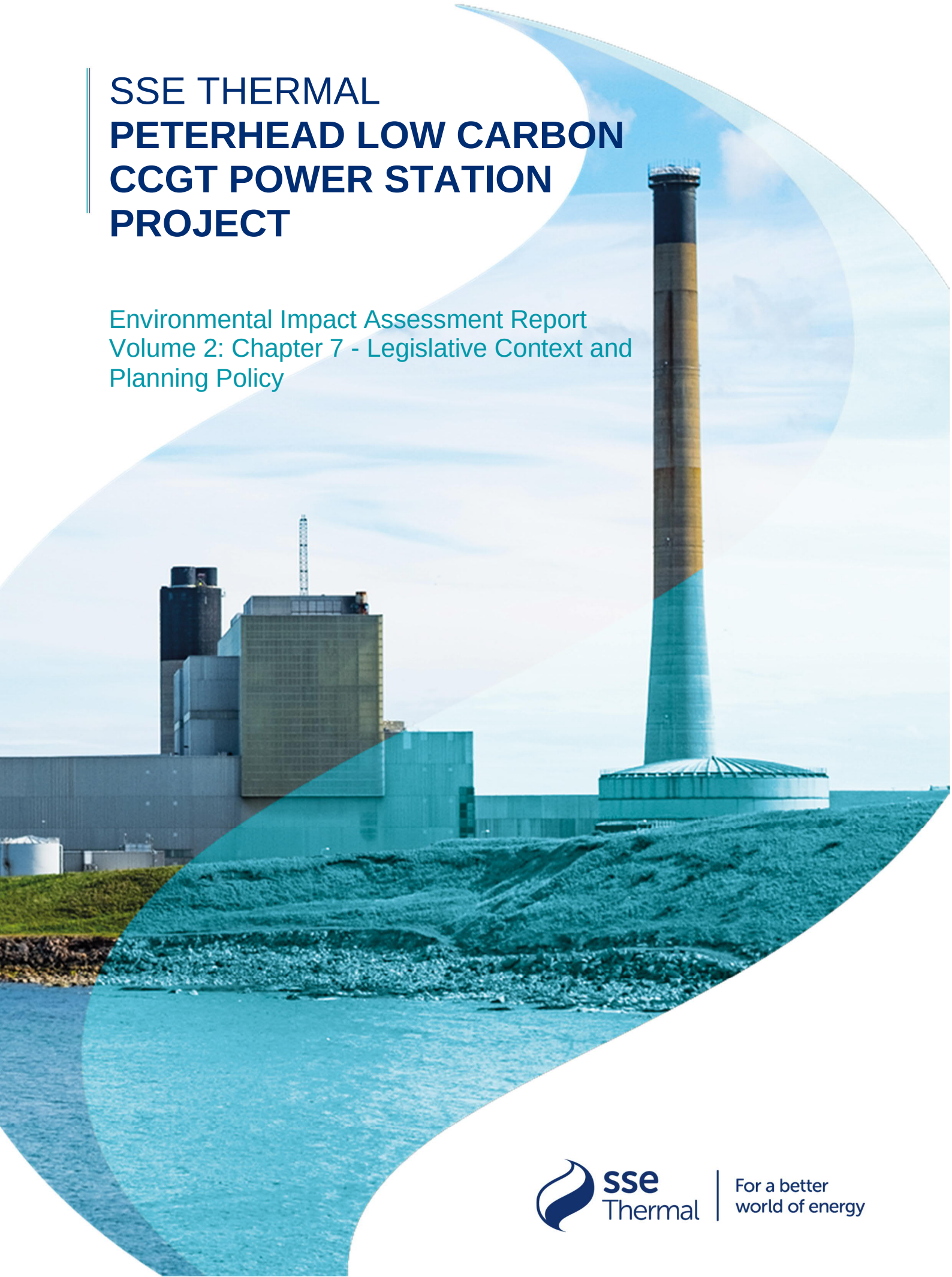
SSE THERMAL

PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 7 - Legislative Context and Planning Policy



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CONTENTS

7. Legislative Context and Planning Policy

7.1. INTRODUCTION

7.1.1.1. This chapter of the EIA Report provides an overview of the legislative and policy context that is relevant to the Proposed Development. Relevant legislation and policy includes:

- The Electricity Act 1989 (as amended);
- The Town and Country Planning (Scotland) Act 1997 (as amended);
- The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017;
- The Climate Change (Scotland) Act 2009 (as amended);
- The Scottish Energy Strategy (December 2017);
- The Climate Change Plan (February 2018) & update (December 2020);
- The Energy Strategy: Position Statement (March 2021);
- A Fairer, Greener Scotland: Programme for Government 2021-22 (September 2021);
- National Planning Framework (NPF) 3 (June 2014) & Draft NPF 4 (November 2021);
- Scottish Planning Policy (June 2014); and
- Regional and Local planning policy.

7.1.1.2. As energy policy is a reserved matter under 'The Scotland Act 1998', appropriate regard has been had to UK energy and climate change policy that may be of relevance to the determination of the Application. This includes:

- The Ten Point Plan for a Green Industrial Revolution (November 2020);
- The Energy White Paper: Powering our net zero future (December 2020); and
- The North Sea Transition Deal

7.1.1.3. Relevant policy, including national, regional and local planning policy, is considered in more detail within the Planning Statement that forms part of the Application. The Planning Statement also provides an assessment of the compliance of the Proposed Development with that policy.

7.2. LEGISLATIVE AND DECISION-MAKING FRAMEWORK

7.2.1.1. As the Proposed Development comprises an electricity generating station with a gross electrical output in excess of 50 megawatts (MW), consent to construct and operate the generating station must be obtained from the Scottish Ministers under Section 36 'the Electricity Act 1989' (the '1989 Act').

7.2.1.2. When granting consent under Section 36 of the 1989 Act, the Scottish Ministers may also give a direction that planning permission be deemed to be granted, under Section 57(2) of 'the Town and Country Planning (Scotland) Act 1997' (the 'TCP(S)A 1997').

7.2.2 The Application seeks consent for the generating station under Section 36 of the 1989 Act and also deemed planning permission under Section 57(2) of the TCP(S)A 1997 for the generating station and ancillary development. All of the elements of the generating station and the development that is ancillary to its construction and operation are set out in Section 2 of this Planning Statement and described in more detailed within Chapter 4 of the EIA Report.

7.2.3 Schedule 8 of the 1989 Act sets out procedural requirements for applications under Section 36. In particular the application must be in writing and describe by reference to a map the land to which the application relates.

7.2.4 Schedule 9, Paragraph 3, sub-paragraph (1) of the 1989 Act relates to the preservation of amenity and fisheries. It states that in preparing a Section 36 application the applicant shall have regard to:

"(a) …the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and

(b) shall do what he reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects."

7.2.5 Sub-paragraph (2) goes on to state that in considering a Section 36 application, the Scottish Ministers shall have regard to the desirability of the matters mentioned in sub-paragraph (1)(a) and the extent to which the applicant has complied with his duty under sub-paragraph (1)(b).

7.2.6 The determination of applications under Section 36 is primarily a matter of energy and climate change policy. However, other matters that may be relevant to the determination of a Section 36 application (particularly in the context of whether to deem planning permission to be granted under Section 57(2) of the 1997 Act) include statements of planning policy and the development plan.

7.2.7 The Proposed Development falls under Schedule 1 of The Electricity Works (EIA) (Scotland) Regulations 2017 (the 'EIA Regulations') Category (2) being a *"thermal generating station with a heat output of 300 megawatts or more…"*. As such, the Proposed Development is 'EIA development' for the purposes of the EIA Regulations and an EIA Report (including Non-Technical Summary) has been prepared and forms part of the Application.

7.2.7.1. Regulation 3 of the EIA Regulations confirms that the Scottish Ministers must not grant Section 36 consent for EIA development (or direct that deemed planning permission is to be granted) unless an EIA has been undertaken in respect of that development and the Minsters have taken that environmental information into account.

7.3. ENERGY AND CLIMATE CHANGE POLICY

7.3.1 OVERVIEW

7.3.1.1. An overview of relevant Scottish energy and climate change legislation and policy is provided below.

7.3.1.2. As confirmed above, as energy policy is a reserved matter under 'The Scotland Act 1998', appropriate regard has been had to UK energy and climate change policy that may be of relevance to the determination of the Application.

7.3.2 THE CLIMATE CHANGE (SCOTLAND) ACT 2009

7.3.2.1. 'Part 1 of the Climate Change (Scotland) Act 2009' (the 'Climate Change Act') (Part 1) introduced a statutory framework for greenhouse gas emissions reductions in Scotland by setting an interim 42% reduction target for 2020, with the power for this to be varied based on expert advice (provided by the UK Committee on Climate Change), and an 80% reduction target for 2050. Part 1 of the Climate Change Act also requires Scottish Ministers to set annual targets, set out in secondary legislation, for Scottish emissions from 2010 to 2050.

7.3.2.2. In April 2019, Scotland became one of the first nations in the World to declare a state of climate emergency, seeking to place climate change at the heart of all policy decisions and actions. Following the First Minister's declaration of a climate emergency, amendments to the Climate Change Act were passed by the Scottish Parliament through 'the Climate Change (Emissions

Reduction Targets) (Scotland) Act 2019', which set a net zero emissions target for Scotland by 2045. This amendment to the Climate Change Act also set more ambitious emissions reduction targets for 2020 (56% reduction), 2030 (75% reduction) and 2040 (90% reduction).

7.3.2.3. The targets set by the Scottish legislation are more ambitious than those set by the UK Government, which is targeting net zero greenhouse gas emissions by 2050.

7.3.3 THE FUTURE OF ENERGY IN SCOTLAND: SCOTTISH ENERGY STRATEGY, DECEMBER 2017 (SCOTTISH GOVERNMENT)

7.3.3.1. 'The future of energy in Scotland: Scottish Energy Strategy' (December 2017) sets out the Scottish Government's vision for the future energy system in Scotland. The Strategy identifies a number of key energy priorities such as promoting 'Renewable and local carbon solutions' as well as exploiting 'Oil and gas industry strengths' by supporting investment, innovation and diversifications across the oil and gas sector, including through the development of the potential carbon capture and storage (CCS) resource that has been created as a by-product of these industries in the North Sea.

7.3.3.2. Chapter 1 of the Strategy 'A 2050 Vision for Energy in Scotland' confirms that a diverse, well-balanced energy supply portfolio or 'energy mix' will remain essential as Scotland decarbonises, providing the basis for secure and affordable heat, mobility and power in future decades (page 11).

7.3.3.3. Chapter 3 'Scotland's Route to 2050' sets out various targets, priorities and actions for Scotland's energy system, including the need to ensure system security and flexibility. It notes (page 57) that while renewables will play a huge part in meeting Scotland's future energy needs, there will be roles too for other sources and technologies, including thermal generation with carbon capture. It goes onto state (also page 57):

"Scotland needs a balanced and secure electricity supply. That means a system and a range of technologies which provide sufficient generation and interconnection to meet demand. It means an electricity network which is resilient and sufficiently secure against any fluctuations or interruptions to supply.

For example, efficient and flexible gas-fired generation is a natural complement to a high renewables future – especially when fitted with CCS technology. Gas-fired generation can be scheduled and controlled, meaning that it can be instructed to power up or down depending on rising or falling demand. It provides "inertia", helping to maintain a stable frequency across the network and increasing its resilience."

7.3.3.4. The Strategy goes onto stress (page 65) that Scotland's waters provide the largest carbon storage resource in Europe and that it is well placed to realise CCS at commercial scale providing the opportunity to decarbonise power generation and industry.

7.3.4 THE CLIMATE CHANGE PLAN: THIRD REPORT ON PROPOSALS AND POLICIES 2018 – 2032, FEBRUARY 2018 (SCOTTISH GOVERNMENT)

7.3.4.1. The Climate Change Plan sets out the path to a low carbon economy while helping to deliver sustainable economic growth and secure the wider benefits to a greener, fairer and heathier Scotland in 2032. The Plan covers a number of 'sector pathways' including electricity; buildings; transport; industry; waste; land use, land use change and forestry; and agriculture.

7.3.4.2. Part 1 of the Climate Change Plan (page 24) covers Scotland's decarbonisation pathway to 2032. It states that by 2032, Scotland's energy system will be largely decarbonised and be increasingly important as a power source for heat and transport. It states (page 24):

"Emissions reduction and security of supply will be ensured through diverse generation technologies, including gas generation, increased storage, smart grid technologies and improved interconnection. While Carbon Capture and Storage (CCS) is not a requirement until after 2030, it remains a key technology, supported by the Scottish Government, to meet our long-term emissions reduction targets."

7.3.4.3. Chapter 1 'Electricity' (page 75) notes that as part of developing a range of technologies in Scotland that aid system security, flexibility and resilience, CCS paired with natural gas, has the potential to be used in future to provide low carbon flexible power generation.

7.3.4.4. The Scottish Government published an update to the Climate Change Plan in December 2020. This continues to highlight the potential role of CCS in delivering negative emissions in the electricity system by 2032. It also calls on the UK Government to put clear measures and a stable policy environment in pace to support the commercialisation of such technologies.

7.3.5 THE ENERGY STRATEGY: POSITION STATEMENT, MARCH 2021 (SCOTTISH GOVERNMENT)

7.3.5.1. The Energy Strategy: Position Statement, published in March 2021 was intended to provide a clear view of the Scottish Government's policies in relation to energy in advance of COP21 in November 2021. It reinforces a commitment to remain guided by the key principles set out in Scotland's Energy Strategy (December 2017) and sets out a number of key priorities for the short to medium-term.

7.3.5.2. A key priority under 'Energy Transition' (page 9) is to invest in decarbonisation projects and the document announces a new £180m 'Emerging Energy Technologies Fund' to support the development of CCS/CCUS and other 'Net Emissions Technologies'.

7.3.5.3. Chapter 6 'Maximising Scotland's International Potential' states that Scotland's Energy Strategy identifies internationalism as a key area as Scotland transitions to net zero. The development of CCS/CCUS is identified as one key priority area for international collaboration (page 18).

7.3.5.4. Chapter 8 'Support for Industries and Sectors across the Energy Landscape' includes a section on the oil and gas sector (page 24). It highlights the wealth of skills and expertise in this sector that can be drawn upon to support key aspects of decarbonisation such as CCUS, which in turn will transition works from high carbon to activities that are more consistent with delivering Scotland's net zero target. It goes onto state (page 25):

"The Scottish Government supports the development of a Carbon Capture and Storage (CCS) network that can utilise the vast storage potential presented by the geology of the North Sea. It is clear that CCUS will play an important role in helping us to reach net-zero emissions; advice from the Committee on Climate Change describes CCS as a "necessity, not an option" to achieve this goal.

CCS will play a central role across the decarbonisation strategies of key sectors such as heat, industry and power, underpinning the production of low-carbon hydrogen and developing negative emissions technologies, such as bioenergy with CCS (BECCS) and direct air capture and storage (DACS), that the committee for climate change that the Committee on Climate Change and our own Climate Change Plan describe as essential to meet net zero in 2045.

Last year, alongside publication of our Climate Change Plan update, we announced the aforementioned Emerging Energy Technologies Fund to support the development of hydrogen and CCS, and which will add new impetus to the development of NETs. Projects supporting the development of CCS and NETs can access £80 million of the overall total of £180 million in the fund, with the direction of funding being supported by work in 2021 to undertake a NETs feasibility study and a CCUS economic impact assessment.

Utilising legacy oil and gas infrastructure, skills and knowledge, CCUS projects have the potential to secure existing jobs as well as delivering new ones, in a developing supply chain. If successful, existing industries, which are currently some of Scotland's largest carbon emitters will be able to move to a sustainable business model actively supporting and reducing Scotland's emissions."

7.3.5.5. The Energy Strategy: Position Statement therefore underlines the Scottish Government's support for CCS/CCUS, the importance of this technology in helping Scotland reach net zero emissions and its role in affecting a transition in the oil and gas sector by utilising legacy infrastructure and drawing upon existing skills and expertise).

7.3.6 A FAIRER, GREENER SCOTLAND: PROGRAMME FOR GOVERNMENT 2021-22 (SCOTTISH GOVERNMENT)

7.3.6.1. This document sets out the Scottish Government's programme for government, including key actions, one of which it to 'Secure a Net Zero Nation' ending Scotland's contribution to climate changes, restoring nature and enhancing climate change resilience.

7.3.6.2. Chapter 3 'A Net Zero Nation' (page 52) refers to the Scottish Government's Energy Transition Programme, which is aimed at funding industry to play a leading role in the development and deployment of new, low carbon technologies, and to support the development of hydrogen and CCS/CCUS. Support for such technologies also includes (page 63) the £180m Emerging Energy Technologies Fund. The document confirms that the Scottish Government is committed to supporting these technologies as part of the energy transition.

7.3.7 THE TEN POINT PLAN FOR A GREEN INDUSTRIAL REVOLUTION, NOVEMBER 2020 (UK GOVERNMENT)

7.3.7.1. 'The Ten Point Plan for a Green Industrial Revolution - Building back better, supporting green jobs, and accelerating out path to net zero', is aimed at delivering a 'Green Industrial Revolution' in the UK, with the foreword by the Prime Minister stating that the Ten Point Plan will seek to mobilise £12 billion of government investment and potentially three times as much from the private sector, to create and support up to 250,000 green jobs.

7.3.7.2. The Introduction to the Ten Point Plan (pages 5 - 6) states that:

"We will generate new clean power with offshore wind farms, nuclear plants and by investing up to half a billion pounds in new hydrogen technologies. We will use this energy to carry on living our lives, running our cars, buses, trucks and trains, ships and planes, and heating our homes while keeping bills low. And to the extent that we still emit carbon, we will pioneer a new British industry dedicated to its capture and return to under the North Sea…"

7.3.7.3. The 'Ten Points' of the Plan are summarised at page 7 of the document. Point 8 is 'Investing in Carbon Capture, Usage and Storage' (CCUS) and is dealt with at pages 22 - 23 of the Plan. It states that CCUS will be an exciting new industry to capture the carbon we continue to emit and revitalise the birthplaces of the first Industrial Revolution. It states that the UK Government's

ambition is to capture 10Mt of CO2 a year by 2030, the equivalent of four million cars' worth of annual emissions. It goes on to set out the Government's commitment to invest up to £1 billion to support the establishment of CCUS in four industrial clusters, creating 'SuperPlaces' in areas such as the North East, the Humber, North West, Scotland and Wales. Page 24 highlights the function and necessity of CCUS in achieving a green economy and the Government's commitment to establish CCUS in two industrial clusters by the mid-2020s:

"CCUS technology captures carbon dioxide from power generation, low carbon hydrogen production and industrial processes, storing it deep underground where it cannot enter the atmosphere. This technology will be globally necessary, but no one country has yet captured the market. The UK has an unrivalled asset – our North Sea, that can be used to store captured carbon under the seabed. Developing CCUS infrastructure will contribute to the economic transformation of the UK's industrial regions, enhancing the long-term competitiveness of UK industry in a global net zero economy. It will help decarbonise our most challenging sectors, provide low carbon power and a pathway to negative emissions. We will establish CCUS in two industrial clusters by mid 2020s, and aim for four of these sites by 2030, capturing up to 10 Mt of carbon dioxide per year. Developed alongside hydrogen, we can create these transformative "SuperPlaces" in areas such as the heart of the North East, the Humber, North West and in Scotland and Wales. Our £1 billion CCUS Infrastructure Fund will provide industry with the certainty required to deploy CCUS at pace and at scale. These clusters will be the starting point for a new carbon capture industry, which could support up to 50,000 jobs in the UK by 2030, including a sizeable export potential. Alongside this, we will bring forward details in 2021 of a revenue mechanism to bring through private sector investment in industrial carbon capture and hydrogen projects, to provide the certainty investors require."

7.3.8 THE ENERGY WHITE PAPER: POWERING OUR NET ZERO FUTURE, DECEMBER 2020 (UK GOVERNMENT)

7.3.8.1. 'The Energy White Paper – Powering our Net Zero Future' (the 'EWP'), was presented to the UK Parliament in December 2020 and builds on the Prime Minister's Ten Point Plan. At the core of the EWP is the commitment to achieve net zero and tackle climate change. The EWP seeks to put in place a strategy for the wider energy system that transforms energy, supports a green recovery and creates a fair deal for consumers (page 4). As with the Ten Point Plan, the EWP confirms the UK Government's support for CCUS drawing upon the resource provided by the North Sea.

7.3.8.2. The Government estimates (Introduction, page 15) that the measures in the EWP could reduce emissions across power, industry and buildings by up to 230Mt CO2 in the period to 2032 and enable further savings in other sectors such as transport. In doing so, these measures could support up to 220,000 jobs per year by 2030. These figures include the energy measures from the Ten Point Plan as well as additional measures set out in the EWP. However, the EWP recognises that more will need to be done to meet key milestones on the journey to net zero.

7.3.8.3. The EWP (pages 16 - 17) provides an overview of the Government's key policies and commitments to put the UK on the course to net zero. These are grouped under a number of headings, including 'Transform Energy', 'Support a Green Recovery from Covid-19' and 'Creating a Fair Deal for Consumers'. Those of particular relevance to the Proposed Development are:

"TRANSFORM ENERGY

Supporting the deployment of CCUS in four industrial clusters including at least one power CCUS project, to be operational by 2030 and putting in place the commercial frameworks required to help stimulate the market to deliver a future pipeline of CCUS projects.

SUPPORT A GREEN RECOVERY FROM COVID-19

Increasing the ambition in our Industrial Clusters Mission four-fold, aiming to deliver four low-carbon clusters by 2030 and at least one fully net zero cluster by 2040.

Investing £1 billion up to 2025 to facilitate the deployment of CCUS in two industrial clusters by the mid-2020s, and a further two clusters by 2030, supporting our ambition to capture 10Mt per year by the end of the decade."

7.3.8.4. Chapter 2 of the EWP deals with 'Power' with the stated goal being to use electricity to enable the transition away from fossil fuels and decarbonise the economy cost-effectively by 2050. Figure 3.2 'Electricity demand, Net Zero scenarios' (page 42) highlights how electricity demand could double by 2050 as electricity replaces the use of petrol and diesel in transport and to some extent, gas for heating. This would require a four-fold increase in clean electricity generation with the decarbonisation of electricity being required to underpin the delivery of the net zero target.

7.3.8.5. Despite the push to increase clean electricity generation and decarbonise the power sector, the EWP states that the UK Government is not targeting a particular generation mix by 2050 and its view remains that the electricity market should determine the best solutions for very low emissions and reliable supply, at a low cost to consumers (page 42). While the EWP (page 43) states that a low-cost, net zero consistent system is likely to be composed predominantly of wind and solar, in order to ensure the system is reliable, it needs to be complemented by technologies which provide power, or reduce demand, when the wind is not blowing or the sun does not shine. This includes natural gas with CCS and short-term dispatchable generation providing peaking capacity, which can be flexed as required.

7.3.8.6. Figure 3.4 of the EWP (page 44) details different potential electricity mixes to 2050 and it is notable that gas with CCS is an important component of those mixes. Furthermore, linked to the commitment to support the deployment of at least one power CCUS project, the EWP (page 47) recognises that:

"In the power sector, gas-fired generation with CCUS can provide flexible, low-carbon capacity to complement high levels of renewables. These characteristics mean that deployment of power CCUS projects will play a key role in the decarbonisation of the electricity system at low cost.

We will support at least one power CCUS plant to come forward and be operational by 2030 and will put in place a commercial framework which will enable developers to finance the construction and operation of a power CCUS plant and stimulate a pipeline of projects. This will enable at least one power CCUS project to be developed in one of the four industrial clusters as part of our mission to decarbonise them …"

7.3.8.7. CCUS is dealt with in detail at pages 125 and 126. It stresses how the UK is in a strong position to become a global technology leader in CCUS with the potential to store 78 billion tonnes of CO_2. Furthermore, deployment of CCUS could create new markets for UK businesses, at home and abroad, as other countries look to meet their emissions reduction commitments and could support 50,000 jobs in UK by 2030.

7.3.9 NORTH SEA TRANSITION DEAL, MARCH 2021 (DEPARTMENT FOR BUSINESS, ENERGY & INDUSTRIAL STRATEGY AND OGUK)

7.3.9.1. The North Sea Deal is a transformational sector deal for the offshore oil and gas sector in recognition of the key role that it can play in helping the UK meets its net zero commitments. The document recognises (Foreword, page 6) that with declining output of hydrocarbons from the UK Continental Shelf ('UKCS') and a projected decline in domestic demand, there is a clear need for determined action to be taken to build on the proven capabilities and skills within the existing sector to support the transition to net zero. It continues:

7.3.9.2. "The UK already has the capability and skills within the existing sector to lead in new and emerging energy technologies such as Carbon Capture, Usage and Storage (CCUS) and the hydrogen economy as well as to support the growth of new sectors such as offshore wind.

7.3.9.3. … Delivering large-scale decarbonisation solutions will strengthen the position of the existing UK energy sector supply chain in a net zero world, securing new high-value jobs in the UK, supporting the development of regional economies and competing in clean energy export markets."

7.3.9.4. The Executive Summary (page 8) states that the North Sea Deal is aimed a delivering on the commitments set out in the oil and gas chapter of the EWP and is closely aligned with the Prime Minister's Ten Point Plan. It do this through the implementation of a number of commitments and measures, including supporting up to 40,000 direct and indirect supply chain jobs in decarbonising UKCS production and the CCUS and hydrogen sectors.

7.3.9.5. The Deal is built on five key outcomes. These are seen as being closely interlinked, meaning that they must be delivered as an integrated whole for the Deal to achieve its full potential. These include:

- CCUS – a commitment to deploy of two CCUS clusters by the mid-2020s and a further two by 2030. This commitment aims to unlock investment of £2-3 billion in CCUS transport and storage infrastructure from the sector to underpin widespread roll out. The sector's experience and capabilities offshore will enable efficiencies and cost reductions to be achieved as new CCUS projects are executed.
- Supply chain transformation – the Deal will focus on supporting the transformation of the oil and gas supply chain to service low-carbon energy sectors. The UK's energy supply chain should be competitively positioned to seize the opportunities present by offshore electrification, CCUS and hydrogen both in the domestic market and internationally.
- People & skills – the Deal will support up to 40,000 high-quality direct and indirect supply chain jobs. Many of the skills present in the oil and gas sector are transferable across the wider energy sector. Offshore renewables, as well as a future CCUS industry will rely heavily on many of the current skillsets in the oil and gas industry.

7.4. NATIONAL PLANNING POLICY

7.4.1 NATIONAL PLANNING FRAMEWORK 3 (NPF3), JUNE 2014

7.4.1.1. The NPF3 is a long-term strategy for Scotland. It is the spatial expression of the Scottish Government's economic strategy, and its plans for development and investment in infrastructure. The NPF3 identifies national developments and other strategically important development opportunities in Scotland. It is accompanied by an Action Programme, which identifies how the Scottish Government expects it to be implemented.

7.4.1.2. The NPF3 provides a statutory framework for Scotland's long-term spatial development and the Scottish Ministers expect Local Planning Authorities (LPAs) to take it into account in preparing development plans and for planning decisions by LPAs to support its delivery.

7.4.1.3. Part 1 of the NPF3 sets out the Scottish Government's vision for Scotland, which is to be:

- a successful, sustainable place;
- a low carbon place;
- a natural resilient place; and
- a connected place.

7.4.1.4. Part 2 'A successful, sustainable place' sets out (Section 2.2) the aim of the Scottish Government to stimulate economic activity and investment across Scotland's communities. A key sector identified for investment and growth is energy.

7.4.1.5. Paragraph 2.23 deals with Scotland's city regions. It highlights how Aberdeen and the north east is identified as the energy capital of Europe and the 'City Investment Plan' sets out an ambition *"to maintain Aberdeen's position as one of the world's key energy capitals and to maximize its growth potential and diversification into other sectors."* It goes onto state:

"Development of Carbon Capture and Storage technology focussed on Peterhead, and possibly St Fergus, enhancements to the electricity grid and new connections for offshore renewables underline the importance of energy-related development to this region …"

7.4.1.6. Part 3 'A low carbon place' identifies Peterhead as an 'Energy Hub' and also the location for a 'National Development', this being a 'Carbon Capture and Storage (CCS) Network and Thermal Generation'.

7.4.1.7. Paragraph 3.10 confirms a continued and important role for thermal generation in Scotland's future energy mix, with a requirement for new or upgraded efficient fossil fuel thermal generation capacity, progressively fitted with CCS. Paragraph 3.11 sets out a need for a minimum of 2.5 GW of thermal generation with CCS to meet Scotland's energy requirements and support the diversification of supplies. It states:

"Proposals are also now coming forward for world-leading projects for energy generation that implement CCS technology and use our natural capacity to store carbon in geological formations of the oil and gas fields in the North Sea."

7.4.1.8. Paragraph 3.18 highlights that CCS provides a major opportunity to reduce emissions from the energy sector and establish Scotland as a world leader in this technology. Paragraph 3.19 recognises the role of Peterhead Power Station, albeit in relation to previous proposals for conversion of the existing gas-fired power station, in pioneering CCS technology and establishing the area as a hub for CO2 transport and storage. It goes onto state that to make best use of existing infrastructure, the site has been identified as a National Development.

7.4.1.9. Peterhead is also identified as an area for coordinated action (paragraph 3.41):

"Peterhead is a focus for a number of important projects, including the conversion of the existing power station to provide CCS and proposals for further expansion of the harbour to support this and other opportunities for diversification. Nearby St. Fergus has a potentially nationally important role in supporting an emerging CCS network. The area may also be the landfall for an international North Sea interconnector and could be a focus for onshore connections to support offshore renewable energy. These can support wider aspirations for growth, including the Energetica corridor where energy-driven opportunities are being used to focus investment and promote a place-based approach to development."

7.4.1.10. Part 6 'Delivery' identifies several National Developments that are needed to help deliver the spatial strategy. Importantly, National Development status establishes the need for a project, albeit that the relevant consents and permissions still need to be obtained. As confirmed above, Peterhead is identified as a National Development (National Development 3) for a CCS Network and Thermal Generation and also as part of a High Voltage Energy Transmission Network (National Development 4). Peterhead is identified as key (paragraph 6.5) in assisting with the delivery of the strategy of a 'low carbon place' reflecting the significant opportunities for growth arising from Scotland's natural energy resources. The full statement of need for and description of the CCS Network and Thermal Generation is set out at Annex A (page 72) of NPF3.

7.4.2 DRAFT NATIONAL PLANNING FRAMEWORK 4 (NPF4), NOVEMBER 2021

7.4.2.1. The Scottish Government has recently published a draft NPF4. The NPF4 was laid before the Scottish Parliament on 10 November 2021 and will be considered for a period of up to 120 days. Alongside Parliamentary scrutiny of the draft the Scottish Government is running a public consultation, which is open until 31 March 2022. The final adoption date will depend on the approval of NPF4 by the Scottish Parliament, but it is currently anticipated that a finalised version will be laid before Parliament for approval by Summer 2022.

7.4.2.2. The draft NPF4 is intended to provide the spatial strategy for Scotland to 2045 and takes account of the target of net zero emissions by 2045 set by the Scottish Government. The draft also incorporates updated Scottish Planning Policy ('National Planning Policy'), which will contain detailed national policy on a number of planning topics.

7.4.2.3. Upon approval and publication, the NPF4 will set out the national policy position for land use planning and form part of the statutory development plan. Upon its publication all strategic development plans and any supplementary guidance issued in connection with them will cease to have effect. NPF3 remains the current national planning framework until NPF4 is published.

7.4.2.4. Part 1 of draft NPF4 states that the spatial strategy is a shared vision that will guide future development in a way that reflects a number of overarching spatial principles, including achieving:

- Compact growth;
- Local living;
- Balanced development;
- Conserving and recycling assets;
- Urban and rural synergy; and
- Just transition.

7.4.2.5. Part 1 (page 11) identifies several 'Action area for Scotland 2045', which includes a 'North east transition' to actively plan a just transition from oil and gas to a net zero future.

7.4.2.6. Part 2 'National Developments' identifies eighteen National Developments that are proposed to support the delivery of the spatial strategy. It confirms (page 44) that the designation of a National Development means that the principle of the development does not need to be agreed in later consenting processes, providing more certainty for communities, businesses and investors.

7.4.2.7. Two 'Industrial Green Transition Zones' are identified as National Developments. These are the 'Scottish Cluster' and 'Grangemouth Investment Zone'. The draft NPF4 confirms (page 54) that the Scottish Cluster encompasses a Carbon Capture, Utilisation and Storage (CCUS) projects

network and is a key strategic vehicle for industrial decarbonisation, energy generation, and the transportation and storage of captured carbon. It goes onto state:

"The designation relates to projects that form a Scottish Cluster in the first instance specifically Peterhead, St Fergus and Grangemouth, as well as further industrial transition sites that are expected to emerge in the longer term. This national development will support the generation of significant economic opportunities for low-carbon industry as well as minimising carbon emissions at scale and will play a vital part in maintaining the security and operability of Scotland's electricity supply and network. The creation of hydrogen and deployment of negative emissions technologies, utilising CCS, at commercial scale will establish the opportunities to decarbonise industry, transport and heat, as well as other sectors, and pave the way for the transportation and storage infrastructure to support the growing hydrogen economy in Scotland."

7.4.2.8. Page 55 confirms the need for such development to meet the targets for emissions reduction and states that it will also support a just transition by creating new jobs in emerging technologies and significant economic opportunities for lower carbon industry. It will also help to decarbonise other sectors, sites and regions, paving the way for increasing demand to be completed by the production of further hydrogen in the future. It also sets out the classes of development that are covered by the designation.

7.4.3 SCOTTISH PLANNING POLICY, JUNE 2014

7.4.3.1. Scottish Planning Policy (SPP) is a statement of Scottish Government policy on how nationally important land use planning matters should be addressed across Scotland. It is non-statutory but as a statement of Minsters' priorities the content of the SPP is a material consideration that carries significant weight, though it is for the decision-maker to determine the appropriate weight in each case.

7.4.3.2. SPP and the NPF3 share a single vision for Scotland (paragraph 11):

"We live in a Scotland with a growing, low-carbon economy with progressively narrowing disparities in well-being and opportunity. It is growth that can be achieved whilst reducing emissions and which respects the quality of environment, place and life which makes our country so special. It is growth which increases solidarity - reducing inequalities between our regions. We live in sustainable, well-designed places and homes which meet our needs. We enjoy excellent transport and digital connections, internally and with the rest of the world."

7.4.3.3. SPP sets out four planning outcomes (paragraph 13) that explain how planning should support this vision. These are to create a successful place; a low carbon place; a natural, resilient place; and a more connected place. In respect of Outcome 2: A low carbon place, SPP states (paragraph 17) that the NPF3 will facilitate a transition to a low carbon economy, particularly by supporting diversification of the energy sector.

7.4.3.4. SPP includes several policy principles, one of which is a presumption in favour of development that contributes to sustainable development. This includes (paragraph 29) making efficient use of existing land, buildings and infrastructure and supporting the delivery of infrastructure, including energy infrastructure. A further principle (paragraph 40) is to direct development to the right place.

7.4.3.5. Chapter 4 'A low carbon place' is clear (paragraph 152) that planning must facilitate the transition to a low carbon economy. While paragraph 154 confirms that the planning system should support transformational change to a low carbon economy through energy efficiency and increased deployment of renewables, paragraph 171 states that

"Proposals for energy generation from non-renewable sources may be acceptable where carbon capture and storage or other emissions reduction infrastructure is either already in place or committed within the development's lifetime and proposals must ensure protection of good environmental standards."

7.4.3.6. As confirmed above, the NPF4 will incorporate updated SPP and will replace the 2014 version. This means that SPP will also form part of the development plan.

7.5. REGIONAL AND LOCAL PLANNING POLICY

7.5.1 OVERVIEW

7.5.1.1. The development plan for the Site currently comprises the Aberdeen City and Shire Strategic Development Plan 2020 and the Aberdeenshire Local Development Plan 2017.

7.5.1.2. As stated above, the NPF4 (and new SPP) will form part of the statutory development plan once published and strategic development plans and related supplementary guidance will cease to have effect.

7.5.1.3. Aberdeenshire Council is at a relatively advanced stage of preparing a new Local Development Plan 2022. The 'Proposed Local Development Plan' (PLDP) has been submitted to the Scottish Ministers and the examination of the Plan commenced on 28 June 2021. The PLDP is expected to be adopted in the first half of 2022. As the PLDP is still subject to examination it is considered that it can only be afforded limited weight in decision-making. The Aberdeenshire Local Development Plan 2017 remains the up to date Local Development Plan for the area and the primary document against which planning applications should be determined until such time as the new Local Development Plan for the area is adopted.

7.5.2 STRATEGIC DEVELOPMENT PLAN, AUGUST 2020

7.5.2.1. The Aberdeen City and Shire Strategic Development Plan (SDP) was prepared by the Aberdeen City and Shire Strategic Development Planning Authority and approved by Scottish Ministers on 12 August 2020. It sets out the strategic framework for investment in jobs, homes and infrastructure. It covers the local authority areas of Aberdeen City and Aberdeenshire, except that part of Aberdeenshire that is within the Cairngorms National Park.

7.5.2.2. The SDP is a statutory planning document which is prepared at a City Region level and covers a 20-year period to 2040. The SDP takes account of national strategies, policy and guidance from the Scottish Government and will be used to inform the preparation of Local Development Plans by the local councils.

7.5.2.3. Chapter 3 'Our Spatial Strategy' identifies a number of 'Strategic Growth Areas' within the City Region. Figure 1 (page 9) identifies a corridor running north from Aberdeen along the coast to and including Peterhead as one of four Strategic Growth Areas (SGAs). Paragraph 3.8 states that the SGAs will be the main focus form development in the area up to 2040. Over this period, it is expected that at least 75% of all homes built and employment land developed will be in the SGAs.

7.5.2.4. Paragraphs 3.27 to 3.32 and Figure 3 (pages 16 to 17) relate specifically to the Aberdeen to Peterhead SGA. Paragraph 3.27 states that this area includes the 'Energetica Corridor' and has important strategic assets, high environmental quality and significant potential for development. Paragraph 3.28 highlights that there are a number of National Developments

identified within this area, which the Aberdeenshire Local Development Plan must make provision for, including:

"the development of Carbon Capture and Storage (CCS) Technology at Peterhead Power Station (Boddam), with a potential pipeline extension to St Fergus;

a key role for Peterhead as a National Renewable Infrastructure Siter and "Energy Hub"; and

the expected landfall for offshore High Voltage Energy Transmission Networks to Norway and England."

7.5.2.5. Paragraph 3.29 goes onto state that the Acorn Project at St Fergus creates the opportunity for low carbon hydrogen production, using natural gas and capturing the carbon dioxide for storage offshore deep underground.

7.5.2.6. Chapter 5 'Our Economy' confirms that the key objective for the City Region is to provide opportunities for sustainable economic growth and create new employment in a range of area. Paragraph 5.1 (page 34) states that in order to promote a diverse regional economy it will be important to build on existing assets, particularly in the field of "innovative energy".

7.5.2.7. Chapter 6 'Our Resources' of the SDP sets out the objectives to make sure new development safeguards and, where appropriate, enhances the City Region's historic, natural and cultural assets and is within the capacity of the environment and (page 38):

"To be a City Region which:

- takes the lead in reducing the amount of emission and pollutants released into the environment;
- mitigates and adapts to the effects of climate change and changing weather patterns;
- limits the amount of non-renewable resources it uses; and.
- supports and protects our biodiversity."

7.5.2.8. Under 'Sustainable Development and Climate Change' (page 41) paragraph 6.15 recognises the importance of tackling the supply of energy during the Plan period. Paragraph 6.17 goes onto state:

"The City Region … remains committed to Carbon Capture and Storage and the development of hydrogen opportunities, both to maximise the benefits from existing energy resources and energy infrastructure available."

7.5.3 ABERDEENSHIRE LOCAL DEVELOPMENT PLAN, APRIL 2017

7.5.3.1. The Aberdeenshire Local Development Plan (LDP) was adopted by Aberdeenshire Council on 17 April 2017 and sets out the detailed planning policies that will be used for assessing planning applications as well as identifying development opportunities across Aberdeenshire.

7.5.3.2. Section 6 'Shaping Buchan' sets out the planning framework for the Buchan area, which includes Peterhead, and identifies land use planning allocations for the area. It notes (page 13) that Peterhead is the northern point of the Peterhead to Aberdeen Strategic Growth Area (SGA), it is also part of a regeneration area and the northern hub of the 'Energetica corridor', "a lifestyle and leisure project designed to promote a change in the world's view of the north-east coast as a quality location for the energy industry". It goes onto state that:

"Peterhead is an important centre identified in National Planning Framework, for developing facilities to allow for the transfer of electricity from overseas and off-shore sources to and from the National Grid, and for the equipment needed to allow carbon dioxide to be stored in

depleted North Sea oilfields. We have made large land allocations to take advantage of these business development opportunities …"

7.5.3.3. The figure at page 14 of the LDP confirms that the Site is within a 'Regeneration Priority Area' and the Energetica corridor. The interactive Proposals Map for the LDP also confirms that the Site forms part of an area that is reserved for development related to the National Planning Framework (NPF3).

7.5.3.4. Section 11 of the LDP 'Shaping Business Development' sets out policies in respect of business and industrial development in Aberdeenshire. Policy B1 'Employment and business land' (page 29) is supportive of new business and industrial development on land allocated for those purposes and subject to it respecting the character of the area, being compatible with nearby uses and benefiting from good access.

7.5.3.5. Section 14 'Shaping Places – Layout, Siting and the Design of New Development' sets out policies that are aimed at including high quality design in new developments. Policy P1 'Layout, siting and design' (page 47) sets out general principles for the design of new development, although these are more aimed at place-making than infrastructure developments. The Policy states that new development should include measures to enhance biodiversity or geodiversity in proportion to the opportunities available and the scale of the development and seek to minimise waste during construction and operation.

7.5.3.6. Policy P2 'Open space and access in new development' (page 48) states that existing and potential public access routes, including core paths, should be protected. Construction of new paths must comply with published best practice.

7.5.3.7. Policy P4 'Hazardous and potentially polluting developments and contaminated land' (pages 48 and 49) states that the Council will refuse development if there is a risk that it could cause significant pollution, create a significant nuisance, or present an unacceptable danger to the public of the environment. Where such development is considered acceptable buy the appropriate authorities, satisfactory steps must be taken to mitigate any residual negative impacts. It goes onto state that the Council will take the advice of the Health and Safety Executive when determining planning applications for development within the consultation zones for hazardous installations of pipelines.

7.5.3.8. Section 15 deals with natural heritage and landscape. Policy E1 'Natural heritage' (pages 53 and 54) states that the Council will in general not allow development where it may have an adverse effect on a nature conservation site designated for its biodiversity or geodiversity importance unless certain circumstances apply. For example, in the case of an internationally designated nature conservation site, there are imperative reasons of overriding public importance, there is no alternative solution and suitable compensatory measures are implemented.

7.5.3.9. Policy E1 goes on to state that development should seek to avoid any detrimental impact on protected species through the carrying out of surveys and submission of protection plans to describe appropriate mitigation where necessary. A baseline ecological survey should also be prepared for all major developments where there is evidence to suggest that a habitat, geological feature or species of importance may exist on the site. Furthermore, all developments should identify measures that will be taken to improve biodiversity and geodiversity in proportion to the potential opportunities available and the scale of the development.

7.5.3.10. Policy E2 ‘Landscape’ (page 55) states that development will be refused where it causes unacceptable effects through its scale, location or design on key natural landscape elements, historic features or the composition or quality of the landscape character.

7.5.3.11. Section 16 ‘The Historic Environment’ includes policies aimed at protecting heritage assets, including listed buildings, scheduled monuments and archaeological sites. These include Policies HE1 ‘Protecting historic buildings, sites, and monuments’ and HE2 ‘Protecting historic and cultural areas’ (pages 59 to 60).

7.5.3.12. Section 17 focuses on protecting resources within Aberdeenshire, including the water environment, mineral deposits, prime agricultural land, peat and other carbon rich soils, open space and important trees and woodlands. Policy PR1 ‘Protecting important resources’ (page 65) states that in all cases, development which impacts on such features and resources will only be permitted when the public economic or social benefits clearly outweigh the value of the feature or resource to the local community and there are no reasonable alternatives.

7.5.3.13. Policy PR2 ‘Protecting important development sites’ (page 66) states that the Council will protect and not allow alternative development on site that may reasonably be needed in the future for improvements to transport, generating and providing energy, waste management, education, other community infrastructure and site to support national developments identified in the National Planning Framework. It goes onto state that:

“National developments that directly affect the area covered by this plan include proposals for contribution to capturing and storing carbon and making use of heat generation, specifically at Peterhead power station but also at other locations associated with the pipeline from the central belt to St Fergus, and high-voltage electricity transmission infrastructure, including cabling, substations, and converter stations, again at a range of locations but expected to include sites associated with the electricity substation south of Peterhead.”

7.5.3.14. Section 18 deals with climate change. The foreword to this section of the LDP recognises that for Aberdeenshire tackling climate change means reducing the use of energy (both in the distribution of development and within developments themselves), conserving water, promoting energy generation by renewable sources, sustaining existing carbon stores (such as peat and wood), and dealing with long-term flood risks.

7.5.3.15. Policy C3 ‘Carbon sinks and stores’ (pages 72 and 73) states:

“We support the development of carbon capture and storage developments, including proposals for woodland that can store carbon for long periods of time. In line with the national planning framework, we also support the development of carbon networks aimed at storing CO2 in offshore oil and gas fields, especially around Peterhead and the gas fired power station.”

7.5.3.16. Policy C4 ‘Flooding’ identifies the need for flood risk assessments for developments in medium to high category of flood risk of 0.5% to 10% annual probability (1 in 200 years to 1 in 10 years). Development should avoid such areas except where it is a development to effect flooding or erosion, it is consistent with the flood storage function of a floodplain, it would otherwise be unaffected by flooding or it is essential infrastructure. In such circumstances, development should be designed to be flood resilient and use construction methods to assist in the evacuation of people and minimise damage. It must not result in increased severity of flood risk elsewhere through altering flood storage capacity or the pattern and flow of flood waters.

7.6. REFERENCES

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SSE THERMAL

PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 8 - Air Quality

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CONTENTS

TABLES

8. Air Quality

8.1. INTRODUCTION

8.1.1 INTRODUCTION

8.1.1.1. This chapter of the Environmental Impact Assessment (EIA) addresses the potential air quality effects of the Proposed Development.

8.1.1.2. Impacts during the construction, operation and decommissioning phases of the Proposed Development are assessed. In particular, the chapter considers potential impacts on identified human health and ecological receptors in terms of:

- Dust generation during construction;
- Emissions from road traffic and Non-Road Mobile Machinery (NRMM) during construction;
- Process emissions from the operational phase of the Proposed Development; and
- The potential effects of the eventual decommissioning of the Proposed Development.

8.1.1.3. This chapter is supported by:

- **Appendix 8A: Air Quality - Construction Phase Assessment** (EIA Report Volume 4);
- **Appendix 8B: Air Quality - Operational Phase Assessment** (EIA Report Volume 4);
- **Appendix 8C: Air Quality - Assessment of Amine Degradation Products** (EIA Report Volume 4); and
- **Figures 8.1 – 8.12** (EIA Report Volume 3).

8.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

8.2.1 INTRODUCTION

8.2.1.1. The United Kingdom (UK) is no longer a member of the European Union (EU). Most EU legislation as it applied to the UK on 31st December 2020 is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies as a form of domestic legislation known as 'retained EU legislation'. This is set out in Sections 2 and 3 of the European Union (Withdrawal) Act 2018. Section 4 of the European Union (Withdrawal) Act 2018 ensures that most remaining EU rights and obligations, including directly effective rights within EU treaties, continue to be recognised and available in domestic law after exit.

8.2.2 AIR QUALITY LEGISLATION

8.2.2.1. The objectives adopted in Scotland for the purpose of Local Air Quality Management (LAQM) are set out in the Air Quality (Scotland) Regulations 2000, the Air Quality (Scotland) Amendment Regulations 2002, and the Air Quality (Scotland) Amendment Regulations 2016. Similar targets are set based on those set at EU level, where they are called limit or target values. These are set out in Directive 2008/50/EC on Ambient Air Quality, which was transposed into Scottish legislation by the Air Quality Standards (Scotland) Regulations 2010.

8.2.2.2. To protect human health, the Air Quality Standards (Scotland) Regulations 2010 set ambient air quality limits for a number of major air pollutants that have the potential to impact public health, such as nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), and particulate matter (PM_{10}, which is particulate matter of 10 micrometres (µm) diameter or less).

They also include a national target value for $PM_{2.5}$ ($PM_{2.5}$ is particulate matter of 2.5µm diameter or less).

8.2.2.3. The Air Quality Standard objectives that have been applied in this assessment are set out in Table 8.1.

Table 8-1: Air Quality Strategy objectives (AQS) – Protection of human health

Pollutant	Concentration (µg/m^3)	Measured as	Source
Nitrogen dioxide (NO_2)	40	Annual mean	EU air quality limit value
	200	1-hour mean, not to be exceeded more than 18 times a year	
Particulate matter (PM_{10})	40	Annual mean	
	50	24-hour mean, not to be exceeded more than 35 times a year	
	50	24-hour mean, not to be exceeded more than 7 times a year	Air Quality (Scotland) Amendment Regulations 2002
	18	Annual mean	
Particulate matter ($PM_{2.5}$)	25	Annual mean	EU air quality target value
	10	Annual mean	Air Quality (Scotland) Amendment Regulations 2016
Carbon monoxide (CO)	10,000	Maximum daily running 8-hour mean	EU air quality limit value

8.2.2.4. The Environment Act 1995 requires local authorities across the UK to undertake an assessment of local air quality to establish whether the objectives are being achieved, and to designate Air Quality Management Areas (AQMA) if improvements are necessary to meet the objectives. Where an AQMA has been designated, the local authority must draw up an Air Quality Action Plan (AQAP) describing the measures that will be put in place to assist in achieving the objectives. The Department for Environment Food and Rural Affairs (Defra) has responsibility for coordinating assessments and AQAP for the UK as a whole.

8.2.2.5. There are no Air Quality Management Areas (AQMAs) within the Aberdeenshire Council area.

8.2.2.6. The impact of emissions from the Proposed Development on sensitive ecological receptors are quantified in two ways:

- As direct impacts arising due to increases in atmospheric pollutant concentrations, assessed against defined ‘critical levels’; and
- As indirect impacts arising through deposition of acids and nutrient nitrogen to the ground surface, assessed against defined ‘critical loads’.

8.2.2.7. Critical levels and critical loads were introduced by the United Nations Economic Commission for Europe (UNECE). Critical levels for the protection of vegetation and ecosystems are defined as “*concentrations of pollutants in the atmosphere above which direct adverse effects on...plants [and] ecosystems...may occur according to present knowledge*,” and critical loads

are defined as "*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*" (UNECE 2004).

8.2.2.8. The critical level for oxides of nitrogen (NOx) are set in the Directive 2008/50/EC on Ambient Air Quality and transposed in the Air Quality Standards (Scotland) Regulations 2010. In the case of ammonia (NH_3), UK target value critical levels have been established. The greater sensitivity of lichens and bryophytes to this pollutant is reflected in the application of two critical levels, with a stricter critical level to be applied to locations where such species are present.

8.2.2.9. The critical levels applied in this assessment are set out in Table 8.2 and apply regardless of the habitat type present at the habitat receptor.

Table 8-2: Critical Levels (CL) – Protection of vegetation and ecosystems

Pollutant	Concentration (µg/m^3)	Measured as	Source
Oxides of nitrogen (NO_x)	30	Annual mean	Scottish National Air Quality Strategy
	75	Daily Mean	UK Target Value
Ammonia (NH_3)	1	Annual mean	UK target value for lichen and bryophytes
	3	Annual mean	UK target value

8.2.2.10. Critical load criteria for the deposition of nutrient nitrogen and acidifying species are dependent on the habitat type and species present and are specific to the sensitive receptors considered within the assessment. Critical loads are detailed on the APIS website (CEH and APIS 2021) and the criteria adopted for the sensitive ecological receptors considered in this assessment are presented in **Appendix 8B** (EIA Report Volume 4).

8.2.3 INDUSTRIAL EMISSIONS DIRECTIVE

8.2.3.1. The European Parliament and Council's Directive 2010/75/EU on industrial emissions ('IED') provides operational limits and controls to which EU regulated plant must comply, including Emission Limit Values (ELV) for pollutant releases into the air. The Combined Cycle Gas Turbine (CCGT) of the Proposed Development falls under the Large Combustion Plant (LCP) requirements (Chapter III) of the IED, since it will have a capacity of greater than 50MW thermal input.

8.2.3.2. The operator of a plant covered by the IED is required to employ Best Available Techniques (BAT) for the prevention or minimisation of emissions to the environment, to ensure a high level of protection of the environment as a whole. European BAT reference documents ('BRefs') are published for each industrial sector under the IED, and they include BAT-Associated Emission Levels (BAT-AEL) which are expected to be met through the application of BAT. These levels may be the same as those published in the IED, or they may be more stringent. The current (2017) version of the LCP BRef (European Commission, 2017) includes annual average BAT-AEL for NO_x and an indicative value for CO from gas turbines which are more stringent than the ELV included in the IED.

8.2.3.3. As an emerging technology, new BAT guidance for carbon capture plant (CCP), has recently been published by the Environment Agency (EA 2021), and is supported by a BAT Review (Gibbins and Lucquiaud 2021), which summarises available evidence. However, no BAT-AEL have been defined for the activity to date as it is intended that these will be developed once

CCP becomes operational in the UK, and collated monitoring data can confirm suitable levels for which the BAT-AEL should be set. As there is no equivalent guidance from the Scottish Environment Protection Agency however, this guidance has been used where appropriate.

8.2.3.4. The emission limits assessed for the Proposed Development are discussed in **Appendix 8B** (EIA Report Volume 4).

8.2.4 POLLUTION PREVENTION AND CONTROL REGULATIONS

8.2.4.1. The Pollution Prevention and Control (Scotland) Regulations 2012 apply to all new installations and transpose the requirements of the IED into Scottish legislation. Both combustion activities and carbon capture and storage activities are listed activities under the Pollution Prevention and Control (PPC) regime, and therefore the Proposed Development will require a PPC Permit to operate, issued by the Scottish Environment Protection Agency. Performance against the relevant ELV or BAT-AEL, as defined in the IED and associated BRefs, or set by SEPA, would therefore be regulated through the PPC Permit.

8.2.4.2. Where legislative ambient air quality limits or objectives are not specified for the pollutant species potentially released from the Proposed Development, Environmental Assessment Levels (EAL), published in the Scottish Environment Protection Agency's Integrated Pollution Prevention and Control Environmental Assessment and Appraisal of BAT, referred to as the 'H1 guidance' (SEPA, 2003) can be used to assess potential health effects on the general population. This includes annual average and hourly EAL for NH_3, which can result from the Selective Catalytic Reduction (SCR) abatement that may be required for the operational CCGT plant as well as being emitted from the carbon capture process.

8.2.4.3. As well as the combustion emissions from the operational CCGT plant, emissions of primary, secondary and tertiary amines and their breakdown products (as they thermally and chemically react with oxygen) could occur from the CCP absorber stack(s). Such species could include the amines themselves and degradation products, such as aldehydes and ketones, depending on the amine solvent used, and therefore these have also been included in the assessment. Where EALs are not provided in the H1 guidance (SEPA 2003), alternatives have been sought from the Environment Agency Risk Assessment for your Environmental Permit guidance (Defra and Environment Agency, 2021).

8.2.4.4. The EALs for the potential breakdown products (except amines) are provided in Table 8.3.

Table 8-3: Environmental Assessment Levels (EAL) for degradation products – human health

Pollutant	Concentration (µg/m^3)	Measured as	Source of EAL
Ammonia (NH_3)	180	Annual mean	H1 guidance (SEPA, 2003).
	2,500	Hourly mean	
Acetaldehyde	9,200	Annual mean	
	370	Hourly mean	
Formaldehyde	100	Annual mean	
	5	Hourly mean	
Ketones[1]	89,500	Annual mean	Environment Agency Risk Assessment Guidance (no EALs for ketones in
	6,000	Hourly mean	

Pollutant	Concentration (µg/m^3)	Measured as	Source of EAL
			the H1 guidance) (Environment Agency 2021).

[1] EAL for Methyl ethyl ketone used, as the lowest EAL of any ketone listed in the Environment Agency Risk Assessment Guidance (Defra and Environment Agency, 2021), therefore ensuring a conservative assessment.

8.2.4.5. At this stage of the project, the actual carbon capture solvent has not been selected, and therefore it is not possible to know exactly which amine species may be released. There are also limited EALs available for amine species, however those that are provided in the H1 guidance (SEPA, 2003) are detailed in Table 8.4.

Table 8-4: Potential Environmental Assessment Levels (EAL) for amines – human health

Pollutant	Concentration (µg/m^3)	Measured as
Diethyl amine	300	Annual mean
	7,600	Hourly mean
Dimethyl amine	38	Annual mean
	1,100	Daily mean
NN-Dimethylethylamine	300	Annual mean
	4,600	Hourly mean
Ethylamine	38	Annual mean
	1,100	Hourly mean
Methylamine	130	Annual mean
	3,900	Hourly mean
Triethylamine	420	Annual mean
	6,300	Hourly mean
Trimethylamine	250	Annual mean
	3,700	Hourly mean

8.2.4.6. As a result of the likelihood of carbon capture technology being employed in the UK, the Environment Agency has recently introduced new EALs for Mono-ethanolamine (MEA) (400µg/m^3 as a daily mean and 100µg/m^3 as an hourly mean) in their Risk Assessment for your Environmental Permit guidance (Defra and Environment Agency, 2021). Although MEA has not been confirmed as being present in the carbon capture solvent to be used in the operational Proposed Development, it is likely that this could form the basis of any solvent solution used or could be used as an appropriate surrogate species. Therefore, this recommended EAL has been used for the assessment of the impacts of amine emissions from the Proposed Development, rather than the Amine EALs provided in Table 8.4. It is considered that this will enable a conservative assessment to be undertaken, especially for short term impacts, given that the new short term MEA EAL (100µg/m^3) is significantly lower than those detailed in Table 8.4.

8.2.4.7. It is also known that some amines can potentially degrade and form nitrosamines and nitramines (collectively referred to as N-amines) both during the carbon capture process itself and also in the atmosphere, following their release from the CCP absorber stack(s). Therefore, the impacts of both directly released N-amines and the N-amines produced through atmospheric degradation of released amines have also been considered in the assessment. This assessment is provided in **Appendix 8C** (EIA Report Volume 4).

8.2.4.8. Again, no EALs for N-amines in the atmosphere are included in the H1 guidance (SEPA, 2003), but the Environment Agency's Risk Assessment for your Environmental Permit guidance (Defra and Environment Agency, 2021) has recently introduced an EAL for N-nitrosodimethylamine (NDMA), of 0.2 nanograms (ng)/m^3. It is understood that NDMA has been used for the basis of the EAL as this is considered to be one of the most harmful nitrosamines, and therefore results in a conservative EAL. In addition, it is understood that the Environment Agency propose to compare the total nitrosamine concentration from plant emissions with the NDMA EAL, although it should be recognised that some of the degradation products will be less harmful, and therefore this is a very conservative assumption.

Table 8-5: Environmental Assessment Levels (EAL) used for amines – human health

Pollutant	Concentration	Measured as	Source of EAL
MEA	400µg/m^3	Daily mean	New Environment Agency EAL in Risk Assessment Guidance (Environment Agency, 2021)
	100µg/m^3	Hourly mean	
NDMA	0.2ng/m^3	Annual mean	

8.2.4.9. Throughout the remainder of this chapter and the associated technical appendices, NAQS objectives, critical levels and EAL are collectively referred to as Air Quality Assessment Levels (AQAL).

8.2.5 SENSITIVE ECOSYSTEMS

8.2.5.1. The UK is bound by the terms of Council Directive 92/43/EEC as transposed into UK legislation, on the conservation of natural habitats and of wild fauna and flora ('Habitats Directive'), Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds ('Wild Birds Directive') and the Convention on Wetlands of International Importance especially as Wildfowl Habitats ('Ramsar sites') (1994).

8.2.5.2. In Scotland, the Habitats Directive is translated into specific legal obligations by the Conservation (Natural Habitats, &c) Regulations 1994, however the Conservation of Habitats and Species Regulations 2017 (as amended) apply in Scotland in relation to certain specific activities (reserved matters), including consents granted under Sections 36 and 37 of the Electricity Act 1989.

8.2.5.3. The Conservation of Habitats and Species Regulations 2017 (as amended) provide for the protection of European Sites created under these, i.e. Special Areas of Conservation (SAC) designated pursuant to the Habitats Directive and Special Protection Areas (SPA) and provisional SPA (pSPA) classified under the Wild Birds Directive. Specific provisions of the European Directives are also applied to SAC, and candidate SAC (cSAC), which requires these sites to be given special consideration, and for further assessment to be undertaken for any development which is likely to lead to a significant effect upon them.

8.2.6 NATIONAL PLANNING POLICY

Scottish Planning Policy (Scottish Government, 2014a)

8.2.6.1. The purpose of the Scottish Planning Policy (SPP) (Scottish Government, 2014a) is to set out national planning policies which reflect Scottish Ministers' priorities for operation of the planning system and for the development and use of land. The National Planning Framework 3 (NPF3) (Scottish Government, 2014b) and the SPP share a vision for the planning system in Scotland:

'*We live in a Scotland with a growing, low-carbon economy with progressively narrowing disparities in well-being and opportunity. It is growth that can be achieved whilst reducing emissions and which respects the quality of environment, place and life which makes our country so special. It is growth which increases solidarity – reducing inequalities between our regions. We live in sustainable, well-designed places and homes which meet our needs. We enjoy excellent transport and digital connections, internally and with the rest of the world.*'

8.2.6.2. In terms of air quality, the SPP states that:

"This SPP introduces a presumption in favour of development that contributes to sustainable development. This means that policies and decisions should be guided by principles, including:

Avoiding over-development, protecting the amenity of new and existing development and considering the implications of development for water, air and soil quality.

Local development plans should safeguard all workable mineral resources which are of economic or conservation value and ensure that those are not sterilised by other development. Plans should set out the factors that specific proposals will need to address, including:

Disturbance, disruption and noise, blasting and vibration, and potential pollution of land, air and water"

National Planning Framework 3 (Scottish Government, 2014b)

8.2.6.3. NPF3, sits alongside the SPP (Scottish Government, 2014a) and presents the long-term strategy for development and investment in infrastructure across Scotland. It identifies national developments and other strategically important developments, and is supported by an Action Programme which details how plans are to be implemented, by whom and in what timeframes. Paragraph 4.12 states:

"*Scotland's environmental agenda is not only about playing to our strengths. In the coming years, we want to see a step change in environmental quality, especially in places with long-standing disadvantages arising from a legacy of past industrial activity. Vacant and derelict land is a continuing challenge. We are committed to reversing the decline of some habitats and species and regulating environmental pollution. Environmental quality is central to our health and well-being. Green infrastructure and improved access and education have a key role to play in building stronger communities. Our spatial strategy identifies where development needs to be balanced with a strategic approach to environmental enhancement*."

Draft National Planning Framework 4 (Scottish Government, November 2021)

8.2.6.4. The latest version of the National Planning Framework, NPF4, intends to combine the SPP and the NPF3 into a single document. A draft of NPF4 was laid before the Scottish Parliament in autumn 2021, with the view of producing a final version for adoption in spring 2022.

8.2.6.5. The NPF4 covers policies to promote sustainable resource management, including a requirement to safeguard air quality, ensuring good design to help improve health through ensuring clean air and proposals to include new policies to improve air quality.

Indicative Regional Spatial Strategies, Summary of emerging work (Scottish Government, 2020b)

8.2.6.6. The Planning (Scotland) Act 2019 established a duty for planning authorities, either separately or jointly, to prepare a Regional Spatial Strategy (RSS). As the RSS is developed and prepared, a document has been produced outlining indicative RSS submissions. Aberdeen City and Aberdeenshire are included in the North East City Region. The RSS utilises the Strategic Development Plan (see 0) to set out the key priorities for the region, and includes policies on carbon/ climate change and the natural environment.

Electricity Generation Policy Statement 2013 (Scottish Government, 2013) and Local Energy Policy Statement (Scottish Government, 2021)

8.2.6.7. The Electricity Generation Policy Statement and the Local energy Policy Statement set the Scottish Government's policies for electricity generation in Scotland. The Policy Statements detail the requirement to reduce emissions from the electricity generation sector in Scotland, through the use of renewable energy generation, Carbon Capture and Storage and improvements in current generation plant.

8.2.7 LOCAL PLANNING POLICY

Aberdeen City and Shire Strategic Development Plan (Aberdeen City and Shire Strategic Development Planning Authority, 2020)

8.2.7.1. The Aberdeen City and Shire Strategic Development Plan (SDP) was prepared by Aberdeen City and Shire Strategic Development Planning Authority on behalf of Aberdeen City and Aberdeenshire Councils, and was approved by Scottish Ministers in August 2020, and replaced the previous 2014.

8.2.7.2. The SDP does not contain policies directly relating to air quality, however, it includes a number of policies which will have an impact on air quality, namely in relation to transport and Sustainable Development and Climate Change.

Aberdeenshire Local Development Plan (Aberdeenshire Council, 2017)

8.2.7.3. Aberdeenshire council published their Local Development Plan (LDP) in 2017, to help guide development in their administrative area. Their LDP contains a policy specific to pollution, including air quality:

"*Policy P4 Hazardous and potentially polluting developments and contaminated land*

We will refuse development if there is a risk that it could cause significant pollution, create a significant nuisance, or present an unacceptable danger to the public or the environment. This includes developments we are told by the Health and Safety Executive to be near facilities they have identified as hazardous. Pipelines, agricultural buildings, wastewater treatment plants, waste disposal/ treatment facilities and heavy industrial uses are all examples of development which could create a nuisance, pollution or hazard. In any circumstances where development of this kind is, on balance, considered acceptable by the appropriate authorities, satisfactory steps must be taken to mitigate any residual negative development impacts.

…

Any proposed development which could have a significant detrimental impact on air quality, including the exacerbation of existing air quality issues, must provide appropriate mitigation measures."

Proposed Aberdeenshire Local Development Plan (Aberdeenshire Council, 2020)

8.2.7.4. In 2020, Aberdeenshire Council published their proposed LDP to replace the LDP published in 2017. While the proposed LDP has not yet been adopted, it contains policies which may be relevant in the future and provides an indication on the Council's future thinking. Policy P4 has been retained, although it explicitly states the requirement for an Air Quality Assessment. Air quality has also been included in a number of additional policies relating to renewable energy (including biomass) and mineral development. Air quality is specifically included in a policy relating to natural resources:

"Policy PR1 Protecting Important Resources

PR1.1 We will not approve developments that have a negative effect on important environmental resources associated with air quality, the water environment, important mineral deposits, prime agricultural land, peat and other carbon rich soils, open space, and important trees and woodland. In all cases development which impacts on any of these features will only be permitted when public economic or social benefits clearly outweigh any negative effects on the protected resource, and there are no reasonable alternative sites.

Air Quality

PR1.2 New developments should not have a significant adverse impact on air quality. An Air Quality Assessment may be required to demonstrate that the development has no significant adverse impact on air quality, and that appropriate mitigation to minimise any adverse effects can be provided and implemented upon."

8.3. ASSESSMENT METHODOLOGY

8.3.1 CONSULTATION

8.3.1.1. The Scoping Report was issued to statutory consultees in May 2021 (**Appendix 1B** EIA Report Volume 4) and responses were obtained from several parties. Those comments that were related to air quality are summarised in Table 8.7.

Table 8-6: Scoping responses

Consultee	Date	Summary of response	How comments have been addressed in this chapter
Aberdeenshire Council	13 July 2021	Supportive of the methodology outlined in the scoping report. Request that specific mitigation required as a result of the Air Quality assessment should be included in the EIAR. Continued engagement with Environmental Health was encouraged during the pre-application stage.	Mitigation is detailed in Section 8.8 of this Chapter. Environmental Health were contacted on 24th September 2021 – and assessment methodologies were sent for comment on 5th November 2021.
Scottish Environment Protection Agency	31 June 2021	Providing sufficient information on impacts of the power generation facility on air quality will be an important issue in	The detailed modelling methodology is provided in **Appendix 8B** and **8C** (EIA Report Volume 4).

Consultee	Date	Summary of response	How comments have been addressed in this chapter
		relation to us being able to determine whether the proposal is capable of being authorised.	
		We note the intention of the developer to provide us with a method statement outlining the proposed approach to modelling the potential air quality impacts prior to the work commencing.	The proposed modelling methodology was sent to SEPA on 27th October 2021. Comments were received back from SEPA on 19th November 2021, and further clarification on a few points raised by SEPA was provided on 15th December 2021. SEPA responded on 10th January 2022 with further comments, which were replied to on 13th January 2022. There has been no further communication since this date.
		Cumulative impact assessment that takes into the proposed operation modes of the existing Power Station and other similar emission sources within the vicinity of the site.	The effects of the Proposed Development have been considered in isolation initially for the purposes of assessing its potential effects in the EIA. However, consideration has also been given to the potential operation of the Proposed Development concurrently with the reduced running regime of the existing Peterhead power station and also with other committed or proposed developments in the area with which potential cumulative effects could occur. For the PPC Permit application the emissions of the permitted installation as a whole will be assessed.
		Undertaking sensitive habitats, and potentially human health, assessment beyond the indicative 15km radius form the development if the modelling anticipates impact beyond that distance.	The modelling study area for human health and ecological receptors are defined in Section 8.3.2 of this Chapter. The modelling predicts impacts that are insignificant within the distances assessed.
		Providing a human health risk assessment considering the	The modelling assessment carried out and reported in this Chapter and in

Consultee	Date	Summary of response	How comments have been addressed in this chapter
		potential releases from the Power Station and Carbon Capture plant.	**Appendices 8B** and **8C** (EIA Report Volume 4) assess the impacts of all species released from the Proposed Development against defined AQALs and the impacts are predicted to be insignificant at all receptors. No further assessment is therefore considered necessary.
		If modelling it to be used then we encourage the developer to use both AERMOD and ADMS modelling at the same time for comparison as this will increase confidence in the modelling results, providing a better understanding of any modelling uncertainties which may exist, and the air quality risks and impacts on the surrounding environment.	A comparison with AERMOD has been made within Annex A of **Appendix 8B** (EIA Report Volume 4).
		The submission should include an assessment of the impact of potential odour emissions from the proposed facility, including likely discharge concentrations where available, and the impact of discharges during routine, non-routine, and abnormal activities to allow us to comment on the consentability of the proposals.	It is recognised that some amines have the potential to generate odour, and therefore the potential odour to occur will depend upon the final licensor selection. As such, no detailed assessment can be carried out at this stage. Amine storage tanks, and associated equipment for tanker deliveries will all be designed with considered of the application of BAT to reduce odorous emissions. Based on the minimisation of fugitive emissions and the expected release concentrations of amines and ammonia from the Proposed Development stack, when compared with the odour thresholds for amines, no odour effects are expected on Site and especially beyond the Site boundary.

8.3.1.2. In addition to the formal comments received in Table 8.6, engagement has been undertaken with the Scottish Environment Protection Agency over the development of BAT for carbon

capture operations and the modelling methodology for the operational phase of the Proposed Development. The Environment Agency's Air Quality Modelling and Assessment Unit (AQMAU) has been consulted over the application of the ADMS amines chemistry module. The Environment Agency has provided a guidance note on the approach to assessment of amine and N-amine emissions (AQMAU, 2021) and this has been applied in the assessment carried out in **Appendix 8C** (EIA Report Volume 4).

8.3.2 STUDY AREA

8.3.2.1. The study areas for the assessments carried out have been defined according to the appropriate guidance for the type of assessment being carried out (i.e. construction dust and NRMM, construction traffic and the operational Proposed Development), and therefore vary for the various assessments.

8.3.2.2. The study area for the construction dust NRMM emissions has been applied in line with the Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction (IAQM, 2014), extending:

- Up to 350m beyond the Proposed Development Site boundary and 50m from the construction traffic route (up to 500m from the Proposed Development Site entrance), for human health receptors; and
- Up to 50m from the Proposed Development Site boundary and construction traffic route (up to 500m from the Proposed Development Site entrance) for ecological receptors.

8.3.2.3. The study area for the traffic assessment is defined in the screening criterion set out in the Design Manual for Roads and Bridges (DMRB) (Highways England (2019) and the EPUK/ IAQM Planning for Air Quality guidance (EPUK & IAQM, 2017), which states that only properties and habitat sites within 200m of affected roads (roads that experience a change in traffic flow above a certain criteria) should be considered in road traffic emissions assessments.

8.3.2.4. The study area for the operational Proposed Development point source emissions extends up to 15km from the northern part of the Proposed Power and Carbon Capture (PCC) Site where the CCGT and CCP would be located, in order to assess the potential impacts on sensitive ecological receptors, in line with H1 guidance (SEPA, 2003):

- SPA, SAC, Ramsar sites and SSSI within 15km; and
- Local Nature Sites (including ancient woodlands, Local Wildlife Sites (LWS) and National and Local Nature Reserves (NNR and LNR)) within 2km.

8.3.2.5. In terms of human health receptors, the predicted impacts from the operational Proposed Development become negligible well within 2km and therefore sensitive receptors for the human health impacts only are concentrated within a 2km study area.

8.3.3 IMPACT ASSESSMENT METHODOLOGY

8.3.3.1. The potential emissions to air from construction and operation of the Proposed Development have been determined or estimated, and key local receptors have been identified, together with the current local ambient air quality.

8.3.3.2. The potential pollutant concentrations resulting from the projected emissions arising from the construction and operational phases of the Proposed Development have been predicted using atmospheric dispersion modelling techniques where appropriate, which enabled the assessment of the impacts associated with the Proposed Development on the existing local ambient air quality and in particular on the identified sensitive receptors. The assessment

methodology for each type of emission is outlined below, with further detail being provided in the accompanying technical appendices (**Appendix 8A, Appendix 8B** and **Appendix 8C** EIA Report Volume 4).

8.3.3.3. The process and traffic emissions assessments are made with reference to the relevant AQAL defined in Table 8.1 to Table 8.2 in Section 8.2 of this Chapter.

Construction phase – construction dust assessment

8.3.3.4. The movement and handling of soils and spoil during construction activities for the Proposed Development is anticipated to lead to the generation of some short-term airborne dust. The occurrence and significance of dust generated by earth moving operations is difficult to estimate and depends heavily upon the meteorological and ground conditions at the actual time and location of the work, and the nature of the activity being carried out.

8.3.3.5. At present, there are no statutory standards relating to the assessment or control of dust in Scotland. The emphasis of the regulation and control of construction dust, therefore, is through the adoption of Best Practicable Means (BPM) when working on site to mitigate any potential impacts. It is intended that significant adverse environmental effects are avoided at the design stage and through embedded mitigation where possible, including the use of good working practices to minimise dust formation which is detailed further in Mitigation and Enhancement Measures of this Chapter.

8.3.3.6. The IAQM provides guidance for good practice and for qualitative assessment of risk of dust emissions from construction and demolition activities (IAQM, 2014). The guidance considers the risk of dust emissions from unmitigated activities to cause human health impacts (associated with PM_{10}), dust soiling impacts, and ecological impacts (such as physical smothering, and chemical impacts for example from deposition of alkaline materials). The appraisal of risk is based on the scale and nature of activities and on the sensitivity of receptors, and the outcome of the appraisal is used to determine the level of good practice mitigation required for adequate control of dust.

8.3.3.7. The assessment undertaken for the Proposed Development is consistent with the overarching approach to the assessment of the impacts of construction, and the application of example descriptors of impact and risk set out in IAQM guidance. It considers the significance of potential impacts with no mitigation and recommends mitigation measures appropriate to the identified risks to receptors. The steps in the assessment are to:

- Identify receptors within the appropriate study area for the Proposed Development Site;
- Identify the magnitude of impact through consideration of the scale, duration and location of activities being carried out (including demolition, earthworks, construction and trackout, where construction vehicles could carry mud onto the public highway);
- Establish the sensitivity of the area through determination of the sensitivity of receptors and their distance from construction activities;
- Determine the risk of significant impacts on receptors occurring as a result of the magnitude of impact and the sensitivity of the area, assuming no additional mitigation (beyond the identified development design and impact avoidance measures) is applied;
- Determine the level of additional mitigation required based on the level of risk, to reduce potential impacts at receptors to insignificant or negligible; and
- Summarise the potential residual effects of the mitigated works.

8.3.3.8. The criteria for assessment of magnitude, sensitivity, and risk for construction dust are summarised in Tables 1 – 6 **Appendix 8A** (EIA Report Volume 4).

Construction phase – construction site plant (Non-Road Mobile Machinery (NRMM) assessment

8.3.3.9. There are likely to be emissions to air during construction activities arising from on-site construction plant or NRMM. The IAQM guidance (IAQM, 2014) states:

8.3.3.10. "*Experience of assessing the exhaust emissions from on-site plant … and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/ vehicles and their operating hours and locations to assess whether a significant effect is likely to occur.*"

8.3.3.11. The screening criterion in the DMRB (Highways England (2019) and Planning for Air Quality guidance (EPUK & IAQM, 2017) states that only properties and habitat sites within 200m of roads should be considered in traffic assessments. This has been considered in determining the potential for impacts from NRMM associated with the Proposed Development on sensitive receptors. A qualitative assessment of the potential for impact from NO_2 and PM_{10} emissions from NRMM on identified receptors has therefore been made based on the criteria outlined in the DMRB guidance.

8.3.3.12. During the construction phase it may be necessary to utilise small mobile diesel generators, to provide power for power tools, welfare facilities or construction equipment. At this stage, the numbers and locations of such plant are not known, and therefore it is not possible to carry out a quantitative assessment of their potential impact at this time.

8.3.3.13. Any plant over 5MW (but less than 50MW) would require a PPC permit to operate after 2024, and be required to meet ELVs set for the protection of human health and habitat sites. Additional controls, such as siting such equipment away from sensitive receptors and ensuring adequate stack heights to aid dispersion would also be put in place.

Construction and operational phase – road traffic assessment

8.3.3.14. The incomplete combustion of fuel in vehicle engines results in the presence of combustion products of CO, PM_{10}, and $PM_{2.5}$ in exhaust emissions as well as hydrocarbons such as benzene and 1,3-butadiene. Similarly, but to a lesser extent, any sulphur in the fuel can be converted to SO_2 that is then released to atmosphere. In addition, at the high temperatures and pressures found within vehicle engines, some of the nitrogen in the air and the fuel is oxidised to form oxides of nitrogen, mainly in the form of nitric oxide (NO), which is then converted to NO_2 in the atmosphere. NO_2 is associated with adverse effects on human health. Better emission control technology and fuel specifications are expected to reduce emissions per vehicle across the UK vehicle fleet in the long term.

8.3.3.15. Although SO_2, CO, benzene, and 1,3-butadiene are present in motor vehicle exhaust emissions, detailed consideration of the associated impacts on local air quality is not considered relevant in the context of this Proposed Development. This is because the released concentrations of these pollutants are low enough so as to not be likely to give rise to significant effects. In addition, no areas within the administrative boundaries of Aberdeenshire Council are considered to be at risk of exceeding the relevant objectives for these pollutants, therefore the risks to the attainment of the relevant air quality objectives in the vicinity of the Proposed Development are considered negligible. Emissions of SO_2, CO, benzene, and 1, 3-butadiene from road traffic are therefore not considered further within this assessment.

8.3.3.16. The exhaust emissions from road vehicles that do have the potential to affect the ambient concentrations of pollutants are NO_2, PM_{10} and $PM_{2.5}$. Therefore, the assessment of the significance of road traffic air quality impacts only considers these pollutants.

8.3.3.17. DMRB LA105 guidance (HE, 2019) sets out criteria to establish the need for an air quality assessment from road traffic. The guidance considers the following changes in traffic anticipated because of a development, to identify the need for further evaluation:

- Annual Average Daily Traffic (AADT) flows of more than 1,000 vehicles;
- 200 Heavy Duty Vehicles (HDV, all vehicles greater than 3.5 tonnes gross weight, including buses);
- A change in the speed band; or
- A change in carriageway alignment by >5m.

8.3.3.18. The Planning for Air Quality guidance (EPUK & IAQM, 2017) proposes a lower threshold in AADT flow to warrant a detailed air quality assessment of a change of 500 Light Duty Vehicles (LDV, all vehicles less than 3.5 tonnes gross weight) or 100 HDV when outside of an AQMA. For changes in traffic below these criteria, significant changes in air quality are not expected. As this guidance proposes a lower threshold in AADT flow to warrant a detailed air quality assessment, in order to conduct a conservative assessment of the air quality impacts of construction traffic, the lower screening criteria has been applied to this assessment. The AADT associated with the associated with the construction phase of the Proposed Development therefore requires detailed air quality modelling.

8.3.3.19. No detailed assessment of operational traffic emissions has been made, as the numbers of additional vehicles associated with the operational phase of the Proposed Development are below all the screening criteria published for requiring such assessment.

Operation phase – process emissions from the operational plant

8.3.3.20. Emissions from the Proposed Development, assumed to be operational at the earliest in 2027[1], has been assessed using the methodology described in the H1 guidance (SEPA, 2003), to identify where proposed emissions can be screened out as being unlikely to cause significant effects. Detailed dispersion modelling using the atmospheric dispersion model ADMS (currently ADMS 5.2.2) has been used to calculate the concentrations of pollutants at identified receptors. These concentrations have been compared with the defined AQAL for each pollutant species, as summarised in Table 8.1 to Table 8.5.

8.3.3.21. Dispersion modelling calculates the predicted concentrations arising from the emissions to atmosphere, based on Gaussian approximation techniques. The model employed has been developed for UK regulatory use. **Appendix 8B** (EIA Report Volume 4) details the model inputs for the assessment, with further details on the amine assessment presented in **Appendix 8C** (EIA Report Volume 4).

8.3.3.22. The assessment has been based on a single CCGT unit and its associated CCP being operated continuously, as this is considered to represent the worst-case scenario in terms of the annual average operational emissions.

8.3.3.23. As described in **Chapter 4** (EIA Report Volume 2), consideration has been given to both a single large absorber, with a stack height of 105m above ground level, and the option of a smaller twin absorber configuration with two stacks up to 77m above ground level. The worst-case results from either scenario have been reported in the assessment.

8.3.3.24. Whilst it is recognised that during start-up and shut down there may be short periods where emission concentrations are higher than those assessed, at this stage in the design process,

[1] As described in **Chapter 2**: **Assessment Methodology** (EIA Report Volume 2) timescales for commercial operation are linked to the development of the Acorn Project Carbon Capture and Storage Pipeline by Storegga into which the Proposed Development will connect.

there is limited data on the duration and release concentration of these emissions. During such times, it is envisaged that although the emission concentration may be higher, the gas flow rate will be lower, therefore resulting in mass emissions likely to be comparable with steady state operation. It is therefore considered that this will have a minimal impact on the short-term impacts from the Proposed Development. It is anticipated that detail on start-up emissions will become available during the FEED process and therefore these assumptions will be reappraised when information becomes available, as part of the PPC Permit process.

8.3.3.25. The first year of operation (referred to as opening) of the Proposed Development is assumed to be 2027 for the purpose of this assessment, which is the earliest date that the Proposed Development could realistically start to operate.

8.3.3.26. The assessment of worst-case long-term (annual mean) and short-term (daily and hourly mean) emissions resulting from the operation of the Proposed Development has been undertaken by comparing the maximum process contributions ('PC') that occur anywhere, (to ensure a worst-case assessment in terms of human health impacts) with the annual mean and hourly mean AQAL, taking into consideration the baseline air quality, in accordance with H1 guidance (SEPA, 2003).

8.3.3.27. An assessment of nutrient nitrogen enrichment has been undertaken by applying published deposition velocities to the predicted annual average NO_2 and NH_3 concentrations at the identified ecological sites, determined through dispersion modelling, to calculate nitrogen deposition rates (expressed as kilograms per hectare per year, Kg/ha/yr). These deposition rates have then been compared to the Critical Loads for nitrogen published by UK APIS (CEH and APIS, 2016), taking into consideration the baseline air quality.

8.3.3.28. Potential increases in acidity on designated ecological receptors from depositional contributions of NO_2 and NH_3 from the process contribution have also been considered. Acid deposition is derived from nitrogen deposition modelling values using standard conversion factors and expressed as kilograms of nitrogen equivalent per hectare per year (KqN_{eq}/ha/yr). The PC acid deposition rates and baseline deposition rates have been used within the APIS Critical Load Function Tool (CEH and APIS, 2016) to determine whether the contribution will result in exceedance of the defined acidity Critical Loads for the most sensitive feature.

8.3.3.29. Cumulative impacts with other committed developments that could interact with the operational impacts and effects of the Proposed Development has been carried out and is presented in **Appendix 8B** (EIA Report Volume 4) and summarised in **Chapter 20: Summary and Likely Combined Effects and Residual Effects** (EIA Report Volume 2). The impact of cumulative operational emissions on nutrient nitrogen deposition on habitats is considered in the **Appendix 11F Statement to Inform Habitat Regulations Appraisal** (EIA Report Volume 4).

8.3.4 EVALUATION OF SIGNIFICANCE

Construction phase dust assessment

8.3.4.1. For potential amenity effects, such as those related to dust deposition, the aim is to bring forward a scheme, to include mitigation measures as necessary, that minimises the potential for amenity, human health, and ecological impacts as a result of the Proposed Development construction works.

8.3.4.2. The IAQM guidance (IAQM, 2014) does not provide a method for the evaluation of impacts on receptors from construction dust, rather a means to determine the level of mitigation required to avoid significant impacts on receptors. The guidance indicates that application of appropriate mitigation should ensure that residual effects will normally be 'not significant'. Such control

measures are proposed to be included in the final CEMP – a framework for which is included in **Appendix 5A** (EIA Report Volume 4).

Traffic and operational emissions assessment

8.3.4.3. The evaluation of the significance of air quality effects from the traffic and operational point sources has been based on the criteria referenced in the Planning for Air Quality (EPUK & IAQM, 2017), and in the H1 Guidance (SEPA, 2003). The predicted changes in pollutant concentrations are compared to AQAL to determine the magnitude of change.

8.3.4.4. For a change of a given magnitude, the EPUK & IAQM (EPUK & IAQM, 2017) has published recommendations for describing the magnitude of long-term impacts at individual receptors and describing the significance (Table 8.8) of such impacts. This terminology has been changed where appropriate in order to maintain consistency with the rest of this EIA – where the EPUK & IAQM uses 'substantial' this has been changed to 'major', and 'slight' has been changed to 'minor'.

Table 8-7: Air quality impact descriptors for long term changes in ambient pollutant concentrations

Long term averaging concentration at receptor	Percentage change in annual mean concentrations				
	Up To 0.5%	0.5 – 1%	2-5%	6-10%	>10%
	Imperceptible	Very Low	Low	Medium	High
75% or less of AQAL	Negligible	Negligible	Negligible	Minor	Moderate
76-94% of AQAL	Negligible	Negligible	Minor	Moderate	Moderate
95-102% of AQAL	Negligible	Minor	Moderate	Moderate	Major
103-109% of AQAL	Negligible	Moderate	Moderate	Major	Major
110% or more of AQAL	Negligible	Moderate	Major	Major	Major

AQAL = Air Quality Assessment Level (NAQS objective or Environmental Assessment Level)

8.3.4.5. The guidance is not explicit in the identification of whether any of the above impact descriptors should be considered 'significant' or 'not significant' effects, rather it indicates that the descriptors should be applied to individual receptors and a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect; other factors need to be considered. However, it indicates further that 'negligible' impacts are likely to lead to effects that are 'not significant' and 'major' impacts describe the potential for 'significant' effects. The judgment of significance of effects adopted within this assessment is discussed below.

8.3.4.6. The H1 guidance (SEPA, 2003) details screening criteria for the comparison of predicted PC with AQAL, which states that an emission may be considered insignificant (or negligible) where:

- Short term PC <=10% of the AQAL; and
- Long term PC <=1% of the AQAL.

8.3.4.7. Where an emission cannot be screened out as insignificant, the second stage of screening considers the PC in the context of the existing background pollutant concentrations; the predicted environmental concentration (PEC) is considered not to require further consideration where:

- Short term PC <20% of the short-term AQAL minus twice the long-term background concentration; and
- Long term PEC (PC + background concentration) <70% of the AQAL.

8.3.4.8. Where the PEC is not predicted to exceed the AQAL and the proposed emissions comply with the BAT-AEL (or equivalent requirements) the emissions are typically considered acceptable by the Scottish Environment Protection Agency.

8.3.4.9. The EPUK & IAQM guidance indicates that the Scottish Environment Protection Agency's threshold criterion of 10% of the short term AQAL is sufficiently small in magnitude to be regarded as having an 'insignificant' effect. The IAQM guidance deviates from the H1 guidance with respect to the background contribution; the EPUK & IAQM guidance indicates that severity of peak short-term concentrations can be described without the need to reference background concentrations as the PC is used to measure impact, not the overall concentration at a receptor.

8.3.4.10. The peak short-term PC from an elevated source is therefore described as follows:

- PC <=10% of the AQAL represents an 'insignificant' (negligible) impact;
- PC 11-20% of the AQAL is small in magnitude representing a minor impact;
- PC 21-50% of the AQAL is medium in magnitude representing a moderate impact; and
- PC >51% of the AQAL is large in magnitude representing a 'substantial' (major) impact.

8.3.4.11. The impact of point source emissions on ecological receptors, through deposition of nutrient nitrogen or acidity, has been evaluated using the Scottish Environment Protection Agency and NatureScot insignificance criterion of 1% of the long-term objective, as above.

8.3.4.12. Where emissions are not screened as insignificant (negligible), the descriptive terms for the air quality effect outlined in Table 8.8 above have been applied.

8.3.5 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

8.3.5.1. The physical parameters for the modelling of emissions from the Proposed Development's stack(s) have been sourced from concept design data provided by design studies prepared for the Proposed Development, and the pollutant mass emission rates have been calculated by AECOM, based on licensor data, the relevant emission limits or BAT-AEL. They are summarised in **Appendix 8B** (EIA Report Volume 4, Table 1 - Table 3).

8.3.5.2. The dispersion modelling of point source emissions has taken into consideration the sensitivity of predicted results to model input variables, and to ultimately identify the realistic worst-case results for inclusion in the assessment. These variables include:

- Meteorological data, for which five years' recent data (2016-2020) from a representative meteorological station (Inverbervie) have been used;
- The assessment has considered the options of a single large absorber and a twin absorber design offered by one licensor. The worst-case results of these two options has been reported in this assessment;
- For the single large absorber option, the stack has been assessed assuming it is potentially located at the four outermost extents of the CCP area (**Figure 3.3** EIA Report Volume 3), and the worst-case receptor results reported; and
- Inclusion of buildings, structures and local topography that could affect dispersion from the source into the modelling scenarios, including the position of the absorber stack.

8.3.5.3. Information on the proposed three layout options that are currently under consideration has been used to develop a reasonable worst-case assessment of potential environmental effects of the different parameters of the Proposed Development that cannot yet be fixed. This is discussed in more detailed in **Chapter 4: Proposed Development** (EIA Report Volume 2).

8.3.5.4. For this assessment, the preferred CCGT and post combustion amine technologies have not yet been selected and will be subject to further design and commercial engagement. Therefore, the emission parameters for the CCGT unit and CCP proposed by the different technology licensors under consideration have been compared and although unlikely, the worst-case emissions leading to the worst-case predicted impacts has been used in the assessment, to ensure that it is conservative.

8.3.5.5. The operational Proposed Development has been assumed to be running 24 hours a day for 8,760 hours per year for the purpose of carrying out a worst-case assessment, however it is likely that the plant may operate in dispatchable mode, with much lower running hours annually. The assumed continuous operation throughout the year is considered to lead to worst-case annual mean impacts.

8.3.5.6. The building dimensions included within the assessment are the maximum dimensions under consideration. It is envisaged that should the actual buildings be smaller in size, specifically in height, than those used in the assessment, then this would have the potential to reduce the plume downwash effects associated with buildings in close proximity to stack(s), therefore improving emission dispersion. This would lead to a reduction in the level of impact predicted in the assessment.

8.3.5.7. A range of stack heights have been assessed, and in terms of the air quality impacts, the lowest stack height for the building dimensions used in the assessment that is considered to be appropriate for the operational Proposed Development has been reported in this assessment.

8.3.5.8. As described in **Chapter 4: Proposed Development** (EIA Report Volume 2), consideration has been given to both a single large absorber, with a stack height of 105m, and the option of a smaller twin absorber configuration with two stacks up to 77m high, in determining worst-case assessments. The single larger absorber unit provided the worst-case modelled results in terms of the maximum concentration predicted anywhere, and therefore these have been presented in this chapter. The maximum concentrations found to occur at identified human health receptors were found to occur for the twin absorber scenario, and this is detailed further in **Appendix 8B** (EIA Report Volume 4).

8.4. BASELINE CONDITIONS

8.4.1 SENSITIVE RECEPTORS

8.4.1.1. During the construction phase, based on IAQM guidance (IAQM, 2014) explained in paragraph 8.3.16, receptors potentially affected by dust soiling and short-term concentrations of PM_{10} generated during construction activities are limited to:

- Human receptors: located within 350m of the nearest construction activity, and/ or within 50m of a public road used by construction traffic that is within 500m of the construction site entrance; and
- Ecological receptors: located within 50m of the nearest construction activity and/ or within 50m of a public road used by construction traffic that is within 500m of the construction site entrance.

8.4.1.2. Receptors potentially affected by the exhaust emissions associated with construction phase vehicle movements are those located within 200m of a public road used by construction traffic to access the Proposed Development Site.

8.4.1.3. Receptors potentially affected by operational emissions from the Proposed Development including local residential and amenity receptors have been identified through site knowledge, desk study of local mapping and consultation. Through the dispersion modelling, isopleth figures of pollutant concentration dispersion have been examined, to identify the receptors that will receive the highest point source contributions so that the assessment of impact can be made at these receptors. Those receptors considered to be representative of impacts in the vicinity of the Proposed Development have been modelled as discrete receptors.

8.4.1.4. Ecological receptors potentially affected by operational emissions have been identified through desk study of Defra Magic mapping (Defra, 2021) and consultation (see **Chapter 11: Biodiversity and Nature Conservation** EIA Report Volume 2). Statutory designated sites including SAC, SPA, Ramsar sites and SSSI up to 15km from the Proposed Development Site have been considered. Further details of these sites and reasons for designations are provided in **Chapter 11: Biodiversity and Nature Conservation** (EIA Report Volume 2).

8.4.1.5. Identified receptors are detailed in Table 8.9 and are shown in **Figure 8.1**: Air Quality – Construction Study Area, **Figure 8.2: Air Quality – Operation Study Area Human Health Receptors** and **Figure 8.3: Air Quality – Operation Study Area Ecological Health Receptors** (EIA Report Volume 3) (CDR = Construction Dust Receptor, TR = Traffic Receptor (for human health impacts), TE = Traffic Ecology, OR = Operational Receptor (for human health impacts), OE = Operational Ecology).

Table 8-8: Identified receptors with potential for air quality impacts from the Proposed Development

Receptor I.D.	Receptor Name	Grid Reference (x,y)		Shortest Distance to Road Source (m)	Approximate Distance and Direction from CCP Stack
CDR1	Buchan Ness to Collieston Coast SPA	Various from 412492 - 413368	Various from 843605 – 842950	>200m	400m East
CDR2	Thistle Seafoods Limited	413195	842872	>200m	650m South-east
CDR3	New Gardens, Boddam	413245	842737	>200m	840m South-east
CDR4	Claymore Cresent, Boddam	412912	842644	>200m	610m South-east
CDR5	Millbank Coaches	412465	842580	5m	480m South
CDR6	Residential Property on the A90	412598	842528	25m	560m South-east
CDR7	Sardakan Cottage (A90)	412000	843411	15m	430m North-west

Receptor I.D.	Receptor Name	Grid Reference (x,y)		Shortest Distance to Road Source (m)	Approximate Distance and Direction from CCP Stack
CDR8	New Mill of Sandford (Residential)	412095	843660	95m	700m North-west
TR1	Sardakan Cottage	412000	843411	15m	430m North-west
TR2	Newton of Sandford	412106	843126	65m	270m West
TR3	Millbank	412465	842580	5m	480m South
TR4	Residence on A90	412598	842528	25m	560m South-east
TR5	Stirling	412673	842336	30m	790m South-east
TR6	Stirlinghill	412906	841537	5m	1.7km South
TR7	Rocksley Drive	412936	841664	15m	1.6km South
TR8	Boddam	412800	842123	5m	1.15 km South
TR9	Glenugie Gardens	411918	844461	15m	1.4 km North-west
TR10	South Road	412202	845086	8m	1.9 km North
TR11	Mile End	412202	845138	13m	1.9 km North
TR12	Greenacres Av	410745	844940	10m	2.5 km North-west
TR13	Boddam	412812	842139	5m	1.15 km South
TR14	Stirlingbrae Cottage	412765	841166	5m	950m South
TE1	Buchan Ness to Collieston SPA/SAC	Various from 412787 - 412882	Various from 841141 - 840976	20 to 200	2.1km South
OR1	Sardakan Cottage	412000	843411	15m	430m North-west
OR2	Newton of Sandford	412106	843126	65m	270m West
OR3	Denend Croft	411728	842503	>200m	850m South-west
OR4	Millbank	412465	842580	5m	480m South
OR5	Residence on A90	412598	842528	25m	560m South-east
OR6	Stirling	412673	842336	30m	790m South-east

Receptor I.D.	Receptor Name	Grid Reference (x,y)		Shortest Distance to Road Source (m)	Approximate Distance and Direction from CCP Stack
OR7	Claymore Crescent, Boddam	412912	842644	>200m	610m South-east
OR8	New Gardens, Boddam	413245	842737	>200m	840m South-east
OR9	Invernettie	412415	844290	>200m	1km North
OR10	Burnhaven Primary School	412532	844282	>200m	1km North
OR11	Meethill School, Peterhead	412010	845185	>200m	1.9km North-west
OR12	Dales Park School, Peterhead	411510	845330	>200m	2.2km North-west
OE1	Buchan Ness to Collieston Coast SPA	Various from 412492 - 413368	Various from 843605 - 842950	>200m	400m East
OE2	Buchan Ness to Collieston Coast SAC Bullers of Buchan Coast SSSI	413203	841833	>200m	1.4km South
OE3	Loch of Strathbeg SPA, Ramsar and SSSI	410446	857033	>200m	13.8km North
OE4	Ythan Estuary, Sands of Forvie and Meikle Loch SPA	410259	835705	>200m	7.7km South-west
OE5	Rora Moss SSSI	405508	852217	>200m	11km North-west
OE6	Collieston to Whinnyfold Coast SSSI	408573	833731	>200m	10km South-west
OE7	Meikle Loch and Kippet Hills SSSI	403360	832135	>200m	14.3km South-west

8.4.1.6. In addition, there are a further four SSSIs within 15km of the Proposed Development (Moss of Cruden, Bellscamphie, Hill of Longhaven and Kirkhill) which are designated due to their geological features. It is therefore considered that these sites will not be affected by emissions from the Proposed Development, as the Critical Levels and Critical Loads assigned to such

sites are for the protection of vegetation and ecosystems only, and therefore these will not be included in the assessment.

8.4.2 BASELINE AIR QUALITY

8.4.2.1. Existing air quality conditions in the vicinity of the Proposed Development Site have been evaluated through a review of Local Authority air quality management reports, Air Quality in Scotland and Defra published data and other sources. The key pollutants of concern resulting from construction and operation of the Proposed Development and that have potentially elevated background concentrations from other sources are NO_x, NO_2, CO, NH_3, PM_{10} and $PM_{2.5}$, therefore the assessment of baseline conditions within this chapter considers these pollutants only. Amines and N-amines are also considered in this assessment, however, based on activities in the local area and wider region, these are not expected to have elevated background concentrations.

8.4.2.2. Baseline concentrations of the pollutants such amines, nitrosamines and nitramines are considered in **Appendix 8C** (EIA Report Volume 4).

8.4.2.3. The impact of the existing Peterhead Power Station emissions are considered to be accounted for in the background numbers derived for the assessment. This is considered to be a conservative assumption, as the existing Peterhead Power Station comprises three operating gas turbines, however only one of the existing gas turbines will be operational by the time the Proposed Development becomes operational. That said, the Scottish Environment Protection Agency have specifically requested that the assessment includes the impacts of the retained gas turbine, and therefore an additional model scenario to include this has been carried out and the results are presented in Annex C of **Appendix 8B** (EIA Report Volume 4).

8.4.2.4. There are no Air Quality Management Areas (AQMAs) within the Aberdeenshire Council area. The closest AQMAs to the Proposed Development Site are the three declared in the Aberdeen City Council administrative area for NO_2 and PM_{10}, approximately 40km to the south of the Proposed Development, and therefore it is not considered that the Proposed Development will impact upon the air quality within the AQMAs.

8.4.2.5. The 2020 Air Quality Annual Progress Report (Aberdeenshire Council 2020) published by Aberdeenshire Council details monitoring that is carried out within their administrative area. The council does not currently operate any automatic monitoring sites within their area, however non-automatic monitoring (using passive diffusion tubes) for NO_2 was carried out at eleven sites during 2019. Four of these sites were located in Peterhead and are within 2km of the Proposed Development Site.

8.4.2.6. Reported annual mean NO_2 concentrations for these four sites were less than half of the annual mean AQS objectives for NO_2 in 2019, therefore indicating that NO_2 concentrations are very unlikely to exceed the AQS objective in the vicinity of the Proposed Development Site. It should be noted that these sites are 'roadside' monitors where the ambient concentrations can be expected to be principally influenced by emission from road traffic and where concentrations would be expected to be higher than background levels.

8.4.2.7. Aberdeenshire Council do not carry out monitoring for any other pollutant species detailed in the Air Quality Framework Directive (European Commission 2008) or National Air Quality Strategy (Defra 2007).

8.4.2.8. The reported annual mean NO_2 concentrations for the four sites within Peterhead are shown in Table 8.10.

Table 8-9: Aberdeenshire Council diffusion tube monitoring results 2019

Monitoring Site	Site Type	Location (NGR)	NO_2 Concentration ($\mu g/m^3$)
Peterhead 2	Roadside	413209, 846356	18.8
Peterhead 4	Roadside	412758, 846144	19.9
Peterhead BH	Roadside	413379, 845906	19.7
Peterhead MS1	Kerbside	413420, 845918	17.3

8.4.2.9. In addition, baseline background NO_2 and PM_{10} concentrations for the area in the vicinity of the Proposed Development has been determined from Air Quality Scotland air quality maps (Scottish Air Quality 2021). The background maps are based on data for 2018, and therefore it is conservatively assumed that 2018 will be representative of the opening year for the Proposed Development; as general trends are showing a reduction in both NO_2 and PM_{10} concentrations over time, this is considered to be a conservative assumption.

8.4.2.10. Background CO data has been from Defra background maps from 2001, and the appropriate year adjustment factor has been applied to provide a baseline for 2018.

8.4.2.11. The background concentrations have been derived for the location of the Site, and also the nearest human health receptors. Given that the area in the immediate vicinity of the Proposed Development is quite sparsely populated, and has a relatively low background NO_2 concentration, background concentrations at the most populous residential area in the prevailing wind direction have also been included.

8.4.2.12. Table 8.11 summarises the Scottish Air and Defra background mapping for the assessment.

Table 8-10: Summary of background data for use in the operational impact assessment

Receptor	Location (NGR)	NO_2 Concentration ($\mu g/m^3$)	CO Concentration ($\mu g/m^3$)
Proposed Development Site	412500, 843500	8.4	63.5
Invernettie	412500, 844500	19.3	63.5

8.4.2.13. To carry out a conservative assessment, a NO_2 background concentration of 19.3$\mu g/m^3$ will be used for the assessment of operational impacts, being that of the Scottish Air background concentration for the largest populous area downwind of the emissions from the Proposed Development.

8.4.2.14. The existing air quality concentrations at designated habitat sites in the vicinity of the Proposed Development, and the existing acid and nutrient nitrogen deposition rates at those sites, have been obtained from the UK Air Pollution Information System (APIS 2020) and are shown in Table 8.12.

Table 8-11: APIS background data NO_x and NH_3 (2017 – 2019 data)

Receptor I.D.	Ecology site	APIS Backgrounds			
		NO_x ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	N-Deposition (kg N/Ha/Yr)	Acid Deposition (K eq/Ha/Yr) (N:S)
OE1	Buchan Ness to Collieston Coast SPA	9.76	1.23	12.04	0.90 : 0.10
OE2	Buchan Ness to Collieston Coast SAC Bullers of Buchan Coast SSSI	5.43	1.23	12.04	0.90 : 0.10
OE3	Loch of Strathbeg SPA, Ramsar, SSSI	4.55	0.93	10.36	0.74 : 0.10
OE4	Ythan Estuary, Sands of Forvie and Meikle Loch SPA	3.89	1.32	13.44	0.96 : 0.10
OE5	Rora Moss SSSI	3.99	1.35	13.30	0.5 : 0.11
OE6	Collieston to Whinnyfold Coast SSSI	3.81	1.05	10.78	0.77 : 0.09
OE7	Meikle Loch and Kippet Hills SSSI	3.90	1.15	11.76	0.84 : 0.10

8.4.2.15. It is not considered necessary to carry out any additional monitoring of NOx, NO_2 or ammonia, given the availability of suitable data.

8.4.2.16. At this stage, we do not consider it appropriate to monitor background amine levels, as there are currently no accredited standards available. In addition, background levels of amines and N-amines are considered to be potentially below the limit of detection of any monitoring technique currently available and expected to be very low given the absence of sources in the local area.

8.4.2.17. For the traffic impact assessment, 2021 and 2026 annual average background concentrations were taken from Air Quality Scotland air quality maps (Scottish Air Quality 2021) for NO_x, NO_2 and PM_{10} and from Defra's 2018 baseline 1x1 km background maps for $PM_{2.5}$. The data used in the assessment is presented for the centre of each 1x1 km grid square in Table 8.13. The Defra background concentrations have also been compared against local authority background monitoring, which has suggested no uplift is required.

Table 8-12: Summary of background data for use in the traffic impact assessment

Grid Ref. of Centre Point	2021 Background concentrations (µg/m^3)				2026 Background concentrations (µg/m^3)			
	NOx	NO_2	PM_{10}	$PM_{2.5}$	NOx	NO_2	PM_{10}	$PM_{2.5}$
412500, 843500	10.4	7.2	8.0	4.3	9.1	6.4	7.8	4.1
412500, 842500	7.8	5.5	8.3	4.4	6.8	4.8	8.0	4.2
412500, 841500	6.5	4.7	8.9	4.4	5.6	4.0	8.6	4.2
411500, 844500	12.1	8.4	9.6	4.8	10.7	7.5	9.3	4.6
412500, 845500	21.2	14.1	8.3	4.7	19.0	12.7	8.0	4.5
410500, 844500	8.3	5.8	10.4	4.9	7.2	5.1	10.2	4.7

8.4.3 FUTURE BASELINE AIR QUALITY

8.4.3.1. Background concentrations of pollutants are expected to decrease in the future due to changes in technology and the types of emission sources; however, to provide a conservative prediction of pollutant concentrations in the future, the current baseline background concentrations are used for the future operational assessment scenarios, assuming no decrease in background concentrations.

8.4.3.2. The current baseline also includes the contribution from the three existing SSE Peterhead Power Station Gas Turbines; however, only one of the existing gas turbines will be operational with the Proposed Development. This again therefore ensures a conservative background concentration has been used in the assessment.

8.4.3.3. For future construction assessment scenarios, Defra's latest emission factors have been used as these provide a robust prediction of pollutant concentrations in the future.

8.5. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

8.5.1 CONSTRUCTION

Construction Environmental Management Plan (CEMP)

8.5.1.1. Emissions of dust and particulates from the construction phase of the Proposed Development will be controlled in accordance with industry best practice, through incorporation of appropriate control measures according to the risks posed by the activities undertaken, as determined through this assessment process. The management of dust and particulates and application of

adequate mitigation measures will be enforced through embedding measures in the CEMP. A Framework CEMP is included as **Appendix 5A** (EIA Report Volume 4). The final CEMP will be developed in accordance with the principles set out in that framework.

8.5.1.2. Based on an initial assessment of the Proposed Development Site and surrounding area, of its sensitivity to dust impacts and the likely risk of impacts arising from each of the key construction activities (earthworks, construction and 'trackout' of material onto roads (see **Appendix 8A** EIA Report Volume 4) appropriate embedded measures to be implemented during construction (good site techniques drawn from the 'high risk' site schedule in the IAQM guidance (IQMA 2014) that have been identified are:

- Avoid mechanical roughening or grinding of concrete surfaces, where appropriate;
- Store sand and aggregates in bunded areas and store cement powder and fine materials in silos, where appropriate;
- Use water suppression and regular cleaning to minimise mud on roads, and control dust during earth moving activities;
- Cover vehicles leaving the construction site that are carrying waste materials or spoil;
- Employ wheel wash systems at site exits;
- Restrict, where practicable, the use of unmade road accesses;
- Minimising duration of storage of topsoil or spoil during pipeline construction; and
- Prohibit open fires on site.

8.5.1.3. Good practice will also be employed for the siting and operation of NRMM to control associated emissions, including:

- Minimise vehicle and plant idling;
- Where reasonably practicable, locating static plant away from sensitive boundaries or receptors; and
- Minimise operating time outside of core working hours/ daylight hours.

8.5.2 OPERATION

IED/ BAT AEL Emission Limit Value Compliance

8.5.2.1. The Proposed Development will be designed such that process emissions to air comply with the ELV requirements specified in the IED, or, if tighter, the LCP BRef, as well as any additional ELVs set by SEPA in the PPC Permit. This will be regulated by SEPA through the PPC Permit

Emissions control

8.5.2.2. The impact assessment is based on emissions performance of the CCP that licensors have confirmed is achievable through a combination of solvent selection and process control techniques. Emissions of NOx from the CCGT will be controlled through the use of SCR so as to achieve the BAT-AEL and to minimise NOx carry over into the CCP.

8.5.2.3. Emissions of amines will be controlled in accordance with the use of BAT through the use of water wash stages prior to the flue gas exiting the stack; the use of water wash enables solvent that is carried over in the flue gas to be captured and returned to the process for re-use.

8.5.2.4. Control of operational emissions will be made through a BAT justification and via the PPC Permit.

Stack height(s)

8.5.2.5. The proposed height of the single CCP absorber stack for the Proposed Development has been assessed with consideration given to minimisation of ground-level air quality impacts and

the visual impacts of taller stacks, based on current worst-case building massings of the main structures of the Proposed Development.

8.5.2.6. Dispersion modelling has been undertaken to determine the optimum height of absorber stack at the current stage of design, through comparison of the impacts at human health and ecological receptors, to result in impacts at sensitive receptors that are considered to be acceptable.

8.5.2.7. At the detailed design stage, should the final building dimensions be reduced from those assessed in this EIA, lower stack heights may be able to be used to achieve the same level of effect as presented in this chapter.

8.5.2.8. The location of the HRSG stack and absorber stack(s) will be controlled by discharge of the detailed design planning condition. Emissions from the HRSG stack have not been presented in this assessment, as initial model has shown that this will lead to impacts that are no worse than the emission from the CCP absorber. The combustion emissions (NO_x and CO) and NH_3 from the SCR would be subject to the same emission limits from the HRSG as from the CCP absorber stack and therefore the associated release rates would be comparable. The emissions from the HRSG stack however would be released at a higher temperature than from the absorber and would therefore have improved thermal buoyancy, and consequentially dispersion, resulting in a level of impact for the unabated CCGT operation that is better than – or no worse than - for the carbon capture mode of operation. The HRSG stack would be sized appropriately to ensure that this is the case although would not exceed the maximum parameters stated in Table 4.1 **Chapter 4: Proposed Development** (EIA Report Volume 2).

8.5.3 DECOMMISSIONING

8.5.3.1. Appropriate best practice mitigation measures will be applied during any decommissioning works and documented in a Decommissioning Environmental Management Plan (DEMP); no additional mitigation for decommissioning of the Proposed Development beyond such best practice is considered necessary at this stage. The predicted air quality effects of eventual decommissioning of the Proposed Development are considered to be comparable to, or less than, those assessed for construction activities.

8.6. LIKELY IMPACTS AND EFFECTS

8.6.1 CONSTRUCTION

Assessment of construction dust

8.6.1.1. The area sensitive to dust soiling and PM_{10} health effects has been assessed, as detailed in **Appendix 8A** (EIA Report Volume 4), from the sensitivity of receptors and the proximity of the Proposed Development activities to these receptors. Identified human and ecological sensitive receptors to dust soiling and PM_{10} effects from construction works are detailed in **Appendix 8A** (EIA Report Volume 4, Table 7).

8.6.1.2. The risk assessment for construction dust indicates that there would be a medium to high risk of unmitigated dust impacts on human health (PM_{10}) and a high risk for dust soiling from unmitigated clearance works (“demolition (site clearance and preparatory works)”), earthworks, construction and track out activities. The assessment also shows that the impact of unmitigated construction activities on ecological sites is likely to be a medium to high risk. Therefore, mitigation measures appropriate to the scale of perceived risk would be applied as part of the

CEMP and through these embedded control and mitigation measures, the risk from dust soiling on human health and ecological sites will therefore be reduced to **not significant** levels, which is considered a **negligible** effect.

Assessment of construction traffic

8.6.1.3. Table 16 of **Appendix 8A: Air Quality - Construction Phase** (EIA Report Volume 4) shows the predicted annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$; and number of exceedances of the 24-hour 50 µg/m^3 PM_{10} objective for the Do Something scenario at sensitive receptors. Table 18 and Table 19 of **Appendix 8A** show the relevant information and assessment results for the significance of construction traffic impacts on ecological receptors.

8.6.1.4. The impact at all human receptors can be considered negligible, as both the change between the Do Minimum and Do Something scenarios for all receptors is less than 5% of the AQAL; and all receptors are below 75% of the AQAL.

8.6.1.5. Despite there being some sensitive human receptors along roads where construction traffic will be present, the largest change in AADT flow occurs on the A90 South of Gatehouse Road. The effects of changes in pollutant concentrations due construction traffic and changes in traffic flows on the road network is considered not to be significant, given that the magnitude of change between the two scenarios is so small where human receptors are present.

8.6.1.6. The impacts at all nationally and internationally designated ecological receptors (TE1_1 to TE1_18) are considered to be unlikely to give rise to significant effects as the change in pollutant concentrations are less than 1% of the relevant Critical Level or Critical Load, or that these are not exceeded.

8.6.1.7. The highest predicted change is at TE1_1 and is 1.6% of the Critical Level for the annual mean NOx AQAL. TE1_1 is part of the Buchan Ness to Collieston. The assessment is based on peak construction traffic flows and assumes that this peak flow will continue for a full year of construction. The peak is likely to last for no more than two months, and over the course of a year traffic flows will be much lower, and the predicted change in NOx will also be lower. It is therefore considered that these changes are unlikely to give rise to significant effects at TE1_1.

8.6.1.8. The effect of changes in traffic flows due to construction traffic on human health and ecological receptors is therefore considered to be **negligible** and **not significant**.

Assessment of emissions from construction site plant (NRMM)

8.6.1.9. The assessment has identified a number of sensitive human receptors within 200m of the Proposed PCC Site and the ecologically sensitive Buchan Ness to Collieston SPA and SAC is located within the Proposed Development Site boundary. Construction activities in these areas are described **in Chapter 5: Construction Programme and Management** (EIA Report Volume 2). As works within these areas will be phased, NRMM and site plant (including any small diesel generator plant that may be required) will only be required to be operational at that nearest location for a limited duration over the overall construction period, and only operational on an 'as and when required' basis during that particular phase. Emissions from site plant and NRMM will also be controlled by measures set out in the **Appendix 5A** (EIA Report Volume 4) to reduce emissions associated with this source, including restriction of their operation within designated areas only, prohibiting of idling, the enforcement a minimum engine emissions standard and enforcement of maximum site speed limits. Due to these proposed controls, it is considered that the potential for NRMM emissions within the Proposed Development Site to result in air quality impacts on local human health and ecological receptors is considered **negligible** with reference to the IAQM/EPUK screening criterion. The effect of NRMM

emissions on all receptors near to the Proposed PCC Site is therefore considered to be **not significant**.

8.6.2 OPERATION

Process emissions from the operational CCP

8.6.2.1. The impact of point source emissions from the CCP at human health receptors has been determined from isopleth figures of pollutant dispersion and maximum model outputs at discrete receptor locations. The maximum hourly, daily and annual mean predicted concentrations have been compared with the relevant AQAL, as summarised in Tables 8.14 – 8.16.

8.6.2.2. The results have been presented at the maximum receptor location (worst case receptor) in Table 8.14 from the operation of the Proposed Development.

8.6.2.3. Further information on the detailed concentrations at all identified receptor locations are provided in **Appendix 8B** (EIA Report Volume 4, Table 13 – Table 21) and **Appendix 8C** (EIA Report Volume 4, Table 5 - Table 8).

8.6.2.4. Isopleth figures showing the maximum predicted annual and short-term process contributions of NO_2 are provided in **Figures 8.5 – 8.12** (EIA Report Volume 3) for both the single absorber and twin absorber scenarios.

8.6.2.5. The dispersion modelling includes several conservative assumptions in combination, including:

- The operational Proposed Development has been assumed to operate on a continuous basis i.e. for 8,760 hour per year, although in practice the plant is likely to operate in dispatchable (intermittent) mode;
- The modelling predictions are based on the use of five full years of meteorological data from Inverbervie meteorological station for the years 2016 to 2020 inclusive, with the highest result being reported for all years assessed;
- The assessment has considered the options of a single large absorber and a twin absorber design offered by one licensor. The worst-case results of these two options has been reported in this assessment;
- For the single large absorber option, the stack has been assessed as being potentially located in each of the four extents of the CCP area, and the worst-case receptor results reported;
- The largest possible building sizes have been included in the assessment; therefore, the stack height represents the lowest required to achieve the impacts presented in this assessment based on those building dimensions;
- Emission concentrations for the process are calculated based on the use of IED limits, BAT-AEL concentrations, or maximum envisaged emission rates from licensors; in practice annual average rates would be below this to enable continued compliance with PPC Permit requirements (Scottish Government, 2012); and
- Conservative estimates of background concentrations for the commencement of operation at the receptor locations.

8.6.2.6. The methodology, conservative assumptions, assessment uncertainties and the full results of the assessment of N-amines is provided in **Appendix 8C** (EIA Report Volume 4).

Table 8-13: Results of operational impact assessment for human health impacts – maximum receptor location

Pollutant	Measured as	AQAL (µg/m^3)	PC (µg/m^3)	PC/ AQAL %	BC (µg/m^3)	PEC (µg/m^3)	PEC/ AQAL %	Significance of effect
NO_2	Hourly mean (as the 99.79th percentile)	200	21.0	11%	38.6	59.6	30%	Negligible adverse (**not significant**)
	Annual mean	40	1.7	4%	19.3	21.0	53%	Negligible adverse (**not significant**)
CO	Hourly mean (as the 100th percentile)	30,000	216	1%	127	343	1%	Negligible adverse (**not significant**)
	8-hour rolling average	10,000	126	1%	127	253	3%	Negligible adverse (**not significant**)
NH_3	Hourly mean (as the 100th percentile)	2,500	6.5	0.3%	3.1	9.5	<1%	Negligible adverse (**not significant**)
	Annual mean	180	0.2	0.1%	1.5	1.8	1%	Negligible adverse (**not significant**)
Amines (as MEA)	Hourly mean (as the 100th percentile)	400	5.3	1%	-	5.3	1%	Negligible adverse (**not significant**)
	Daily mean	100	4.1	4%	-	4.1	4%	Negligible adverse (**not significant**)
N-amines	Annual mean (direct release)	0.2ng/m^3	0.06ng/m^3	31%	-	0.06ng/m^3	31%	Moderate adverse (**potentially significant**)
	Annual mean (in-direct release screening assessment)		0.08ng/m^3	49%	-	0.08ng/m^3	49%	Moderate adverse (**potentially significant**)

Pollutant	Measured as	AQAL (µg/m^3)	PC (µg/m^3)	PC/ AQAL %	BC (µg/m^3)	PEC (µg/m^3)	PEC/ AQAL %	Significance of effect
	Annual mean (in-direct release ADMS Chemistry MEA Results)		0.02ng/m^3	9%	-	0.02ng/m^3	9%	Minor adverse (**not significant**)
	Annual mean (in-direct release ADMS Chemistry DMA Results)		0.06ng/m^3	29%	-	0.06ng/m^3	29%	Moderate adverse (**potentially significant**)
Acetaldehyde	Hourly mean (as the 100th percentile)	9,200	11.4	0.1%	-	11.4	0.1%	Negligible adverse (**not significant**)
	Annual mean	370	0.4	0.1%	-	0.4	0.1%	Negligible adverse (**not significant**)
Formaldehyde	Hourly mean (as the 100th percentile)	100	4.3	4%	-	4.3	4%	Negligible adverse (**not significant**)
	Annual mean	5	0.1	3%	-	0.1	3%	Negligible adverse **(not significant)**
Ketones	Hourly mean (as the 100th percentile)	89,500	11.4	0.01%	-	11.4	0.01%	Negligible adverse (**not significant**)
	Annual mean	6,000	0.4	0.01%	-	0.4	0.01%	Negligible adverse (**not significant**)

C = Process Contribution, AQAL = Air Quality Assessment Level, BC = Background Concentration, PEC = Predicted Environmental Concentration

8.6.2.7. The impacts of all but one pollutant species released from the operational Proposed Development are predicted to result in negligible adverse effects at all receptors within the study area, at the receptor receiving the maximum impact. The impacts of NO_2, CO, NH_3, amines, acetaldehyde and formaldehyde can therefore be considered to be **not significant** at all human health receptors.

8.6.2.8. As stated previously, at this stage in the design process, information on the potential for higher short term emissions during start-up is not available. However, it should be noted that the predicted effects of short-term emissions when assessed against long term average emissions are well below the criteria to show insignificance against the short term AQAL, so in the event that start-up emissions are higher, there is significant headroom in the assessment before significant effects would be realised.

8.6.2.9. The only pollutant species that has not be determined to have a negligible adverse effect is the direct and in-direct emissions of N-amines, which is shown to be a moderate adverse effect, and therefore may potentially be significant.

8.6.2.10. The screening assessment results indicate that PCs at all the receptor locations are well within the AQAL for NDMA, with the worst-case receptor predicted to experience impacts that are 31% of the AQAL for direct amine releases and 49% for indirect releases (totalling a maximum of 80% of the AQAL). This is therefore over the Scottish Environment Protection Agency's screening criteria of 70% of the AQAL to determine insignificance. Although over the screening criteria, it should be noted that these results are based on a screening assessment of indirect N-amine impacts only, and further detail and assessment of the effects of amine degradation products are carried out and discussed in **Appendix 8C** (EIA Report Volume 4). The more detailed assessment of degradation products using the ADMS amines chemistry module shows that the indirect emissions of N-amines from the Proposed Development are predicted to be 9% for MEA and 29% for DMA of the proposed Environment Agency EAL for N-amines at the maximum human health receptors (Tables 7 and 8 **Appendix 8C** EIA Report Volume 4). In-combination with the direct emissions this would be 40% or 60% of the AQAL respectively. As this is below 70% of the proposed AQAL for NDMA, and results at all other receptors are lower, it is considered that the impacts are **not significant**.

8.6.2.11. The impact of point source emissions at ecological receptors has been determined from isopleth figures of pollutant dispersion and maximum model output at the discrete receptor locations. The maximum daily and annual mean predicted concentrations have been compared with the relevant AQAL, as summarised in Table 8.16. The full results for each receptor are provided in **Appendix 8B** (EIA Report Volume 4) with depositional impacts also being presented.

Table 8-14: Results of operational impact assessment for worst-case ecological receptor

Pollutant	Worst case receptor	Measured as	AQAL (µg/m^3)	PC (µg/m^3)	PC/ AQAL %	BC (µg/m^3)	PEC (µg/m^3)	PEC/ AQAL %	Significance of effect
NOx	OE1 - Buchan Ness to Collieston Coast SPA	Daily mean	75	45.1	60%	14.6	59.7	80%	Major adverse (potentially **significant** effects, but considered unlikely – see paragraphs 8.6.2.12 – 8.6.2.13)
		Annual mean	30	2.5	8%	9.8	12.3	41%	Moderate adverse (**not significant**)
Ammonia		Annual mean	3	0.22	7%	1.2	1.5	48%	Moderate adverse (**not significant**)

C = Process Contribution, AQAL = Air Quality Assessment Level, BC = Background Concentration, PEC = Predicted Environmental Concentration

8.6.2.12. The closest ecological receptor to the Proposed Development, and the one for which impacts of NOx are highest, is OE1 – Buchan Ness to Collieston Coast SPA. The impacts of daily NOx at this receptor is defined as having a major magnitude of impact, according to the significance criteria employed for the assessment. The PEC (59.7µg/m^3) indicates that an exceedance of the daily critical level (75µg/m^3) is very unlikely, with impacts at 80% of the critical level.

8.6.2.13. As explained in the Statement to Inform Habitats Regulations Appraisal (**Appendix 11F** EIA Report Volume 4), this SPA is not vulnerable to NOx, largely because the part adjacent to the Proposed Development comprises marine habitat (rather than terrestrial vegetation, which could be affected by NOx). Further afield (1km or more from the emission stacks) the SPA consists of cliffs/ islands with nesting seabirds, where the overwhelming nitrogen input and effect on vegetation is from the birds themselves. Consequently, the nearest potentially sensitive ecological receptor to atmospheric NOx is considered to be OE2 (comprising the overlapping Buchan Ness to Collieston SAC and Bullers of Buchan SSSI).

8.6.2.14. The PC of daily NOx at OE2 is 27.7µg/m^3, which represents 37% of the daily critical level, which according to the significance criteria represents a medium magnitude of change, representing a moderate impact. The PEC, (35.8µg/m^3) indicates that an exceedance of the daily critical level (75µg/m^3) is very unlikely, with impacts at 48% of the critical level.

8.6.2.15. Annual average impacts of NO_x at the worst-affected receptor (OE1 - Buchan Ness to Collieston Coast SPA) are considered to be moderate adverse in accordance with the IQMA screening criteria, however when considered together with the existing background concentration the PEC represents 41% of the AQAL, and therefore is considered to be well below the AQAL. In terms of the SEPA screening criteria, the PEC is less than 70% of the AQAL, and therefore it is considered that the effects are **not significant**.

8.6.2.16. The annual mean NH_3 impacts at the worst-affected ecological receptor (E1 - Buchan Ness to Collieston Coast SPA) represent 7% of the relevant critical level and therefore represent a moderate magnitude of impact. However, again, together with the background concentrations it represents 48% of the AQAL, and therefore is considered to be well below the AQAL (and less than the SEPA screening criteria of 70%). Annual mean NH_3 impacts at more distant ecological receptors are lower still. As such, effects are considered to be **not significant**.

8.6.3 DECOMMISSIONING

8.6.3.1. The predicted air quality effects of eventual decommissioning of the Proposed Development are considered to be comparable to, or less than, those assessed for construction activities i.e. **not significant**. This is based upon the assumption that groundwork, traffic movements and site work likely to be required to decommission the Proposed Development would be less than that required for its construction. Appropriate best practice mitigation measures will be applied during any decommissioning works and documented in a DEMP; no additional mitigation for decommissioning of the Proposed Development beyond such best practice is considered necessary at this stage

8.7. MITIGATION, MONITORING AND ENHANCEMENT

8.7.1 OVERVIEW

8.7.1.1. The management of construction phase emissions, including dust and particulates, and the application of adequate mitigation measures will be enforced through the CEMP, as detailed in

Section 8.5, and through the application of appropriate mitigation according to the risk of dust emissions from Proposed Development Site activities as identified in this assessment.

8.7.1.2. The environmental effects from construction traffic associated with the Proposed Development have been identified as not significant, therefore no specific additional mitigation has been identified as necessary for the construction phase of the Proposed Development, other than the measures outlined in Sections 8.5 and 8.7 of this Chapter.

8.7.1.3. The air quality assessment of operational impacts has assumed that the BAT-AELs will be met for the operational plant as required under the IED and in accordance with use of BAT under the PPC regime. The environmental effects from operation of the Proposed Development have been identified as **not significant** at all human health receptors for the operation of the Proposed Development for all pollutant species.

8.7.1.4. Detailed modelling of predicted impacts at ecological receptors indicates that potential effects at ecological receptors because of the operation of the Proposed Development are largely insignificant, except for the daily NOx impacts at the E1 receptor. Further assessment of the predicted effects at ecological receptors and the determination of the significance of these effects has therefore be assessed further in **Chapter 11: Biodiversity and Nature Conservation** (EIA Report Volume 2) and in the **Appendix 11F** (EIA Report Volume 4).

8.7.1.5. No specific additional mitigation has been identified as necessary for the operation or decommissioning phases of the Proposed Development other than the embedded mitigation measured outlined in Section 8.5 Development Design and Impact Avoidance.

8.7.1.6. The measures proposed to avoid and reduce, where possible, significant adverse effects on the environment are set out in Section 8.5. The monitoring strategies to track the delivery and success of design elements and proposed mitigation for construction phases are set out in the **Appendix 5A** (EIA Report Volume 4).

8.7.1.7. Monitoring strategies for the operational plant will be enshrined within the PPC Permit and are likely to require continuous monitoring of key pollutant emissions from stack(s), with annual reporting of results to the Scottish Environmental Protection Agency and annual independent validation of the monitoring results.

8.8. CUMULATIVE EFFECTS

8.8.1 CUMULATIVE EFFECTS

8.8.1.1. An assessment of cumulative impacts with other proposed developments that could interact with the impacts and effects of this Proposed Development have been assessed within **Appendix 8B** (EIA Report Volume 4) and summarised in **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4). The impact of cumulative operational emissions on nutrient nitrogen deposition for relevant habitats is considered in the **Appendix 11F** (EIA Report Volume 4).

8.9. LIMITATIONS OR DIFFICULTIES

8.9.1 OVERVIEW

8.9.1.1. Until the preferred technology provider is selected, there will be some degree of uncertainty in the operational emissions used in the assessment. Therefore, to minimise the likelihood of

under-estimating the predicted impacts for the operational emissions, several conservative assumptions have been made in the assessment. The conservative assumptions used in the assessment are detailed in **Appendix 8B** (EIA Report Volume 4).

8.9.1.2. There is also uncertainty associated with any modelling assessment, due to the inherent uncertainty of the dispersion modelling process itself. Nevertheless, the use of dispersion modelling is a widely applied and accepted approach for the prediction of impacts from industrial and transport sources.

8.10. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

8.10.1 CONSTRUCTION AND DECOMMISSIONING

8.10.1.1. The air quality assessment of construction impacts assumes that the measures outlined within Section 8.6 of this Chapter would be incorporated into the control of construction of the Proposed Development, as they are standard best practice measures that are routinely applied across UK construction sites. No additional mitigation has been identified as necessary for the construction phase of the Proposed Development. For this reason, the residual effects would be as reported within Section 8.6 of this Chapter (i.e. **not significant**).

8.10.1.2. Consistent with construction mitigation, it has been assumed that relevant best practice mitigation measures would be in place during any decommissioning works. No additional mitigation has been identified as necessary for the decommissioning phase of the Proposed Development.

8.10.2 OPERATION

8.10.2.1. The air quality assessment of impacts at opening has assumed that the BAT-AEL will be met for the operational plant as required and in accordance with use of BAT under the PPC permitting regime. For this reason, the residual effects would be as reported within the Mitigation and Enhancement Measures Section of this chapter (Section 8.7).

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SSE THERMAL

PETERHEAD LOW CARBON CCGT POWER STATION PROJECT

Environmental Impact Assessment Report
Volume 2: Chapter 9 – Noise and Vibration

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CONTENTS

TABLES

9. Noise and Vibration

9.1. INTRODUCTION

9.1.1 INTRODUCTION

9.1.1.1. This chapter of the Environmental Impact Assessment Report (EIA Report) addresses the potential noise and vibration effects resulting from the Proposed Development on local noise and vibration sensitive receptors.

9.1.1.2. Impacts during the construction, operation (including maintenance) and decommissioning of the Proposed Development are assessed. In particular, the assessment considers:

- Existing and future baseline sound conditions at Noise Sensitive Receptors (NSRs) in the vicinity;
- Effects of construction of the Proposed Development on NSRs during the site clearance and construction works including predicted changes in road traffic noise levels on the local road network;
- Effects of noise and vibration resulting from operation of the Proposed Development at sensitive receptors; and
- Effects of noise and vibration resulting from decommissioning of the Proposed Development at sensitive receptors.

9.1.1.3. This chapter is supported by **Figure 9.1 – 9.4C** (EIA Report Volume 3), **Appendix 9A: Construction Noise Assessment** and **Appendix 9B: Sound Monitoring and Operational Noise** (EIA Report Volume 4).

9.1.1.4. This chapter assesses the impacts of noise and vibration on residential and other human receptors. The assessment of noise impacts on relevant ecological receptors is presented in **Chapter 11: Biodiversity and Nature Conservation** (EIA Report Volume 2). The assessment of noise and vibration impacts on relevant cultural receptors is presented in **Chapter 16: Cultural Heritage** (EIA Report Volume 2).

9.2. LEGISLATION, PLANNING POLICY AND GUIDANCE

9.2.1 INTRODUCTION

9.2.1.1. This section discusses the legislation, planning policy context and standards relevant to assessing the impacts and effects of noise on residential and other human receptors. The legislation, planning policy context and standards applicable to assessment of noise and vibration impacts and effects on the relevant ecological and cultural receptors are discussed respectively in **Chapter 11** and **Chapter 16** (EIA Report Volume 2).

9.2.2 LEGISLATION

Environmental Protection Act 1990

9.2.2.1. The Environmental Protection Act (EPA) 1990 Part 3 identifies that noise (and vibration) emitted from premises (including land) can, at certain levels, be prejudicial to health or give rise to statutory nuisance.

9.2.2.2. Local Authorities are required to investigate any public complaints of noise and if they are satisfied that a statutory nuisance exists, or is likely to occur or recur, they must serve a noise abatement notice. A notice is served on the person responsible for the nuisance. It requires either the abatement of the nuisance; or works to abate the nuisance to be carried out; or it prohibits or restricts the activity. Contravention of a notice without reasonable excuse is an offence. A right of appeal to the Sheriff Court exists within 21 days of the service of a noise abatement notice.

9.2.2.3. No statutory noise limits exist for determining a nuisance; therefore, the Local Authority can take account of various guidance documents and existing case law when investigating complaints. Lower noise level limits are generally applied when considering the acceptability of a planning permission than those which would be used when considering whether an existing noise source amounts to a statutory nuisance. Demonstrating the use of best practicable means (BPM) to minimise noise levels is an accepted defence against a noise abatement notice.

Control of Pollution Act 1974

9.2.2.4. The Control of Pollution Act 1974 (CoPA) requires that BPM (as defined in Section 72 of CoPA) are adopted to control construction noise on any given site as far as reasonably practicable. Sections 60 and 61 of the CoPA provide the main legislation regarding enabling works and construction site noise and vibration. If noise complaints are received, a Section 60 notice may be issued by Aberdeenshire Council with instructions to cease work until specific conditions to reduce noise have been adopted.

9.2.2.5. Section 61 of the CoPA provides a means to apply for prior consent to carry out noise generating activities during construction. Once prior consent has been agreed under Section 61, a Section 60 notice cannot be served provided the agreed conditions are maintained on-site.

9.2.2.6. Whilst construction noise and vibration are factors which can be considered during the planning process, Local Authorities have alternative powers under Sections 60 and 61 of CoPA to regulate these issues if complaints arise.

9.2.1 PLANNING POLICY CONTEXT

Planning Advice Note 1/ 2011 Planning and Noise

9.2.1.1. Current national guidance on noise is contained in Planning Advice Note (PAN) 1/2011 Planning and Noise (The Scottish Government, 2011a). In para 2 PAN 1/2011 states that it "*promotes the principles of good acoustic design and a sensitive approach to the location of new development. It promotes the appropriate location of new potentially noisy development, and a pragmatic approach to the location of new development within the vicinity of existing noise generating uses, to ensure that quality of life is not unreasonably affected and that new development continues to support sustainable economic growth.*"

9.2.1.2. Para 3 of PAN 1/2011 states "The Environmental Noise (Scotland) Regulations 2006 transposed the European Directive 2002/49/EC (the Environmental Noise Directive) into Scottish law… They require Scottish Ministers and airport authorities to manage noise through a process of strategic noise mapping and noise action plans. In the areas affected by the Regulations, planning authorities have a role in helping to prevent and limit the adverse effects of environmental noise." There are no Noise Action Plans in proximity to the Proposed Development site.

9.2.1.3. A Technical Advice Note (TAN 2011) (The Scottish Government, 2011b) accompanies PAN 1/2011 and provides technical guidance on noise assessment.

9.2.1.4. Para 3.20 of TAN 2011 states *"In deciding if a significant impact occurs in regard to the assessment of industrial noise, or noise of an industrial nature, using the methodology of BS 4142 (where appropriate); the Scottish Government consider impacts are normally not significant (in a quantitative sense only) the difference between the Rating and background noise levels is less than 5 dB(A), and that usually the threshold of minor significant impacts is when the difference between the Rating and background noise levels is at least 5 dB(A); and commonly do not become sufficiently significant to warrant mitigation until the difference between the Rating and background noise levels is more than 10 dB(A)."*

Aberdeenshire Local Development Plan 2017

9.2.1.5. The Aberdeenshire Council 2017 Local Development Plan (Aberdeenshire Council, 2017) doesn't specifically reference noise. However, policy P4 states "*We will refuse development if there is a risk that it could cause significant pollution, create a significant nuisance, or present an unacceptable danger to the public or the environment*." Noise is a pollutant at risk of causing a nuisance if not controlled adequately, therefore this policy is applicable to this assessment. Furthermore, the Aberdeenshire Council 2020 Proposed Local Development Plan (PLDP) (Aberdeenshire Council, 2020) was submitted to the Directorate of Planning and Environmental Appeals (DPEA) for examination in March 2021 and is anticipated to be adopted in late 2021/ early 2022. Policy P4 of the PLDP states "*We will refuse development, even infill development, if there is a risk that it could cause significant pollution, create a significant nuisance (for example through impacts on air quality or noise), or present an unacceptable danger to the public or the environment*."

Aberdeenshire Council Noise Guidance for New Developments

9.2.1.6. Aberdeenshire Council have produced a Submission Guidance Note (SGN2) (Aberdeenshire Council, 2016) on the "Information Required for an Assessment of the Noise Impact of Proposed New Developments to be Undertaken in Connection with a Planning Application". The SGN2 includes methodologies for assessment and target noise levels for common noise sources. Table 2 in the SGN2 shows how the magnitude of noise impact can be determined following guidance from PAN 1/2011 (reproduced below in Table 9-1). For industrial or commercial noise a target level is determined using methodology from BS 4142 (*Rating Level* (L_{Ar}) – *Background Sound Level* (L_{A90}) < 5 dB). Road traffic target noise levels are based upon absolute external (daytime) and internal (night-time) noise levels. The target levels are then subtracted from the predicted level for the respective noise source and assigned a descriptive magnitude of impact.

Table 9-1: Describing the Magnitude of Noise Impact (reproduced from Aberdeenshire Council SGN2)

Noise Sources	Target Levels	Change in Noise Level (predicted or existing noise minus target)	Magnitude of Impact
Road Traffic	External Day time: $L_{Aeq,\ 16\ hours}$ = 50 dB Internal Night-time: $L_{Aeq,\ 8\ hours}$ = 30 dB	>5	Major Adverse
		≤5 but ≥3	Moderate Adverse
		≤3 but ≥1	Minor Adverse
		<1 but ≥0	Negligible Adverse
		0	No Change
Industrial or Commercial Noise	Rating Level (L_{Ar}) – Background Sound Level (L_{A90}) < 5 dB	>10	Major Adverse
		≤10 but ≥5	Moderate Adverse
		≤5 but ≥3	Minor Adverse
		<3 but ≥0	Negligible Adverse
		0	No Change

9.2.1 STANDARDS AND OTHER GUIDANCE

9.2.1.1. The noise and vibration assessment has been carried out in accordance with the following standards and guidance.

Guidelines for Environmental Noise Impact Assessment

9.2.1.2. The 'Guidelines for Environmental Noise Impact Assessment' (Institute of Environmental Management & Assessment, 2014) provide formal guidance on the process for undertaking noise impact assessments to allow for greater transparency and consistency between assessments.

British Standard 7445-1:2003 and 7445-2:1991

9.2.1.3. BS 7445 'Description and measurement of environmental noise' (BSI, 1991 and 2003) defines parameters, procedures and instrumentation required for noise measurement and analysis.

British Standard 5228:2009+A1:2014

9.2.1.4. BS 5228-1 'Code of practice for noise and vibration control on construction and open sites – Noise' (BSI, 2014a) provides a 'best practice' guide for noise control and includes sound power level (L_w) data for individual plant as well as a calculation method for noise from construction activities. BS 5228-2 'Code of practice for noise and vibration control on construction and open sites – Vibration' (BSI, 2014b) provides comparable 'best practice' for vibration control, including guidance on the human response to vibration.

British Standard 6472:2008

9.2.1.5. BS 6472-1 'Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting' (BSI, 2008), presents recommended frequency weighted vibration spectra (for continuous vibration) and vibration dose values (VDV) (for intermittent vibration), above which adverse comment is likely to occur in residential properties.

British Standard 7385:1993

9.2.1.6. BS 7385-2 'Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration' (BSI, 1993) presents guide values for transient and continuous vibration, above which there is a likelihood of cosmetic damage. The standard establishes the basic principles for carrying out vibration measurements and processing the data, with regard to evaluating vibration effects on buildings.

British Standard 4142:2014 + A1:2019

9.2.1.7. BS 4142 'Methods for rating and assessing industrial and commercial sound' (BSI, 2019) can be used for assessing the effect of noise of an industrial nature, including mechanical services plant noise. The method compares the difference between '*rating level*' of the industrial sound, with the '*background sound level*' at the receptor position.

British Standard 8233:2014

9.2.1.8. BS 8233 'Guidance on sound insulation and noise reduction for buildings' (BSI, 2014c) defines criteria for noise levels in and around buildings.

International Organization for Standardization (ISO) 4866:2010

9.2.1.9. ISO 4866:2010 'Mechanical Vibration and Shock – Vibration of Fixed Structures – Guidelines for the Measurement of Vibrations and Evaluation of Their Effects on Structures' (ISO, 2010) establishes the principles for carrying out vibration measurement and processing data with regard to evaluating vibration effects on structures.

ISO 9613-2:1996

9.2.1.10. ISO 9613-2:1996 'Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation' (ISO, 1996) specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources.

Calculation of Road Traffic Noise

9.2.1.11. Department for Transport (DfT)/ Welsh Office Memorandum 'Calculation of Road Traffic Noise' (CRTN) (DfT/Welsh Office, 1988) describes procedures for traffic noise calculation and measurement and is suitable for environmental assessments of schemes where road traffic noise may have an effect.

Design Manual for Road and Bridges (2020)

9.2.1.12. The Highways England 'Design Manual for Road and Bridges LA 111 (Revision 2) Noise and Vibration' (DMRB) (Highways England, 2020) provides guidance on the appropriate approach to be taken when assessing the noise and vibration effects arising from all road projects, including new construction, improvements and maintenance. The guidance is also useful for assessing changes in traffic noise levels because of non-road projects such as this.

World Health Organization

9.2.1.13. The World Health Organization's (WHO) 'Environmental Noise Guidelines for the European Region' (WHO, 2018) provides recommendations to protect human health from noise from transportation, wind turbines and leisure. These guidelines do not cover industrial noise, however, recommend that 'Guidelines for Community Noise' (WHO, 1999) should remain valid.

This recommends external daytime and evening environmental noise limits, and internal night-time limits to avoid sleep disturbance.

9.2.1.14. The WHO 'Night Noise Guidelines for Europe' (WHO, 2009) recommend updated guidelines on night-time noise limits to avoid sleep disturbance.

Association of Noise Consultants

9.2.1.15. 'Measurement and assessment of groundborne noise and vibration'. 3rd ed (Association of Noise Consultants, 2020) describes several published guidelines for assessing impacts of groundborne noise. This includes guidelines published by the American Public Transit Association suggesting a criterion of 35 dB L_{Amax} for ground-borne noise affecting residential properties, during the day or night.

SEPA Guidance

9.2.1.16. The Scottish Environment Protection Agency's (SEPA) 'Guidance on the Control of Noise at PPC Installations' has been replaced with 'Noise and vibration management: environmental permits' ("2021 SEPA Guidance") which was produced by the Environment Agency (EA), SEPA, Natural Resources Wales and Northern Ireland Environment Agency in July 2021.

9.2.1.17. As set out in the 2021 SEPA Guidance, *"operators must prevent significant pollution and also comply with the requirements to use 'appropriate measures' (Waste Framework Directive 2018/851) or 'best available techniques' (BAT) to prevent or minimise noise pollution"*. The guidance also states that *"a noise control method is more likely to be appropriate:*

- *for pollution where there are numerous receptors*
- *where there is significant pollution*
- *where the noise control method significantly reduces the noise pollution"*

9.2.1.18. In assessing the noise impact of an industrial site, the 2021 SEPA Guidance refers to the use of 'BS 4142 Methods for rating and assessing industrial and commercial sound' (BSI, 2019).

9.2.1.19. The 2021 SEPA Guidance states that the site operators must detail the actions to be carried out to meet BAT (if required) based on the noise impact assessment and provide details of timescales for implementing such actions.

9.3. ASSESSMENT METHODOLOGY

9.3.1 INTRODUCTION

9.3.1.1. Details of the methodologies employed in this assessment are provided within **Appendix 9A** and **Appendix 9B** (EIA Report Volume 4). These technical appendices provide detailed descriptions of the sensitive human receptors and the methodology for assessing the impacts of construction and operational noise emissions of the Proposed Development.

9.3.2 CONSULTATION

9.3.2.1. The consultation undertaken with statutory consultees to inform this chapter, including a summary of comments raised via the formal scoping opinion **(Appendix 1B** EIA Report Volume 4) and in response to the formal consultation and other pre-application engagement is summarised in Table 9.2.

Table 9-2: Consultation summary table

Consultee approached	Date and nature of consultation	Summary of comments	Summary of response
Aberdeenshire Council	Scoping opinion 13/07/2021	Encourage continued engagement with environmental health officer. Agree with methodology. It is acknowledged that there would be likely significant effects during both the construction and operational phases of the proposed development owing to various on-site activities. Mitigation to be embedded into the proposal, including the implementation of a Construction Method Statement (CMS) to detail best practice methods for reducing noise and vibration impacts during the construction phase, and noise emission limiting of plant during the operational phase. Any specific measures required should be included within the EIAR table of mitigation for clarity.	An assessment of potential sound emissions from the Proposed Development has been conducted based on the methodology provided in BS4142:2014 + A1:2019. In addition, predicted future (with Proposed Development) ambient sound levels at nearby NSRs have been compared against existing ambient sound levels at NSRs.
SEPA	Email 21/06/2021	Comments and advice provided on methodologies for assessments of air quality, noise, water environment, flood risk and water abstraction. SEPA *"note that a noise assessment will be undertaken, and we welcome the developer's intent to provide SEPA with a method statement outlining the proposed approach prior to the works being undertaken. We would welcome a design that will not lead to any increase in rated ambient sound levels"*.	

Consultee approached	Date and nature of consultation	Summary of comments	Summary of response
Aberdeenshire Council	Further consultation on assessment outcome – Email 22/12/2021	Further contact with Aberdeenshire Council Environmental Health Department was made to discuss the findings of the assessment and to obtain any further feedback. The Council acknowledged that SEPA are the lead regulator and agreed with SEPA's comment on acceptable ambient sound levels with operation of the Proposed Development (as above). The Council requested consideration of the operation frequency of the existing power station in operational noise assessment undertaken. The Council also highlighted that the current live and recent planning applications for noise generating electricity infrastructure in and around the Buckie Farm area may impact on cumulative noise assessments. The relevant planning applications the Council pointed are the following: • APP/2019/0982 (Substation upgrade) • APP/2021/2392 (Synchronous condensers) • APP/2021/2681 (HVDC Converter station)	The existing power station provides peak demand electricity supply, therefore operates as an when required by the wider power network conditions. Hence, the existing power station operates intermittently. Ambient sound level comparison undertaken as part of the operational noise assessment considered periods when the existing power station is in operation and when it is not operational. The potential cumulative impacts from operation of other proposed developments in and around the Buckie Farm area have been considered as part of the cumulative assessments undertaken presented in **Section 9.8** of this Chapter.

9.3.3 STUDY AREA

9.3.3.1. The extent of the study area has been defined to include the NSRs in each direction from the Proposed Development. Study areas have also been informed by changes in road traffic flows predicted during the construction phase of the Proposed Development and potential impacts on ecological and cultural receptors. A description of the study areas for ecological and cultural heritage receptors are presented in **Chapter 11: Biodiversity and Nature Conservation** (EIA Report Volume 2) and in **Chapter 16: Cultural Heritage** (EIA Report Volume 2), respectively.

9.3.3.2. The location of potential NSRs in proximity to the Proposed Development Site boundary has been considered when assessing the effects associated with noise and vibration levels from the construction, operational and decommissioning phases of the Proposed Development.

9.3.3.3. Key NSR locations, representative of the nearest and potentially most sensitive existing receptors to the Proposed Development, have been identified. It is considered that if noise and vibration levels are suitably controlled at the key receptors identified, then noise and vibration levels will be suitably controlled at other sensitive receptors in the surrounding area. The NSRs are shown in Table 9-3 and illustrated on **Figure 9.1** (EIA Report Volume 3).

Table 9-3: Potential noise sensitive receptors

NSR	Sensitivity of receptors	Direction from Proposed Development Site	Approximate Distance from Proposed Development Site(m)*	Approximate Distance from nearest proposed construction works (m)
R1 – 12 Laird's Walk (residential)	High	South-east	595	230
R2 – 54 Claymore Crescent (residential)	High	South-east	445	145
R3 – The Old Manse (residential)	High	South	410	175
R4 – Millbank Cottage (residential)	High	South-west	385	210
R5 – Gateside (residential)	High	South-west	795	550
R6 – Newton of Sandford (residential)**	High	West	420	250
R7 – Bevailey (residential)	High	West	325	150
R8 – Sandford Bungalow (residential)	High	North-west	470	35
R9 – Newmill of Sandford (residential)	High	North-west	520	70

NSR	Sensitivity of receptors	Direction from Proposed Development Site	Approximate Distance from Proposed Development Site(m)*	Approximate Distance from nearest proposed construction works (m)

* Distance from the closest point to the Proposed CCGT and CCP area reported.
** R6 - Newton of Sandford Cottage which was considered in the scoping stage has been demolished as part of the 400kV substation works in August 2021, hence scoped out of this assessment.

9.3.4 IMPACT ASSESSMENT METHODOLOGY

Assessment of construction and decommissioning noise

9.3.4.1. At this stage in the project design development, before the appointment of a construction contractor, site specific details regarding the construction activities, programme and numbers and types of construction plant are unavailable. Nevertheless, indicative construction noise predictions have been undertaken using the calculation methods set out in BS 5228 (BSI, 2014a), based upon construction information from other SSE power station development projects. In addition, indicative calculations have been undertaken for works associated with the Electrical Connection Corridors.

9.3.4.2. The calculation method provided in BS 5228 takes account of factors including the number and types of equipment operating, their associated sound power levels (L_w), their modes of operation (% on-times within the working period), the distance to NSR, and the effects of any intervening ground cover or barrier/topographical screening. This allows prediction of the magnitude of impact.

9.3.4.3. The subsequent assessment of construction noise effects at residential NSRs considers the guidance in 'example method 1 – the ABC method' as defined in BS 5228. Table 9-4 (reproduced from BS 5228-1) provides guidance in terms of appropriate threshold values for residential NSRs, based upon existing ambient noise levels.

Table 9-4: Construction noise threshold values at residential dwellings

Assessment category and threshold value period	Threshold value $L_{Aeq,\,T}$ dB – free-field		
	Category A (a)	Category B (b)	Category C (c)
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Evenings and weekends (d)	55	60	65
Night-time (23:00 – 07:00)	45	50	55

Assessment category and threshold value period	Threshold value $L_{Aeq,T}$ dB – free-field		
	Category A (a)	Category B (b)	Category C (c)

NOTE 1: A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

NOTE 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.

NOTE 3: Applies to residential receptors only.

(a) Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

(b) Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A value.

(c) Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values.

(d) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays, 07:00 – 23:00 Sundays.

9.3.4.4. For the appropriate period (day, evening, night, weekend etc.), the ambient noise level is determined and rounded to the nearest 5 dB and the appropriate threshold value is then derived. The predicted construction noise level is then compared with this noise threshold value.

9.3.4.5. Based upon the BS 5228 ABC method, the criterion adopted in this assessment for the determination of potentially significant effects is the exceedance of the $L_{Aeq,T}$ threshold level for the category appropriate to the ambient noise level at each NSR. As stated in BS 5228, other project-specific factors, such as the number of NSRs affected and the duration and character of the impact, should also be considered by the assessor when determining if there is a potentially significant effect.

9.3.4.6. Based upon the above, the magnitude of the impact of construction noise is classified in accordance with the descriptors in Table 9-5.

Table 9-5: Magnitude of construction noise impacts

Magnitude of impact	Comparison with threshold value $L_{Aeq,T}$ dB
High	Exceedance of ABC Threshold Value by ≥+5 dB
Medium	Exceedance of ABC Threshold Value by up to +5 dB
Low	Equal to or below the ABC Threshold Value by up to 5 dB
Very low	Below the ABC Threshold Value by ≥-5 dB

Assessment of construction traffic on public roads

9.3.4.7. As described in Chapter 4: The Proposed Development (EIA Report Volume 2), subject to the necessary consents being granted, the construction of the Proposed Development would start as early as Quarter 4 2023, and would reach a peak in construction activities in 2026. The traffic on local public roads in the vicinity of the Proposed Development is likely to be affected during the construction phase of the Proposed Development. The assessment focuses on the potential noise impacts at NSRs located alongside the local road network during the anticipated peak construction year of 2026.

9.3.4.8. Construction traffic noise has been assessed by considering the increase in traffic flows during the construction works, following the guidance of CRTN (DfT/ Welsh Office, 1988) and DMRB (Highways England, 2020).

9.3.4.9. 18-hour (06:00 – 24:00) Annual Average Weekday Traffic (AAWT) data have been obtained for the year 2026 (the expected peak construction period) 'with' and 'without' construction traffic, to determine if any existing roads are predicted to be subject to a potentially significant change in 18-hour traffic flows. CRTN Basic Noise Level (BNL) calculations have been undertaken to predict the change in noise level between the 'with' and 'without' scenarios.

9.3.4.10. The commonly used criteria for the assessment of traffic noise changes arising from construction works are presented in Table 3.17 of DMRB and are reproduced in Table 9-6 below. These noise level change bands match those set out by Aberdeenshire Council (as reproduced in Table 9-1 above). For the purposes of this EIAR, the Magnitude of Impact descriptors in Table 9-6 (i.e. Very Low, Low, Medium and High) will be used instead of the Magnitude of Impact descriptors in Table 9-1 (i.e. Negligible, Minor, Moderate and Major), for consistency with the terminology used within the impact assessment for other types of noise source in this Chapter.

Table 9-6: Construction traffic noise criteria

Magnitude of impact	Change in traffic noise level $L_{A10,18hr}$ dB
High	≥ 5
Medium	≥3 to <5
Low	≥1 to <3
Very low	<1

9.3.4.11. DMRB advises that an increase in road traffic flows of 25% (where the traffic speed and composition remain consistent) equates to an approximate increase in road traffic noise of 1 dB $L_{A10,18hr}$. A doubling in traffic flow would be required for an approximate increase of 3 dB $L_{A10,18hr}$.

9.3.4.12. The criteria are based on the current guidance on short-term changes in traffic noise levels in DMRB. It is generally accepted that changes in noise levels of 1 dB L_A or less are imperceptible, and changes of 1 to 3 dB L_A are not widely perceptible.

Assessment of construction vibration

Impacts on Humans - Annoyance

9.3.4.13. The transmission of ground-borne vibration is highly dependent on the nature of the intervening ground between the source and receptor and the activities being undertaken. BS 5228-2: 2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites - Vibration' (BSI, 2014b) provides data on measured levels of vibration for various construction works, with particular emphasis on piling. Impacts are considered for both damage to buildings and annoyance to occupiers.

9.3.4.14. Table 9-7 sets out Peak Particle Velocity (PPV) vibration levels and provides a semantic scale for the description of demolition and construction vibration impacts on human receptors, based on guidance contained in BS 5228-2.

Table 9-7: Construction vibration threshold at residential dwellings

Peak Particle Velocity (PPV) level	Description	Magnitude of impact
>= 10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	High
1.0 to < 10 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.	Medium
0.3 to < 1.0 mm/s	Vibration might be just perceptible in residential environments.	Low
0.14 to < 0.3 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Very low

9.3.4.15. Where medium or greater vibration impacts are likely, further consideration of whether an effect is significant is undertaken using professional judgement, taking account of the duration and frequency of the effect, as well as the time of evening/night that the effect would be experienced.

Impacts on buildings

9.3.4.16. In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels are controlled to those relating to annoyance (i.e. 1.0 mm/s), then it is highly unlikely that buildings will be damaged by demolition and construction vibration levels.

9.3.4.17. The criteria used in this assessment relate to the potential for cosmetic damage, not structural damage. The principal concern is generally transient vibration, for example due to piling.

9.3.4.18. BS 7385-2: 1993 'Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration' (BSI, 1993) provides guidance on vibration levels likely to result in cosmetic damage and is referenced in BS 5228-2:2009+A1:2014 (BSI, 2014b). Guide values for transient vibration, above which cosmetic damage could occur, are given in Table 9-8.

Table 9-8: Transient vibration guide values for cosmetic damage

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

NOTE 1: Values referred to are at the base of the building.

NOTE 2: For un-reinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

9.3.4.19. BS 7385-2 (BSI, 1993) states that the probability of building damage tends to zero for transient vibration levels less than 12.5 mm/s PPV. For continuous vibration, such as from vibratory rollers, the threshold is around half this value.

9.3.4.20. It is also noted that these values refer to the likelihood of cosmetic damage. ISO 4866:2010 (ISO, 2010) defines three different categories of building damage:

- cosmetic – formation of hairline cracks in plaster or drywall surfaces and in mortar joints of brick/concrete block constructions;
- minor – formation of large cracks or loosening and falling of plaster or drywall surfaces or cracks through brick/block; and
- major – damage to structural elements, cracks in support columns, loosening of joints, splaying of masonry cracks.

BS 7385-2 (BSI, 1993) defines that minor damage occurs at a vibration level twice that of cosmetic damage and major damage occurs at a vibration twice that of minor damage. Therefore, this guidance can be used to define the magnitude of impact identified in

9.3.4.21. Table 9-9 below.

Table 9-9: Magnitude of impact – construction vibration building damage

Continuous vibration level PPV mm/s	Damage risk	Magnitude of impact
30	Major	High
15	Minor	Medium
6	Cosmetic	Low
<6	Negligible	Very low

9.3.4.22. Vibration-inducing construction activities, namely piling works, are likely to be undertaken within the Proposed Development Site where the proposed structures are located. Given the distance from the Proposed Development Site to residential sensitive receptors (a minimum distance of approximately 325 m), no significant vibration impact (medium or high magnitude) is expected to result from the proposed construction (or demolition) activities and therefore further assessment of construction vibration on nearby sensitive receptors is scoped out.

9.3.4.23. With respect to existing buildings within the Peterhead Power Station site, as the construction of the Proposed Development and the existing buildings are both within the control of the Applicant, any identified issues can be effectively managed by the Applicant and their contractor(s). Potential measures to ensure that appropriate mitigation is in place during the works are discussed in **Section 9.5**.

Assessment of operational noise impacts on humans (NSRs)

9.3.4.24. Due to the design process being at a relatively early stage, the layout of the Proposed Development is not finalised. At the time of writing three indicative layout options are under consideration, see **Figure 4.1, Figure 4.2** and **Figure 4.3** (EIA Report Volume 3). For the purposes of this assessment potential sound emissions from each layout option (each with a number of potential operational scenarios - see para 9.3.4.47 for details) have been studied and the highest noise level results have been used in the assessment of Likely Impacts and Effects to provide a conservative assessment.

9.3.4.25. All three layout options of the current design of the Proposed Development comprise the following sound generating equipment:

- Gas Turbine;
- Heat Recovery Steam Generator (HRSG);
- Steam Turbine;
- Transformer;
- Flue Gas Fans and Ducting;
- Flue Gas Cooling System including Direct Contact Cooler (DCC);
- CO_2 Absorber and associated stack;
- CO_2 stripper;
- CO_2 Compression and Dehydration;
- Raw Water Treatment; and
- Pumps associated with Stripping and Reclaiming, Chemical Storage and Fire Water Tanks.

9.3.4.26. At this stage full details of the sound generating plant items associated with the Proposed Development are not available. Therefore, indicative details have been sourced from previous noise assessments conducted for similar SSE developments in the UK comprising the above sound generating plant and systems. Details of the sound generating plant included in the noise assessment are given in **Appendix 9B** (EIA Report Volume 4). An assessment based on these assumed plant parameters is considered sufficient to enable a conservative assessment of potential significant effects from operation of the Proposed Development, provided that the sound levels and design approach presented (or similar) are adopted in the final design.

9.3.4.27. In line with the guidance provided in TAN 2011 (The Scottish Government, 2011b) and in the SGN2 (Aberdeenshire Council, 2016) a quantitative assessment of potential noise impacts from the above proposed plant has been undertaken following the method set out in BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (BSI, 2019).

9.3.4.28. To inform the quantitative assessment, operational sound levels from the Proposed Development have been predicted at NSRs using a 3D sound propagation model of the Proposed Development and surroundings. The sound propagation model constructed also includes the existing Peterhead Power Station and associated sound emissions to predict future cumulative sound levels from both the existing and Proposed Development sites, alongside prediction of sound levels from the Proposed Development alone. The sound propagation model has been developed using the SoundPLAN (version 8.2) sound modelling software package. SoundPLAN implements the noise prediction method ISO 9613-2: 1996 'Attenuation of sound during propagation outdoors' (ISO, 1996). Details on software settings used are provided in **Appendix 9B** (EIA Report Volume 2).

9.3.4.29. A key aspect of the BS 4142 assessment procedure is a comparison between the *background sound level* in the vicinity of residential locations and the *rating level* of the sound source under consideration. The relevant parameters in this instance are as follows:

- *Background sound level* – $L_{A90,T}$ – defined in the Standard as the *"A-weighted sound pressure level that is exceeded by the residual sound for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels";*
- *Specific sound level* – L_s ($L_{Aeq,Tr}$) – the "*equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr*"; and
- *Rating level* – $L_{Ar,Tr}$ – the *"specific sound level plus any adjustment made for the characteristic features of the sound".*

9.3.4.30. BS 4142 allows for corrections to be applied based upon the presence or expected presence of the following:

- tonality: up to +6 dB penalty;
- impulsivity: up to +9 dB penalty (this can be summed with tonality penalty); and
- other sound characteristics (neither tonal nor impulsive but still distinctive): +3 dB penalty.

9.3.4.31. Once any adjustments have been made, the *background sound level* and the *rating level* are compared. The standard states that:

- *"Typically, the greater the difference, the greater the magnitude of impact.*

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context".*

9.3.4.32. As indicated above, BS 4142 requires that the *rating level* of the noise source under assessment be considered in the context of the environment when defining the overall significance of the impact. The standard suggests that in assessing the context, all pertinent factors should be taken into consideration, including the following:

- *"The absolute level of sound;*
- *The character and level of the residual sound compared to the character and level of the specific sound; and*
- *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions."*

9.3.4.33. BS 4142 suggests that a one-hour assessment period is considered during the day and a 15-minute assessment period at night.

9.3.4.34. Table 9-10 illustrates the adopted magnitude of impact scale used in this assessment based upon the numerical level difference and considering PAN 1/2011 and the guidance from Aberdeenshire Council as presented in Table 9-1.

Table 9-10: Magnitude of impact for industrial noise

Magnitude of impact	BS 4142 descriptor	Rating level minus background sound level (dB)
High	No BS 4142 descriptor for this magnitude level	>+15
Medium	Indication of a significant adverse impact, depending upon context	≥+10
Low	Indication of an adverse impact, depending upon context	+5 approx.
Very low	Indication of low effect, depending upon context	≤ 0

9.3.4.35. Following the quantitative determination of the magnitude of noise impact, as indicated by TAN 2011 and SGN2, a qualitative assessment has been undertaken. The qualitative assessment undertaken comprise consideration of the context as suggested by BS 4142 and determination of descriptors for qualitative impacts from noise. TAN 2011 provides the example given in

Table 9-11 for this qualitative assessment process. The corresponding impact descriptor used in the assessment is provided in brackets.

Table 9-11: Example of Assigning Descriptors for Qualitative Impacts from Noise on Residential Properties

Perception	Criteria of Descriptor for residential dwellings	Descriptor for qualitative impact
Noticeable (Very disruptive)	Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm.	Major (High)
Noticeable (Disruptive)	Causes an important change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	Moderate (Medium)
Noticeable (Mildly intrusive)	Noise can be heard and may cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows more often. Potential for non-awakening sleep disturbance. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Minor (Low)
Just Noticeable (Non-intrusive)	Noise can be heard, but does not cause any change in behaviour or attitude, e.g. increasing volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Negligible (Very Low)
Not noticeable	None	No Impact

9.3.4.36. It should be remembered that the qualitative assessment can vary the magnitude of impacts initially identified by the quantitative assessment.

Assessment of operational vibration impacts on human beings

9.3.4.37. The operational equipment at the Proposed Development Site will comprise precision rotating machinery, which will be monitored and maintained in a high state of balance. This type of equipment therefore does not pass significant levels of vibration into the ground. Taking this into account, and the distances between the proposed indicative locations of equipment and residential NSR, it is not anticipated that vibration levels will be significant. Therefore, further detailed assessment of operational vibration from the Proposed Development Site is scoped out of this assessment.

Receptor sensitivity

9.3.4.38. Effects are classified based on the magnitude of the impact (as outlined above for the various potential impacts during construction and operation) and the sensitivity or value of the affected receptor. A scale of receptor sensitivity in presented in Table 9-12.

Table 9-12: Sensitivity/value of receptors

Sensitivity/ value of resource/ receptor	Description	Examples of receptor usage
Very high	Receptors where noise or vibration will significantly affect the function of a receptor	Auditoria/studios Specialist medical/teaching centres, or laboratories with highly sensitive equipment
High	Receptors where people or operations are particularly susceptible to noise or vibration	Residential Quiet outdoor areas used for recreation Conference facilities Schools/educational facilities in the daytime Hospitals/residential care homes Libraries
Medium	Receptors moderately sensitive to noise or vibration where it may cause some distraction or disturbance	Offices Restaurants/retail Sports grounds when spectator or noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf)
Low	Receptors where distraction or disturbance of people from noise or vibration is minimal	Residences and other buildings not occupied during working hours Factories and working environments with existing high noise levels Sports grounds when spectator or noise is a normal part of the event

9.3.4.39. Impacts are defined as changes arising from the Proposed Development, and consideration of the result of these impacts on environmental receptors enables the identification of associated effects, and their classification (major, moderate, minor and negligible, and adverse, neutral or beneficial). Each effect has been classified both before and after mitigation measures have been applied.

9.3.4.40. The following terminology has been used in the assessment to define effects:

- adverse – detrimental or negative effects to an environmental resource or receptor;

- neutral – effects to an environmental resource or receptor that are neither adverse nor beneficial; or
- beneficial – advantageous or positive effect to an environmental resource or receptor.

9.3.4.41. The effect resulting from each individual potential impact type above is classified according to the magnitude of the impact and the sensitivity or value of the affected receptor using the matrix presented in Table 9-13 below, but where necessary also considering the context of the acoustic environment.

Table 9-13: Classification of effects

Sensitivity/ value of resource/ receptor	Magnitude of impact			
	High	Medium	Low	Very low
Very high	Major	Major	Moderate	Minor
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Negligible	Negligible
Low	Minor	Negligible	Negligible	Negligible

9.3.4.42. Where adverse or beneficial effects have been identified, these have been assessed against the following significance scale, derived using the matrix presented in Table 9-13:

- negligible – imperceptible effect of no significant consequence;
- minor – slight, very short or highly localised effect of no significant consequence;
- moderate – limited effect (by extent, duration or magnitude), which may be considered significant; or
- major – considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

9.3.4.43. For the purposes of this assessment, negligible and minor effects are considered to be not significant, whereas moderate and major effects are considered to be significant.

Data sources

9.3.4.44. The sources of information used to define the Proposed Development and inform the assessment are detailed in **Appendix 9A** and **Appendix 9B** (EIA Report Volume 4).

Use of Rochdale Envelope

9.3.4.45. The assessment of operational noise and vibration has been undertaken using the Rochdale Envelope approach having regard to the Planning Inspectorate (PINS) Advice Note 9 (PINS, 2018). The Rochdale Envelope is applicable where some of the details of a Proposed Development are not able to be confirmed when an application is submitted and flexibility is needed to address design uncertainty. The three key principles an assessment should adopt are as follows:

- use a cautious worst-case approach;
- the level of information assessed should be sufficient to enable the likely significant effects of a Proposed Development to be assessed; and

- the allowance for flexibility should not be abused to provide inadequate descriptions of projects.

9.3.4.46. In line with these principles, the following approach has been taken for the construction stage:

- within the Site, it has been assumed that fixed plant would be evenly distributed in the Proposed Development Site (areas where new structures are to be built) and mobile plant would be evenly distributed through the Proposed Development Site and adjacent laydown areas (**Figure 3.3)** (EIA Report Volume 3);
- predictions of noise and vibration resulting from piling are based on piling occurring in the Proposed Development Site area (areas where new structures are to be built);
- construction activities and plant have been assumed, conservatively, to be in constant operation through the 07:00 to 19:00 working day, see **Appendix 9A** (EIA Report Volume 4); and
- predictions made for construction noise in the evening and night-time period assume the same intensity of operation as daytime, as a worst-case.

9.3.4.47. The following approach has been taken for the operational stage:

- sensitivity testing of the key sound source locations has been undertaken to represent a reasonable worst-case scenario. This has included moving the highest contributing sound sources to various locations within the respective plant area and reporting the highest predicted sound levels at each NSR;
- the compressor and the absorber have each been conservatively modelled as producing a free-field design criterion sound pressure level of 85 dB $L_{Aeq,T}$ at 1m (unmitigated scenario), which is likely to overestimate the sound level from low pressure compression;
- the absorber stack casing and stack exhaust (at the point of emission to atmosphere) have been conservatively modelled as producing a free-field design criterion sound pressure level of 85 dB $L_{Aeq,T}$ at 1m (unmitigated scenario);
- pumps associated with various plant across the Development have each been conservatively modelled as producing a free-field design criterion sound pressure level of 85 dB $L_{Aeq,T}$ at 1m (unmitigated scenario); and
- the absorber and Direct Contact Cooler (DCC) (part of the Flue Gas Cooling system) sound power levels have initially been calculated based on the free-field sound pressure level of 85 dB $L_{Aeq,T}$ at 1 m (unmitigated), assuming no additional containment. Both sound sources have then been enclosed in a 100 mm thick concrete structure, resulting in a reverberant internal sound environment within each structure. The internal reverberant sound pressure level has been calculated within each structure, and these levels have been used to calculate the sound breakout from each structure, in order to predict noise levels at NSRs.

9.3.4.48. In relation to both construction and operational effects, mitigation, if considered necessary, would be integrated into the detailed design, in order to achieve acceptable (i.e. not significant) sound levels at the nearest NSRs.

9.4. BASELINE CONDITIONS

9.4.1 CURRENT SOUND EMISSIONS FROM EXISTING PETERHEAD POWER STATION

9.4.1.1. Existing Peterhead Power Station has been visited on 18th and 19th August 2021 in order to undertake short-term attended sound measurements in the vicinity of existing sound generating plant. The measurement data obtained has been used to determine the sound power levels of significant sound sources employed within the existing site. These have been used to model sound emissions from the existing Peterhead Power Station and obtain future cumulative sound levels once the Proposed Development would be operational.

9.4.2 EXISTING BASELINE AT NOISE SENSITIVE RECEPTORS

9.4.2.1. Baseline sound monitoring at NSRs was conducted between 19th August 2021 and 1st September 2021 to include two days (19th and 20th August) whilst Peterhead Power Station was operational and the remainder of the time when the site was not operational.

9.4.2.2. Sound monitoring was conducted in accordance with the principles of BS 7445-1:2003 'Description and Measurement of Environmental Noise Part 1: Guide to Quantities and Procedures' and BS 4142:2014 + A1:2019. Details on sound monitoring procedures employed are given in **Appendix 9B** (EIA Report Volume 4).

9.4.2.3. The results from the baseline sound monitoring are provided in Table 9-14. The equivalent sound levels in the Table have been derived from the logarithmic average of the measured $L_{Aeq,15min}$ values over the relevant time period. In accordance with the procedures in BS 4142, statistical analyses of the measured day (07:00 to 23:00) and night-time (23:00 to 07:00) *background sound levels* have been performed as shown in **Appendix 9B** (EIA Report Volume 4). On this basis professional judgement has been applied to determine the representative *background sound levels* and these are reported in the below Table. Observations regarding the general baseline sound environment at each monitoring location are detailed after the table.

Table 9-14: Baseline sound levels

Receptor	Time period	Peterhead Power Station Operational		Peterhead Power Station Not Operational	
		$L_{Aeq,T}$ dB	$L_{A90,T}$ dB	$L_{Aeq,T}$ dB	$L_{A90,T}$ dB
R1 – 12 Laird's Walk	Daytime	49	39	**46**	**38**
	Night-time	**40**	37	43	**34**
R2 – 54 Claymore Crescent	Daytime	-	-	**50**	**35**
	Night-time	-	-	**40**	**37**
R3 - The Old Manse	Daytime	-	-	**49**	**43**
	Night-time	-	-	**44**	**26**

Receptor	Time period	Peterhead Power Station Operational		Peterhead Power Station Not Operational	
		$L_{Aeq, T}$ dB	$L_{A90, T}$ dB	$L_{Aeq, T}$ dB	$L_{A90, T}$ dB
R4 - Millbank Cottage	Daytime	61	46	**60**	**43**
	Night-time	56	**38**	**55**	43
R5 - Gateside	Daytime	**45**	38	51	**31**
	Night-time	39	34	**39**	**31**
R7 - Bevailey[#]	Daytime	53	45	**52**	**41**
	Night-time	48	36	**47**	**32**
R8 - Sandford Bungalow[#]	Daytime	-	-	**66**	**53**
	Night-time	-	-	**61**	**39**
R9 – Newmill of Sandford*	Daytime	53	45	**52**	**41**
	Night-time	48	36	**47**	**32**

* No measurements were undertaken at this location, baseline sound levels are duplicated from R7 on the basis they are deemed representative.

[#] A weather station was set up at this location during the monitoring period.

The lower sound levels are highlighted in **bold**.

9.4.2.4. Observations regarding the general baseline sound environment at each monitoring location whilst in attendance are shown in Table 9-15.

Table 9-15: Receptor noise climate observations

Receptor	Noise climate observations
R1 - 12 Laird's Walk	The existing power station is not visible from the receptor due to the presence of an earth bund. However, a hum from the power station was audible during the day. Residents at the monitoring location note that most noise they hear is from neighbourhood activity rather than the power station.
R2 - 54 Claymore Crescent	From the back of the house the existing power station is just visible over an area of trees. A hum from the power station was audible during the day, in addition to some road traffic noise from the A90.

Receptor	Noise climate observations
R3 - The Old Manse	View of the existing power station from the monitoring location is screened by a hill. No sound from the power station was audible at the receptor. Road traffic from the A90 was observed as the dominant noise source at this location.
R4 - Millbank Cottage	The dominant sound source at this location was observed as road traffic from the A90. When traffic was quiet the power station was audible and considered dominant. There was also sound from running water near the monitoring position. The existing power station is visible from the receptor location.
R5 - Gateside	The existing power station is not visible from the receptor location and no sound from the power station was observed. The main source of noise at this location was from the Balfour Beatty construction site to the south of Newton of Sanford, in addition to road traffic on the A90. Occasional birdsong and air traffic was also observed.
R7 – Bevailey	Road traffic from the A90 was dominant at this location although the power station was audible and visible from the receptor. The Balfour Beatty construction site near to demolished Newton of Sandford Cottage was also audible.
R8 - Sandford Bungalow	Road traffic from the A90 was dominant at this location. The power station was not audible but was visible from the property.
R9 – Newmill of Sandford	Road traffic from the A90 is expected to be dominant at this location, although the power station may also be audible here. R7 is deemed to be representative of this location.

9.4.2.5. The above lower representative *background sound levels* ($L_{A90,T}$) were measured during the night-time (5 dB lower) at R4 when the power station was operational compared when it was not operating. During the daytime and at all other NSRs during the night the *background sound levels* were lower when the power station was not operating. The above daytime *ambient sound levels* ($L_{Aeq,T}$) were lower when the power station was not operating except at R5 which was lower (6 dB lower) when the power station was operating. Night-time *ambient sound levels* ($L_{Aeq,T}$) were lower when the power station was not operating except at R1 which was lower (3 dB lower) when the power station was operating. In order to inform a conservative assessment, the lower measured sound levels (those in **bold** in Table 9-14) have been considered representative of the typical baseline conditions at NSRs.

9.4.3 FUTURE BASELINE AT NOISE SENSITIVE RECEPTORS

9.4.3.1. In the absence of the Proposed Development, future baseline sound levels at NSRs will depend largely on traffic flows on surrounding road networks, and the future operations at other industrial and commercial premises in the area. However, it is considered that sound levels would increase over time compared with those collected in August/September 2021, due to the expected increase in road traffic and other activities in the area.

9.5. DEVELOPMENT DESIGN AND IMPACT AVOIDANCE

9.5.1 CONSTRUCTION NOISE

9.5.1.1. Core construction working hours would be 07:00 to 19:00 Monday to Friday and 08:00 to 13:00 Saturday, as described in **Chapter 5: Construction Programme and Management**. However, for other construction activities, it is assumed that some works may need to take place outside of these core working hours and would be undertaken providing that they comply with any restrictions agreed with the local planning authority, in particular regarding control of noise and traffic.

9.5.1.2. Measures to mitigate noise will be implemented during the construction phase of the Proposed Development to minimise impacts at local NSRs and ecological receptors, particularly with respect to activities required outside of core working hours. Mitigation (to be included in the Construction Environment Management Plan - CEMP) shall include, but not be limited to:

- abiding by agreed construction noise limits at locations to be agreed with Aberdeenshire Council;
- ensuring that processes are in place to minimise noise before works begin and ensuring that BPM are being achieved throughout the construction programme, including the use of localised screening around significant noise producing plant and activities;
- ensuring that modern plant is used, complying with applicable UK noise emission requirements, and selection of inherently quiet plant where possible;
- hydraulic techniques for breaking to be used, where practical, in preference to percussive techniques where reasonably practicable;
- use of lower noise piling (e.g. rotary bored or hydraulic jacking) rather than driven piling techniques, where reasonably practicable;
- off-site pre-fabrication for components of the Proposed Development, where reasonably practicable;
- all plant and equipment being used for the works to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use;
- all contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2) (BSI, 2014a and b), which should form a prerequisite of their appointment;
- loading and unloading of vehicles, dismantling of site equipment such as scaffolding or moving equipment or materials within the Proposed Development Site to be conducted in such a manner as to minimise noise generation, as far as reasonably practicable;
- appropriate routing of construction traffic on public roads and along access tracks, to reduce construction traffic noise, as far as reasonably practicable (see **Chapter 10: Traffic and Transportation** (EIA Report Volume 2));
- provision of information to Aberdeenshire Council and local residents to advise of potential noisy works that are due to take place; and
- monitoring of noise complaints and reporting to the Applicant for immediate investigation.

9.5.1.3. Method statements regarding construction management, traffic management, and overall site management will be prepared in accordance with best practice and relevant British Standards, to help to reduce impacts of construction works. One of the key aims of such method statements will be to minimise noise disruption to local residents during the construction phase as far as reasonably practicable.

9.5.1.4. Regular communication with the local community throughout the construction period will also serve to publicise the works schedule, giving notification to residents regarding periods when

higher levels of noise may occur during specific operations, and providing lines of communication where complaints can be addressed.

9.5.1.5. The selected contractor would be encouraged to be a member of the 'Considerate Constructors Scheme', which is an initiative open to all contractors undertaking building work.

9.5.1.6. As mentioned above, a final CEMP will be prepared which will include setting out provisions to ensure that the noise and vibration impacts relating to construction activities are reduced, as far as reasonably practicable, based on the measures outlined above. To assist in the preparation of the CEMP, a detailed noise and vibration assessment will be undertaken once the contractor is appointed and further details of construction methods are known in order to identify specific mitigation measures for the Proposed Development (including construction traffic).

9.5.1.7. The details regarding timing of future decommissioning are uncertain at this time. However, the mitigation measures set out in this section for construction noise will also be appropriate mitigation during the decommissioning stage.

9.5.1.8. The control and monitoring of noise during construction and decommissioning is proposed to be secured via the CEMP and by planning condition(s) as required.

9.5.1.9. Measures to mitigate noise associated with any carbon dioxide venting during commissioning will include those listed above for construction.

9.5.1.10. As carbon dioxide venting during operation would only take place during emergency scenarios, it is not considered that any further consideration of effects or potential mitigation is required within this noise assessment.

9.5.2 CONSTRUCTION VIBRATION

9.5.2.1. Given the distance from the Proposed Development Site to residential sensitive receptors (a minimum distance of approximately 325m), no significant vibration impacts (medium or high magnitude) are expected to result from the proposed construction (or demolition) activities.

9.5.3 OPERATIONAL NOISE AND VIBRATION

9.5.3.1. During the detailed design stage, potential significant residual noise effects will be mitigated by location and design (see **Section 9.7**). This will include appropriate stack design, use of cladding and shielding where appropriate and, where practical siting of equipment away from site boundaries and NSRs.

9.5.3.2. The Proposed Development Site will be operated in accordance with a Pollution Prevention and Control Permit (PPC Permit), issued and regulated by the Scottish Environmental Protection Agency (SEPA). This will require operational noise from the generating station to be controlled using BAT, which will be determined through the PPC Permit application.

9.5.4 DECOMISSIONING

9.5.4.1. Appropriate best practice mitigation measures will be applied during future decommissioning works and documented in a Decommissioning Environmental Management Plan (DEMP) to control noise effects. No additional mitigation for decommissioning of the Proposed Development beyond such best practice is considered necessary at this stage. The predicted noise and vibration effects of future decommissioning of the Proposed Development are considered to be comparable to, or less than, those assessed for construction activities.

9.6. LIKELY IMPACTS AND EFFECTS

9.6.1 CONSTRUCTION NOISE AND VIBRATION EFFECTS

9.6.1.1. Based upon the analysis and summary of the results of the existing free-field baseline ambient sound surveys, Table 9-16 sets out the BS 5228 'ABC' noise threshold categories (BSI, 2014a) at each NSR for the day, evening and night-time periods as set out in Table 9-4.

Table 9-16: Measured free-field $L_{Aeq,\,T}$ noise levels and associated "ABC" assessment category

Receptor	Weekday daytime 07:00 – 19:00		Weekday evening 19:00 – 23:00		Night-time 23:00 – 07:00	
	$L_{Aeq,16h}$ dB	ABC	$L_{Aeq,4h}$ dB	ABC	$L_{Aeq,8h}$ dB	ABC
R1 – 12 Laird's Walk	48	A	47	A	43	B
R2 – 54 Claymore Crescent	48	A	41	A	41	A
R3 - The Old Manse	50	A	49	A	44	B
R4 - Millbank Cottage	63	B	59	C	56	C
R5 - Gateside	54	A	42	A	38	A
R7 - Bevailey	55	A	51	A	47	B
R8 - Sandford Bungalow	67	B	63	C	61	C
R9 – Newmill of Sandford	55	A	51	A	47	B

9.6.1.2. It may be necessary for some construction activities to take place continuously over day, evening, and night periods during peak construction times of the Proposed Development, although the exact nature of the works is unknown at this stage.

9.6.1.3. Construction noise limits have been derived for each NSR in Table 9-17 below using the BS 5228 ABC methodology (described in Table 9-4). Where baseline sound level data are not available for an NSR, limits have been assigned using conservative assumptions including:

- assuming the lowest measured sound level for the given time period from other representative measurement locations; and
- assuming indicative weekend noise limits based upon the most conservative Category A values.

Table 9-17: Indicative construction noise limits

Receptor	Construction noise limit $L_{Aeq,T}$ dB (free-field)					
	Weekday daytime 07:00 – 19:00	Weekday evening 19:00 – 23:00	Night 23:00 – 07:00	Saturday 07:00 – 13:00	Saturday 13:00 – 23:00	Sunday 07:00 – 23:00
R1 – 12 Laird's Walk	65	55	50	65	55	55
R2 – 54 Claymore Crescent	65	55	45	65	55	55
R3 - The Old Manse	65	55	50	65	55	55
R4 - Millbank Cottage	70	65	55	70	65	65
R5 – Gateside	65	55	45	65	55	55
R7 – Bevailey	65	55	50	65	55	55
R8 - Sandford Bungalow	70	65	55	70	65	65
R9 – Newmill of Sandford	65	55	50	65	55	55

Prediction of construction noise impact magnitude

9.6.1.4. Noise levels experienced by local NSRs during such works depend upon several variables, the most significant of which are:

- the noise generated by plant or equipment used on site, generally expressed as sound power levels (L_w) generated by the plant;
- the periods of use of the plant on site, known as its on-time;

- the distance between the noise source and the receptor;
- the noise attenuation due to ground absorption, air absorption and barrier effects;
- in some instances, the reflection of noise due to the presence of hard surfaces such as the sides of buildings; and
- the time of day or night the works are undertaken.

9.6.1.5. Construction noise predictions have been undertaken using noise data for plant items and calculation methodologies from BS 5228 (BSI, 2014a) and incorporating the approaches set out in Section 9.3.3.8.

9.6.1.6. The predicted levels apply to core weekday daytime (07:00 – 19:00) working, although could approximate to other time periods where working at the same rate and intensity is proposed. These assume constant operation of equipment throughout the 07:00 – 19:00 periods which is a conservative worst-case assumption. Further details regarding the noise prediction methodology, including a full list of indicative construction plant and associated sound power levels (L_w) for each construction phase, are presented in **Appendix 9A** (EIA Report Volume 4).

9.6.1.7. The following four key phases of construction have been identified from the indicative construction and commissioning programme set out in Table 5.1 in **Chapter 5: Construction Programme and Management** (EIA Report Volume 2):

- Phase 1 - Site enabling and demolitions;
- Phase 2 - Ground preparation and earthworks (including piling);
- Phase 3 - Erection of main equipment, gas, electrical and mechanical connections; and
- Phase 4 - Above ground civil works, commissioning and testing.

9.6.1.8. A summary of indicative noise predictions at the NSR locations for the identified key construction phases associated with the Proposed Development are presented in Table 9-18.

9.6.1.9. As advised by BS 5228, noise levels predicted at distances over 300 m should be treated with caution due to the increasing importance of meteorological effects. The distance from each NSR to the nearest area of construction has been included in Table 9-18.

Table 9-18: Indicative predicted daytime free-field construction noise levels

Receptor	Distance from nearest construction area (m)	Indicative free-field daytime construction noise levels during key construction phases (dB $L_{Aeq,12h}$)			
		Phase 1	Phase 2	Phase 3	Phase 4
R1 – 12 Laird's Walk	230	52	56	56	53
R2 – 54 Claymore Crescent	140	57	61	60	57
R3 – The Old Manse	175	53	56	56	52
R4 – Millbank Cottage	210	59	62	62	59

Receptor	Distance from nearest construction area (m)	Indicative free-field daytime construction noise levels during key construction phases (dB $L_{Aeq,12h}$)			
		Phase 1	Phase 2	Phase 3	Phase 4
R5 – Gateside	555	52	56	56	53
R7 – Bevailey	155	59	62	62	58
R8 – Sandford Bungalow	35	66	69	69	63
R9 – Newmill of Sandford	70	62	66	65	59

9.6.1.10. An electrical connection is required to connect the Proposed Development into the existing electricity substation on the west side of the A90 to supply power to the Proposed Development Site plant and equipment during start-up. For the purposes of worst-case predictions, construction activities have been assumed at the closest point to the potential connection routes when undertaking predictions at each NSR. As it is likely that cabling would be primarily below ground, predictions have been made for topsoil striping as the potentially most significant noise source during this activity. Noise predictions are shown in Table 9-19.

Table 9-19: Indicative predicted daytime free-field construction noise levels for electrical connection

Receptor	Indicative free-field daytime construction noise levels during electrical connection construction activity (dB $L_{Aeq,12h}$)
R1 – 12 Laird's Walk	54
R2 – 54 Claymore Crescent	56
R3 - The Old Manse	58
R4 - Millbank Cottage	67
R5 – Gateside	61
R7 – Bevailey	61
R8 - Sandford Bungalow	52
R9 – Newmill of Sandford	49

Noise effects of Proposed Development site construction

9.6.1.11. As a conservative approach, to account for the possibility of some construction activities to take place continuously over day, evening, and night periods, the predicted daytime construction noise levels (as presented in Table 9-18) have been assumed to be equivalent to weekday daytime, evening and night-time noise levels. The predicted effects during each time period have been classified by considering the relevant ABC noise limit values given in Table 9-17, and using the semantic scales in Table 9-5, Table 9-12 and Table 9-13. These effects are summarised in Table 9-20.

Table 9-20: Indicative construction noise effects of Proposed Development Site

Receptor	Time Period	Proposed PCC site construction – significance of effects			
		Phase 1	Phase 2	Phase 3	Phase 4
R1 – 12 Laird's Walk	Daytime	Negligible	Negligible	Negligible	Negligible
	Evening	Minor	**Moderate**	**Moderate**	Minor
	Night-time	**Major**	**Major**	**Major**	**Major**
R2 – 54 Claymore Crescent	Daytime	Negligible	Minor	Minor	Negligible
	Evening	**Moderate**	**Major**	**Major**	**Moderate**
	Night-time	**Major**	**Major**	**Major**	**Major**
R3 – The Old Manse	Daytime	Negligible	Negligible	Negligible	Negligible
	Evening	Minor	**Moderate**	**Moderate**	Minor
	Night-time	**Moderate**	**Major**	**Major**	**Major**
R4 – Millbank Cottage	Daytime	Negligible	Negligible	Negligible	Negligible
	Evening	Negligible	Minor	Minor	Negligible
	Night-time	**Moderate**	**Major**	**Major**	**Moderate**
R5 – Gateside	Daytime	Negligible	Negligible	Negligible	Negligible
	Evening	Minor	Moderate	Moderate	Minor
	Night-time	**Major**	**Major**	**Major**	**Major**
	Daytime	Negligible	Minor	Minor	Negligible

Receptor	Time Period	Proposed PCC site construction – significance of effects			
		Phase 1	Phase 2	Phase 3	Phase 4
R7 – Bevailey	Evening	**Moderate**	**Major**	**Major**	**Moderate**
	Night-time	**Major**	**Major**	**Major**	**Major**
R8 – Sandford Bungalow	Daytime	Minor	Minor	Minor	Negligible
	Evening	**Moderate**	**Moderate**	**Moderate**	Minor
	Night-time	**Major**	**Major**	**Major**	**Major**
R9 – Newmill of Sandford	Daytime	Minor	**Moderate**	Minor	Negligible
	Evening	**Major**	**Major**	**Major**	**Moderate**
	Night-time	**Major**	**Major**	**Major**	**Major**

Daytime (07:00 – 19:00 weekdays) also represents Saturday mornings (07:00 – 13:00)

Evening (19:00 – 23:00 weekdays) also represents Saturday afternoons (13:00 – 23:00) and Sundays (07:00 – 23:00)

Night-time (23:00 – 07:00 all week)

Potentially significant effects are in bold

9.6.1.12. Construction noise effects at eight of the nine NSRs during construction of the Proposed Development Site within core daytime hours including Saturday mornings are predicted to be negligible/minor adverse (not significant) for all four identified phases. However, at R9 there are predicted to experience moderate adverse effects during one construction phase.

9.6.1.13. Comparison of the predicted daytime noise levels for construction of the Proposed Development Site against the lower limit values for the evening, Saturday afternoon and Sunday all day periods indicate the potential for moderate/major adverse (significant) effects for at least one construction phase if the same intensity of working as for the daytime is assumed. During night-time, the potential for major adverse (significant) effects is predicted at all of the NSRs during all construction phases if the same intensity of working as for the daytime is assumed.

Noise effects of electrical connection construction

Table 9-21: Indicative construction noise effects of electrical connection

Receptor	Time Period	Electrical connection construction – significance of effects
R1 – 12 Laird's Walk	Daytime	Negligible
	Evening	Minor
	Night-time	**Moderate**
R2 – 54 Claymore Crescent	Daytime	Negligible
	Evening	**Moderate**
	Night-time	**Major**
R3 – The Old Manse	Daytime	Negligible
	Evening	**Moderate**
	Night-time	**Major**
R4 – Millbank Cottage	Daytime	Minor
	Evening	**Moderate**
	Night-time	**Major**
R5 – Gateside	Daytime	Minor
	Evening	**Major**
	Night-time	**Major**
R7 – Bevailey	Daytime	Minor
	Evening	**Major**
	Night-time	**Major**

Receptor	Time Period	Electrical connection construction – significance of effects
R8 – Sandford Bungalow	Daytime	Negligible
	Evening	Negligible
	Night-time	Minor
R9 – Newmill of Sandford	Daytime	Negligible
	Evening	Negligible
	Night-time	Minor

9.6.1.14. During the core daytime hours and Saturday mornings, predicted noise effects during topsoil stripping for laying the cable to the existing electrical substation are assessed as negligible/minor adverse (not significant) at all NSRs.

9.6.1.15. Should it be necessary to undertake works in the evening or other weekend periods at the same intensity as daytime works, moderate or major adverse (significant) effects are predicted at six of the nine NSRs (R2 – R7), and at night, moderate or major adverse (significant) effects are predicted at seven of the nine NSRs (R1 – R7).

Summary of daytime construction noise effects

9.6.1.16. During the core daytime hours and Saturday mornings, the predicted noise effects for all construction phases, including the electrical connection, has been assessed as negligible/minor adverse (not significant) at all but one NSR (R9). At R9 a moderate adverse (significant) effect has been identified during Phase 2 of construction (ground preparation and earthworks). Potential measures to ensure that appropriate mitigation is in place during the works are as set out in **Section 9.7**.

Summary of evening/night-time construction noise effects

9.6.1.17. In view of the potential for significant adverse noise effects in the evening/night-time (and weekend) periods, construction activities taking place outside core working hours will need to be planned, managed and controlled appropriately so they do not exceed the noise limits, as provided in Table 9-17. Provided the noise limits are not exceeded, construction activities outside core working hours can be considered as having a minor adverse effect or less (not significant). Potential measures to ensure that appropriate mitigation is in place during the works are as set out in **Section 9.7**.

Proposed Development Site construction - vibration effects

9.6.1.18. The level of impact at different receptors will be dependent upon a number of factors, including distance between the works and receptors, ground conditions, the nature and method of works required close to receptors and the specific activities being undertaken at any given time.

9.6.1.19. However, due to large distances (a minimum of approximately 325 m) between residential receptors and the plant that is likely to produce higher levels of vibration (e.g. piling rigs) on the Proposed Development Site, vibration effects on both humans and buildings are predicted to be negligible (not significant).

Construction traffic noise effects

9.6.1.20. For the purposes of assessment, it is assumed that construction traffic access to the proposed construction area will be via the A90. Data has been provided from the Transport Assessment (see **Appendix 10A: Transport Assessment** (EIA Report Volume 4)) for the traffic scenario 'without' and 'with' Proposed Development construction traffic in 2026 for the roads within the scope of the transport assessment, as follows:

- scenario 1 – 'without' Proposed Development construction: 2026 Base; and
- scenario 2 – 'with' Proposed Development construction: 2026 Base + Proposed Development construction traffic.

9.6.1.21. The potential changes in road traffic noise from these roads as a result of the Proposed Development have been considered by calculating the CRTN BNL at 10 m from the road and comparing the change. Table 9-22 presents the results of the assessment.

Table 9-22: Changes in road traffic noise as a result of traffic related to construction of the Proposed Development Site

Road Link	Scenario 1 'Without' Proposed Development construction traffic			Scenario 2 'With' Proposed Development construction traffic			Change in BNL, dB	Classification of effect
	AAWT	%HGV	Speed (km/h)	AAWT	%HGV	Speed (km/h)		
A90 North of Gatehouse Road	13725	15.5	45	13874	16.2	45	0.1	Negligible
A90 South of Gatehouse Road	13651	14.3	63	14857	13.9	63	0.3	Negligible
A90 (between A982 and A950)	8825	11.9	51	8836	11.9	51	0	Negligible
A982	12168	13.3	45	12185	13.3	45	0	Negligible

9.6.1.22. Table 9-22 shows either no change or very low change in road traffic noise resulting from proposed traffic flows along the construction traffic routes of the Proposed Development. This will result in negligible adverse effects (not significant) at local residential NSRs. Based upon the above, no further specific mitigation measures are required beyond those listed in **Section 9.5**.

9.6.2 CARBON DIOXIDE AND OTHER VENTING DURING COMMISSIONING AND OPERATION

9.6.2.1. The CO_2 collection system will be designed to safely discharge the captured CO_2 into the Acorn transport and storage system. For safety reasons, emergency vents may be installed to discharge CO_2 from the system in the event of over-pressurisation for example. Similar venting would be installed on the steam system or due to maintenance activities.

9.6.2.2. No planned operational venting of CO_2 or steam lines is expected during normal operation of the process and the use of vents will be minimised through process controls. It is considered that noise associated with minor and occasional CO_2 venting from the Proposed Development would be not significant and would be controlled by the PPC Permit.

9.6.3 OPERATIONAL NOISE EFFECTS

Quantitative assessment of impact magnitude – unmitigated

9.6.3.1. The final design of the Proposed Development is yet to be determined. Therefore, noise modelling has been undertaken based upon the locations in the three indicative layout options of operational equipment taken from **Figures 4.1-4.3** (EIA Report Volume 3). This has been supplemented by a number of different potential operational scenarios of plant configuration, to give a view of the range of sound levels that could be produced by various unmitigated and mitigated options for the purposes of determining a representative worst-case. Using the Rochdale Envelope approach, reasonable worst-case operational noise impacts and effects are presented.

9.6.3.2. Further details of the sound source sound power level (L_w) data, the settings used in the noise modelling software and the list of assumptions used are presented in **Appendix 9B** (EIA Report Volume 4).

9.6.3.3. In the absence of additional mitigation, the predicted free-field operational *specific sound levels* at the NSRs around the Proposed Development Site are presented in Table 9-23. Operational *specific sound levels* are presented for both daytime and night-time with daytime values presented at the ground floor level of the property and night-time at the first floor.

9.6.3.4. The plant is designed to operate flexibly during its lifetime. Given the anticipated load regimes (baseload and dispatchable) for the generating station, the predicted noise levels could apply to both the 1-hour daytime or 15-minute night-time BS 4142 assessment periods.

Table 9-23: Predicted worst-case operational *specific sound levels*

Receptor	Predicted operational *specific sound levels* $L_{Aeq,T}$ dB	
	Daytime (ground floor level)	Night-time (first floor level)
R1 – 12 Laird's Walk	41	42
R2 – 54 Claymore Crescent	46	46

Receptor	Predicted operational *specific sound levels* $L_{Aeq,T}$ dB	
	Daytime (ground floor level)	Night-time (first floor level)
R3 – The Old Manse	45	46
R4 – Millbank Cottage	48	47
R5 – Gateside	45	45
R7 – Bevailey	49	51
R8 – Sandford Bungalow	48	48
R9 – Newmill of Sandford	49	49

9.6.3.5. The representative *background sound levels* are presented in Table 9-24. As discussed in **Section 9.4.2**, a conservative approach has been taken when identifying representative *background sound levels* to inform a worst-case assessment.

Table 9-24: Representative *background sound levels*

Receptor	Representative *background sound levels* ($L_{A90,T}$), dB	
	Daytime	Night-time
R1 – 12 Laird's Walk	38	34
R2 – 54 Claymore Crescent	35	37
R3 – The Old Manse	43	26
R4 – Millbank Cottage	43	38
R5 – Gateside	31	31
R7 – Bevailey	41	32
R8 – Sandford Bungalow	53	39
R9 – Newmill of Sandford*	41	32
*Levels from R7 are deemed to be representative of R9		

Unmitigated BS 4142 Assessment results

9.6.3.6. The unmitigated daytime BS 4142 assessments are presented in Table 9-25 and the night-time BS 4142 assessments are presented in Table 9.26. The magnitude of impact and effect classification has been included in the tables, to provide context for the BS 4142 assessment outcomes, with reference to the semantic scales in Table 9-10, Table 9-12 and Table 9-13.

9.6.3.7. The values presented are the differences between the representative *background sound level* at each NSR and the predicted *rating level* (the *specific sound level* $L_{Aeq,T}$ presented in Table 9-23 plus an appropriate character correction). Positive values in the table indicate an excess of the *rating level* over the *background sound level*.

9.6.3.8. The assessment has assumed that potential noise of a tonal, impulsive or intermittent nature will be designed out of the Proposed Development during the detailed design phase by the selection of appropriate plant, building cladding, louvres and silencers/ attenuators as necessary. However, a +3 dB correction for other distinctive character has been included at this stage as a conservative approach for NSRs with the potential to identify the new sound source in their existing acoustic environment.

Table 9-25: Daytime BS4142 assessment without additional mitigation

Receptor	*Specific sound level* L_s ($L_{Aeq,Tr}$), dB	Acoustic feature correction, dB	*Rating level* ($L_{Ar,Tr}$), dB	Representative *background sound level* ($L_{A90,T}$), dB	Excess of *rating level* over *background sound level* ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	BS 4142:2014 effect category	Magnitude of impact (assigned from Table 9-10)	Initial classification of effect (assigned from Table 9-13)	Aberdeenshire Council classification of effect (assigned from Table 9-1)
R1 – 12 Laird's Walk	42	+3	45	38	+7	Adverse	Low	Minor	Negligible/Minor
R2 – 54 Claymore Crescent	46	+3	49	35	+14	Significant Adverse	Medium/High	**Moderate/Major**	**Moderate**
R3 – The Old Manse	45	+3	48	43	+5	Adverse	Low	Minor	Negligible
R4 – Millbank Cottage	48	+3	51	43	+8	Adverse	Low/Medium	Minor	Minor
R5 – Gateside	45	+3	48	31	+17	Significant Adverse	High	**Major**	**Major**
R7 – Bevailey	50	+3	53	41	+12	Significant Adverse	Medium	**Moderate**	**Moderate**
R8 – Sandford Bungalow	49	+3	52	53	-1	Low	Very Low	Negligible	No Change
R9 – Newmill of Sandford	49	+3	52	41	+11	Significant Adverse	Medium	**Moderate**	**Moderate**

Table 9-26: Night-time BS4142 assessment without additional mitigation

Receptor	*Specific sound level* L_s ($L_{Aeq,Tr}$), dB	Acoustic feature correction, dB	*Rating level* ($L_{Ar,Tr}$), dB	Representative *background sound level* ($L_{A90,T}$), dB	Excess of *rating level* over *background sound level* ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	BS 4142:2014 effect category	Magnitude of impact (assigned from Table 9-10)	Initial classification of effect (assigned from Table 9-13)	Aberdeenshire Council classification of effect (assigned from Table 9-1)
R1 – 12 Laird's Walk	43	+3	46	34	+12	Significant Adverse	Medium	**Moderate**	**Moderate**
R2 – 54 Claymore Crescent	47	+3	50	37	+13	Significant Adverse	Medium	**Moderate/Major**	**Moderate**
R3 – The Old Manse	46	+3	49	26	+23	Significant Adverse	High	**Major**	**Major**
R4 – Millbank Cottage	48	+3	51	38	+13	Significant Adverse	Medium/High	**Moderate/Major**	**Moderate**
R5 – Gateside	45	+3	48	31	+17	Significant Adverse	High	**Major**	**Major**
R7 – Bevailey	51	+3	54	32	+22	Significant Adverse	High	**Major**	**Major**
R8 – Sandford Bungalow	48	+3	51	39	+12	Significant Adverse	Medium	**Moderate/Major**	**Moderate**
R9 – Newmill of Sandford	49	+3	52	32	+20	Significant Adverse	High	**Major**	**Major**

9.6.3.9. In accordance with Table 9-10, the values presented in Table 9-25 and Table 9-26, for the worst-case scenario produce a range of impact magnitudes from very low to high impact at the nine NSRs. This would result in effects between negligible adverse (not significant) to major adverse (significant) or no change to major, subject to consideration of context.

Qualitative assessment of impact magnitude – unmitigated

9.6.3.10. The existing Peterhead Power Station has been an industrial source operating in the area since 1980, this operates intermittently to meet power demand and representative *background sound levels* employed in the quantitative assessment do not include the contribution of this source. The existing power station currently includes three gas turbines, however, two of the three are to be decommissioned once the Proposed Development is in operation.

9.6.3.11. Table 9-27 shows the future *ambient sound levels* with the Proposed Development and one remaining existing Peterhead Power Station gas turbine in operation, and their comparison against the current *ambient sound levels* when the existing Peterhead Power Station was in operation and when also it was not in operation. Only the night-time is considered as *ambient sound levels* are lower than during the day so the change will be greater.

Table 9-27: Comparison of night-time *ambient sound levels* without additional mitigation

Receptor	Proposed Development predicted operational *specific sound level* ($L_{Aeq,T}$ dB)	Current *ambient sound level* without existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Current operational sound level from existing Peterhead Power Station ($L_{Aeq,T}$ dB)	Current *ambient sound level* with existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Proposed Development and existing Peterhead Power Station (reduced to one gas turbine) predicted operational *specific sound level* ($L_{Aeq,T}$ dB)	Future *ambient sound levels* B and E summed logarithmically ($L_{Aeq,T}$ dB)	Change in *ambient sound level* from situation without existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Change in *ambient sound level* from situation with existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)
Label	**A**	**B**	**C**	**D (B and C summed logarithmically)**	**E**	**F (B and E summed logarithmically)**	**F-B**	**F-D**
R1 – 12 Laird's Walk	43	43	42	46	45	47	+4	+1
R2 – 54 Claymore Crescent	47	40	40	43	47	48	+8	+5
R3 – The Old Manse	46	44	30	44	46	48	+4	+4
R4 – Millbank Cottage	48	55	41	55	49	56	+1	+1
R5 – Gateside	45	39	32	40	45	46	+7	+6
R7 – Bevailey	51	47	37	47	51	53	+6	+6
R8 – Sandford Bungalow	48	61	33	61	48	61	0	0
R9 – Newmill of Sandford	49	47	31	47	49	51	+4	+4

9.6.3.12. As shown in Table 9-27 for the worst-case scenario there will be an increase of up to 6 dB in night-time *ambient sound levels* from the *ambient sound level* when the existing Peterhead Power Station is in operation and up to 8 dB from when it is not.

9.6.3.13. On the basis of the above and to avoid significant effects, potential mitigation options to reduce *specific sound levels* from the Proposed Development have been considered and those required to avoid significant effects and meet Aberdeenshire Council's criteria are discussed in **Section 9.7**.

9.6.4 DECOMMISSIONING NOISE EFFECTS

9.6.4.1. The potential impacts and effects would require further consideration at the decommissioning stage of the Proposed Development, but potential measures to ensure that appropriate mitigation is in place during such works are detailed in **Section 9.7.**

9.6.4.2. The effects of eventual decommissioning are considered to be comparable to, or less than, those assessed for construction activities and are therefore considered to be not significant for the Proposed Development during daytime works at NSRs R1 to R5. Up to moderate adverse (significant) effects may result from decommissioning works during the day at R7, R8 and R9, in the absence of mitigation. Decommissioning may result in some major adverse (significant) effects during evening and night-time periods without mitigation.

9.6.4.3. Decommissioning would require submission of a DEMP to Aberdeenshire planning authority for its approval. Appropriate best practice mitigation measures will be applied during any decommissioning works, as described in **Section 9.7**, and documented in a DEMP; no additional mitigation for decommissioning of the Proposed Development beyond such best practice specified in BS 5228 and the mitigation measures proposed in **Section 9.7** are considered necessary to specify at this stage.

9.7. MITIGATION, MONITORING AND ENHANCEMENT MEASURES

9.7.1 CONSTRUCTION MITIGATION

9.7.1.1. This assessment has identified one NSR (R9) that may have moderate (significant) adverse effects during at least one phase of construction works during daytime or Saturday morning working hours. At all other NSRs the assessment has identified no more than negligible/minor adverse (not significant) noise effects during the daytime or Saturday morning working hours.

9.7.1.2. Based on the indicative outcomes of this assessment, it would be necessary for additional mitigation to be incorporated into the scheme which goes beyond those best practicable means listed in Section 9.5.1. To mitigate the noise emissions from construction works, use of site or activity boundary acoustic barriers to screen neighbouring receptors is recommended during the noisiest activities (i.e. piling and earthworks) undertaken within construction Phase 2. In addition, acoustic barriers along the perimeter of construction laydown areas A and B would further reduce the construction noise levels at neighbouring sensitive receptors. The use of site boundary or activity boundary temporary acoustic barriers can reduce construction noise levels by around 10 dB if line-of-sight from the plant to the receptor is blocked. Assuming temporary acoustic barriers would provide a minimum attenuation of 10 dB (due to removal of line-of-sight), daytime construction noise levels incident on the worst-affected receptor, R9, would reduce to below the identified construction noise limit, i.e. no more than minor adverse (not significant) during the daytime.

9.7.1.3. In the event that construction activities are required during evening/night-time periods, levels in excess of the construction noise limits for night-time works could occur at all NSRs, (depending on the nature of activities undertaken and intensity of working). This could result in a moderate/major adverse (significant) noise effect at these NSRs in the absence of additional mitigation. Measures would therefore be put in place to control or restrict activities during evenings/ night-time so as not to exceed the construction noise limits. Control of construction noise and vibration is proposed to be secured by a planning condition. By timing construction works, avoiding noisier activities being undertaken at night, and where necessary by using activity or site boundary acoustic barriers significant adverse effects can therefore be avoided at most receptors.

9.7.1.4. The preferred approach for controlling construction noise and vibration is to reduce levels at source, where reasonably practicable. Sometimes a greater noise or vibration level may be acceptable if the overall construction time, and therefore length of disruption, is reduced.

9.7.1.5. The list of embedded noise control measures presented within **Section 0** of this chapter provides a detailed but not exhaustive list of construction noise management measures. The measures listed will be implemented and supplemented as necessary with further bespoke measures identified through further detailed assessment as part of the CEMP. With respect to reduction of noise levels during piling, this may include, but not be limited to, choice of piling method, use of a temporary acoustic barrier, use of a partial enclosure around the hammer, and the use of a non-metallic dolly between the hammer and the driving helmet (for driven piling) to prevent metal on metal impact sound. The need for monitoring of noise and vibration levels during construction will also be determined through the detailed assessment undertaken by planning condition once the construction methods are known.

9.7.2 OPERATIONAL NOISE

9.7.2.1. The operational assessment has assumed that potential sound of a tonal, impulsive or intermittent nature (according to BS 4142: 2014) will be designed out of the Proposed Development during the detailed design phase through the selection of appropriate plant, building cladding, louvres and silencers/ attenuators as necessary. However, a +3 dB correction for distinctive character has been applied to the *specific sound levels* predicted from the Proposed Development, for NSRs with the potential to identify the new sound source in their existing acoustic environment.

9.7.2.2. Based on the worst-case results presented in Table 9-25 and Table 9-26 mitigation would be required to achieve operational sound levels at the Aberdeenshire Council criteria at the following NSRs:

- NSR2, NSR5, NSR7 and NSR9 during the daytime; and
- NSR1 to NSR9 during the night-time.

9.7.2.3. Table 9-28 outlines the overall range of attenuation required to achieve the daytime and night-time criterion of *rating level* no greater than +9 dB above the defined representative *background sound level* at each NSR.

Table 9-28: Calculated sound attenuation requirements

Receptor	Attenuation required to achieve Aberdeenshire Council criterion dB $L_{Aeq,T}$	
	Daytime	Night-time
R1 – 12 Laird's Walk	0	3
R2 – 54 Claymore Crescent	5	4
R3 – The Old Manse	0	14
R4 – Millbank Cottage	0	4
R5 – Gateside	8	8
R7 – Bevailey	3	13
R8 – Sandford Bungalow	0	3
R9 – Newmill of Sandford	2	11

9.7.2.4. In light of the required attenuation to achieve the defined noise criteria at the NSRs, the attenuation required from the source sound power levels (listed in **Appendix 9B** EIA Report Volume 4) of the key noise emitting plant to meet the Aberdeenshire Council criterion has been modelled. The attenuation required is listed in Table 9-29

Table 9-29: Required attenuation of plant items/buildings

Plant item	Attenuation required to achieve a *rating level* no greater than + 9 dB above the defined representative *background sound level* (in both daytime and night-time) dB $L_{Aeq,T}$
Absorber stack casing	20
Compressor	20
HRSG building	15
HRSG steam vents	11
Feedwater	10
Gas turbine hall	10

Plant item	Attenuation required to achieve a *rating level* no greater than + 9 dB above the defined representative *background sound level* (in both daytime and night-time) dB $L_{Aeq,T}$
Steam turbine hall	6
Steam turbine hall auxiliaries	11
Water treatment plant building	5
All pumps (Absorber auxiliaries, amine pumps, chemical storage pumps, DCC auxiliaries, fire tank pumps and steam condensate pumps)	12

9.7.2.5. Mitigation measures and general principles to achieve this may include, but not be limited to, the following depending upon potential benefits achieved from such measures:

- reducing the breakout noise from plant through use of enhanced enclosures, or potentially containing them within a building;
- reducing air inlet noise emissions by addition of further in-line attenuation;
- reducing stack outlet noise emissions by addition of silencers or sound proofing panels;
- screening or enclosing the compressors or other equipment;
- use of screening or bunding to shield receptors from noise sources; or
- orientation of plant within the Proposed Development Site to provide screening of low-level noise sources by other buildings and structures.

9.7.2.6. Consultation with project engineers has confirmed the levels of sound reduction identified in Table 9-29 are achievable either through reduction of sound power level at source of the plant procured or the measures listed in this section. During detailed design of the Proposed Development it may be desirable or more practical to apply higher attenuation to some plant items/buildings than listed in Table 9-29 in order to reduce the attenuation applied to other plant items/buildings and still achieve the Aberdeenshire Council criterion.

Quantitative assessment of impact magnitude – mitigated

9.7.2.7. A quantitative assessment of the potential sound emissions from the Proposed Development has been undertaken with additional mitigation measures (discussed above) in place.

Mitigated BS 4142 Assessment results

9.7.2.8. The mitigated daytime BS 4142 assessments are presented in Table 9-30 and the night-time BS 4142 assessments are presented in Table 9-31. The magnitude of impact and effect classification has been included in the tables, to provide context for the BS 4142 assessment outcomes, with reference to the semantic scales in Table 9-10, Table 9-12 and Table 9-13.

Table 9-30: Daytime BS4142 assessment with additional mitigation

Receptor	*Specific sound level* L_s ($L_{Aeq,Tr}$), dB	Acoustic feature correction, dB	*Rating level* ($L_{Ar,Tr}$), dB	Representative *background sound level* ($L_{A90,T}$), dB	Excess of *rating level* over *background sound level* ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	BS 4142:2014 effect category	Magnitude of impact (assigned from Table 9-10)	Initial classification of effect (assigned from Table 9-13)	Aberdeenshire Council classification of effect (assigned from Table 9-1)
R1 – 12 Laird's Walk	30	+3	33	38	-5	Low	Very Low	Negligible	No Change
R2 – 54 Claymore Crescent	32	+3	35	35	0	Low	Very Low	Negligible	No Change
R3 – The Old Manse	31	+3	34	43	-9	Low	Very Low	Negligible	No Change
R4 – Millbank Cottage	35	+3	38	43	-5	Low	Very Low	Negligible	No Change
R5 – Gateside	29	+3	32	31	1	Low/adverse	Very Low/Low	Negligible/Minor	No Change
R7 – Bevailey	38	+3	41	41	0	Low	Very Low	Negligible	No Change
R8 – Sandford Bungalow	36	+3	39	53	-14	Low	Very Low	Negligible	No Change
R9 – Newmill of Sandford	34	+3	37	41	-4	Low	Very Low	Negligible	No Change

Table 9-31: Night-time BS4142 assessment with additional mitigation

Receptor	*Specific sound level* L_s ($L_{Aeq,Tr}$), dB	Acoustic feature correction, dB	*Rating level* ($L_{Ar,Tr}$), dB	Representative *background sound level* ($L_{A90,T}$), dB	Excess of *rating level* over *background sound level* ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	BS 4142:2014 effect category	Magnitude of impact (assigned from Table 9-10)	Initial classification of effect (assigned from Table 9-13)	Aberdeenshire Council classification of effect (assigned from Table 9-1)
R1 – 12 Laird's Walk	31	3	34	34	0	Low	Very Low	Negligible	No Change
R2 – 54 Claymore Crescent	33	3	36	37	-1	Low	Very low	Negligible	No change
R3 – The Old Manse	32	3	35	26	9	Adverse	Low	Minor	Minor
R4 – Millbank Cottage	34	3	37	38	-1	Low	Very low	Negligible	No change
R5 – Gateside	30	3	33	31	2	Low/adverse	Very Low/Low	Negligible/Minor	No Change
R7 – Bevailey	38	3	41	32	9	Adverse	Low	Minor	Minor
R8 – Sandford Bungalow	35	3	38	39	-1	Low	Very Low	Negligible	No Change
R9 – Newmill of Sandford	34	3	37	32	5	Adverse	Low	Minor	Negligible

9.7.2.9. In accordance with Table 9-10, the values presented in Table 9-30 and Table 9-31, for the worst-case mitigated scenario produce a range of impact magnitudes from Very Low to Low impact at the nine NSRs. This would result in effects between negligible adverse (not significant) to minor adverse (significant), subject to consideration of context.

Qualitative assessment of impact magnitude – mitigated

9.7.2.10. Table 9-32 shows the change in night-time *ambient sound levels* with the mitigated Proposed Development and one remaining existing Peterhead Power Station gas turbine in operation when combined with measured periods when the existing Peterhead Power Station was in operation and also when it was not in operation. Only the night-time is considered as *ambient sound levels* are lower than during the day so the change will be greater.

Table 9-32: Comparison of night-time *ambient sound levels* with additional mitigation

Receptor	Proposed Development predicted operational *specific sound level* ($L_{Aeq,T}$ dB)	Current *ambient sound level* without existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Current operational sound level from existing Peterhead Power Station ($L_{Aeq,T}$ dB)	Current *ambient sound level* with existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Proposed Development and existing Peterhead Power Station (reduced to one gas turbine) predicted operational *specific sound level* ($L_{Aeq,T}$ dB)	Future *ambient sound levels* B and D summed logarithmically ($L_{Aeq,T}$ dB)	Change in *ambient sound level* from situation without existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Change in *ambient sound level* from situation with existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)
Label	**A**	**B**	**C**	**D (B and C summed logarithmically)**	**E**	**F (B and E summed logarithmically)**	**F-B**	**F-D**
R1 – 12 Laird's Walk	31	43	42	46	42	46	+3	0
R2 – 54 Claymore Crescent	33	40	40	43	40	43	+3	0
R3 – The Old Manse	32	44	30	44	34	44	0	0
R4 – Millbank Cottage	34	55	41	55	42	55	0	0
R5 – Gateside	30	39	32	40	34	40	+1	0
R7 – Bevailey	38	47	37	47	41	48	+1	+1

Receptor	Proposed Development predicted operational *specific sound level* ($L_{Aeq,T}$ dB)	Current *ambient sound level* without existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Current operational sound level from existing Peterhead Power Station ($L_{Aeq,T}$ dB)	Current *ambient sound level* with existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Proposed Development and existing Peterhead Power Station (reduced to one gas turbine) predicted operational *specific sound level* ($L_{Aeq,T}$ dB)	Future *ambient sound levels* B and D summed logarithmically ($L_{Aeq,T}$ dB)	Change in *ambient sound level* from situation without existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Change in *ambient sound level* from situation with existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)
Label	**A**	**B**	**C**	**D (B and C summed logarithmically)**	**E**	**F (B and E summed logarithmically)**	**F-B**	**F-D**
R8 – Sandford Bungalow	35	61	33	61	37	61	0	0
R9 – Newmill of Sandford	34	47	31	47	36	47	0	0

9.7.2.11. As shown in Table 9-32 night-time *ambient sound levels* are not predicted to increase at any NSRs when the Proposed Development and single gas turbine at the existing Peterhead Power Station operate, compared with periods during which the existing Peterhead Power Station operates. A*mbient sound levels* are predicted to increase by up to 3 dB at NSRs when compared with *ambient sound levels* when the existing Peterhead Power Station was not in operation; 3 dB being a level that would typically be just perceptible under normal environmental conditions.

9.7.2.12. To provide additional context to the overall consideration of likely significant effects, Table 9-33 presents the night-time Proposed Development *BS 4142 rating levels* compared to those from the existing Peterhead Power Station.

Table 9-33: Comparison of night-time *rating levels* with additional mitigation

Receptor	Proposed Development predicted operational *rating level* ($L_{Aeq,T}$ dB)	Current operational *rating level* from existing Peterhead Power Station ($L_{Aeq,T}$ dB)	Measured *background sound level* ($L_{A90,T}$ dB)	Proposed Development excess of *rating level* over *background sound level* ($L_{Ar,Tr}$ - $L_{A90,T}$), dB	Existing Peterhead Power Station excess of *rating level* over *background sound level* ($L_{Ar,Tr}$ - $L_{A90,T}$), dB
R1 – 12 Laird's Walk	34	45	34	0	+11
R2 – 54 Claymore Crescent	36	43	37	-1	+6
R3 – The Old Manse	35	33	26	+9	+7
R4 – Millbank Cottage	37	41	38	-1	+3
R5 – Gateside	33	35	31	+2	+4
R7 – Bevailey	41	40	32	+9	+8
R8 – Sandford Bungalow	38	36	39	-1	-3
R9 – Newmill of Sandford	37	34	32	+5	+2

9.7.2.13. The highest excess of *rating level* over *background sound level* for the proposed development is +9 dB at R3 and R7. This is less than the highest excess of *rating level* over *background sound level* for the currently operational Peterhead Power of +11 dB at R1. The Proposed Development would therefore be predicted to operate within the current levels of impact at NSRs.

9.7.2.14. Considering the assessment presented above this demonstrates that, given the site context, the effects are likely to be lower than the initial BS 4142 (numerical) outcomes might suggest. The most adverse outcome was at R3 and R7 which are considered to be a minor adverse effect using Table 9-11 and a minor impact using the guidance provided in Aberdeenshire Council SGN2 presented in Table 9-1.

9.7.2.15. Overall, following consideration of context, Aberdeenshire Council noise criteria and PAN 1/2011 advice (i.e. that mitigation is not required until the excess of the *rating level* over *background sound level* exceeds +10 dB), the residual effects after mitigation are not considered to be significant and no further mitigation is required.

9.8. CUMULATIVE EFFECTS

9.8.1 CUMULATIVE EFFECTS

9.8.1.1. There is the potential for cumulative effects where the impacts of noise associated with the Proposed Development interact with those associated with other planned projects and developments. These could act together to result in a greater significance of effect. Therefore, cumulative effects are assessed using predictions available in this chapter and information available in noise assessments for other major developments that may have noise impacts.

9.8.1.2. A detailed list of planned projects and developments which have potential for interacting with the Proposed Development is given in **Appendix 2A: Inter-Project Cumulative Effects - Method and Long List** (EIA Report Volume 4). Applications of a distance up to 1km from the Proposed Development have been considered with reference to operational noise and vibration. Beyond that distance significant operational cumulative effects are unlikely to occur. Those planning applications considered in the assessment of operational cumulative effects are given below:

- APP/2019/0982 – Peterhead 400kV Substation to the south of demolished Newton of Sandford Cottage;
- APP/2021/2392 – Synchronous Condenser to the south west of demolished Newton of Sandford Cottage; and
- APP/2021/2681 – HVDC Electrical Converter Station to the north of Four Winds Buckie Farm.

9.8.1.3. Potential cumulative effects of construction noise have been considered for the above applications and more generally for those further afield in the section below.

Construction phase

9.8.1.4. It is understood that the construction works for Peterhead 400kV Substation (APP/2019/0982) have already commenced in February 2021 and are due to take place over a 24-to-30-month period. Construction works for the Proposed Development are due to commence in Q4 2023 at the earliest, so there may be some overlap in construction for the two developments. However, this is likely to be only for a few months and construction activities for the substation would be winding down and construction activities for the Proposed Development would be only just beginning.

9.8.1.5. At this stage construction programmes of the Synchronous Condenser (APP/2021/2392) and HVDC Electrical Converter Station (APP/2021/2681) are not available. The construction of the Synchronous Conders is anticipated to last a total of 12-18 months whereas the construction of HVDC Converter Station would take place over a period of approximately 36 - 48 months.

Depending on the detailed programming of these, there might be a potential for cumulative construction noise and vibration effects across these two developments and the Proposed Development. Potential cumulative construction phase effects are anticipated to be localised, at NSR5 to NSR9, and temporal. However, considering the distance between these potential construction sites and the noise sensitive receptors (minimum approx. 325m) the likelihood of adverse cumulative construction noise effects is considered relatively low. Construction noise effects on both projects will be controlled through project-specific CEMPs.

9.8.1.6. Potential cumulative construction traffic from these and other application construction sites further afield is anticipated to occur predominantly on the A90 and therefore potential changes in road traffic noise levels due to cumulative construction traffic is anticipated to be low based on existing vehicle flows and the volume of construction traffic predicted for each project.

Operational phase

9.8.1.7. To assess potential cumulative operational impacts, operational specific sound levels from nearby Peterhead 400kV Substation, Synchronous Condenser and HVDC Electrical Converter Station (as reported in relevant planning application documentation) have been considered to identify likely changes in ambient sound levels due to operation of these developments, as given in Table 9-34.

9.8.1.8. As shown in Table 9-34, based upon available information, night-time *ambient sound levels* are predicted to increase by 3 dB at R1 and R2, and by 1 dB at R5 to R7, due to operation of the Proposed Development, existing power station and other nearby potential developments when compared with *ambient sound levels* when the existing Peterhead Power Station was not in operation. It is important to note that the identified increases in *ambient sound levels* are equal to those identified without the contribution from other nearby developments (see column F-B in Table 9-32 of this chapter).

9.8.1.9. A 3 dB change in ambient sound levels would typically be just perceptible under normal environmental conditions. Therefore, operational cumulative effects are not considered to be significant.

Table 9-34: Comparison of night-time *ambient sound levels* – operational cumulative effects

Receptor	Current *ambient sound level* without existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Proposed Development and existing Peterhead Power Station (reduced to one gas turbine) predicted operational *specific sound level* ($L_{Aeq,T}$ dB)	Peterhead 400kV Substation operational *specific sound level* ($L_{Aeq,T}$ dB)	Synchronous Condenser operational *specific sound level* ($L_{Aeq,T}$ dB)	HVDC Electrical Converter Station operational *specific sound level* ($L_{Aeq,T}$ dB)	Future *ambient sound levels* A to E summed logarithmically ($L_{Aeq,T}$ dB)	Change in *ambient sound level* from situation without existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)
Label	**A**	**B**	**C**	**D**	**E**	**F**	**F-A**
R1 – 12 Laird's Walk	43	45	N/a	N/a	N/a	46	+3
R2 – 54 Claymore Crescent	40	47	N/a	N/a	N/a	43	+3
R3 – The Old Manse	44	46	N/a	N/a	N/a	44	0
R4 – Millbank Cottage	55	48	14	N/a	N/a	55	0
R5 – Gateside	39	45	13	25	N/a	40	+1

Receptor	Current *ambient sound level* without existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)	Proposed Development and existing Peterhead Power Station (reduced to one gas turbine) predicted operational *specific sound level* ($L_{Aeq,T}$ dB)	Peterhead 400kV Substation operational *specific sound level* ($L_{Aeq,T}$ dB)	Synchronous Condenser operational *specific sound level* ($L_{Aeq,T}$ dB)	HVDC Electrical Converter Station operational *specific sound level* ($L_{Aeq,T}$ dB)	Future *ambient sound levels* A to E summed logarithmically ($L_{Aeq,T}$ dB)	Change in *ambient sound level* from situation without existing Peterhead Power Station in operation ($L_{Aeq,T}$ dB)
R7 – Bevailey	47	51	22	N/a	33	48	+1
R8 – Sandford Bungalow	61	48	N/a	N/a	34	61	0
R9 – Newmill of Sandford	47	48	N/a	N/a	33	47	0

Note: Operational *specific sound levels* from nearby developments have been sourced from publicly available documentation accompanying relevant planning applications. As each development considers a different spatial scope (i.e. different sensitive receptors), contributions from nearby developments are not available at some of the sensitive receptors considered in this assessment. Potential contributions at these locations are anticipated to be lower than those reported, hence considered to be of marginal importance when assessing likely operational cumulative effects.

9.9. LIMITATIONS OR DIFFICULTIES

9.9.1 CONSTRUCTION

9.9.1.1. Detailed construction information is not yet available (given that the construction contractor has not yet been appointed) and therefore this assessment draws upon the experience and assessments undertaken for other similar projects.

9.9.1.2. The assessment is quantitative, but indicative, although it is considered to be reasonable and construction noise thresholds (limit values) are based upon existing ambient sound levels at NSRs. Further assessment has been identified as being required pre-construction, to ensure that appropriate mitigation measures are developed to achieve the BS 5228 ABC threshold noise values once the contractor is appointed. This and other mitigation measures detailed in **Section 0** and **Section 9.7** will be included in the CEMP to minimise construction noise and vibration effects.

9.9.2 OPERATION

9.9.2.1. Assumptions made during the noise modelling and assessment of the Proposed Development are as presented in **Appendix 9B** (EIA Report Volume 4**)**. It is considered that the assumptions result in the assessment being conservative.

9.9.2.2. Sound emission data for key sound emitting plant/ buildings within the Proposed Development (including turbine halls, Heat Recovery Steam Generator (HRSG), absorber tower and stack) have been taken from the Keadby 3 Power Station ES.

9.9.2.3. The final design of the Proposed Development is yet to be determined. Therefore, the operational noise modelling undertaken has considered a representative worst-case using the Rochdale Envelope approach, assessing both unmitigated and mitigated scenarios. Given the identified requirement for additional mitigation measures, further assessment will be undertaken during the detailed design stage, to control noise emissions in order to meet the appropriate noise limits at nearby NSRs.

9.9.2.4. With respect to deriving representative *background sound levels* for use in the BS 4142 assessment, consideration should be given to wind direction in order to accord with the predicted operational sound levels derived from ISO 9613 method, which assumes gentle downwind conditions. The predicted levels presented in this assessment will only actually be experienced at each NSR when it is downwind of the Proposed Development Site. Consequently, it is appropriate to compare these predicted levels with *background sound levels* measured in similar conditions.

9.9.2.5. There is no reliable method of predicting upwind propagation as there are too many variables. However, the upwind sound levels from an individual sound source will generally be 10-15 dB lower than the downwind sound levels. The difference between the upwind and downwind *background sound levels* at the receptors was smaller than this (at 1-5 dB) as they have contributions from sources located all around them. So, the potential impact of the Proposed Development would be at its greatest in downwind conditions.

9.10. SUMMARY OF LIKELY SIGNIFICANT RESIDUAL EFFECTS

9.10.1 SUMMARY

9.10.1.1. A summary of the likely significant residual effects, following the implementation of appropriate mitigation to reduce noise and vibration during construction, operation and decommissioning phases, is presented in Table 9-35 below.

Table 9-35: Summary of likely significant residual effects

Development stage	Predicted impact	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Residual effect	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
Construction	Daytime Noise effects on residential NSRs (R1-R5 & R8)	**Negligible/ Minor adverse** (not significant)	Not required	**Negligible/ Minor adverse** (not significant) on the basis that mitigation is employed such that the BS 5228 ABC noise limits are met and the **Section 9.7** mitigation guidance is followed	St, T, D
Construction	Daytime Noise effects on residential NSRs (R7 & R9)	Up to **Moderate adverse** (significant)	Further detailed assessment and CEMP once contractor appointed	Up to **Minor adverse** (not significant) on the basis that mitigation is employed such that the BS 5228 ABC noise limits are met and the **Section 9.7** mitigation guidance is followed	St, T, D
Construction	Evening/night-time noise effects on all residential NSRs	**Moderate/major adverse** (significant)	Further detailed assessment and CEMP once contractor appointed	**Minor adverse** (not significant) on the basis that mitigation is employed such that the BS 5228 ABC noise limits are met and the **Section 9.7** mitigation guidance is followed	St, T, D

Development stage	Predicted impact	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Residual effect	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
Construction	Noise effects due to construction traffic	**Negligible adverse** (not significant)	Not required	**Negligible adverse** (not significant)	St, T, D
Construction	Vibration effects on sensitive receptors (humans and buildings)	**Negligible adverse** (not significant)	Not required	**Negligible adverse** (not significant)	St, T, D
Operation	Operational effects on residential NSR	**Negligible/ minor adverse** (not significant) to Major adverse (significant) at night	Application of practical sound mitigation to reduce relevant noise at source for the compressors, absorber stack casing, absorber stack exhaust, HRSG walls and roof, all pumps, feedwater, water treatment plant walls and roof, and turbine intake as shown in Table 9-28	**Negligible/ minor adverse** (not significant)	Lt, P, D
Decommissioning	Daytime Noise effects on	**Negligible/ Minor adverse** (not significant)	Not required	**Negligible/ Minor adverse** (not significant) on the basis that mitigation is employed such that	St, T, D

Development stage	Predicted impact	Classification of effect prior to mitigation	Mitigation/ enhancement (if identified)	Residual effect	Nature of effect(s) (Lt/ Mt/ St and P/ T and D/ In)
	residential NSRs (R1-R5, & R8)			the BS 5228 ABC noise limits are met and the **Section 9.7** mitigation guidance is followed	
	Daytime Noise effects on residential NSRs (R7 & R9)	Up to **Moderate adverse** (significant)	Further detailed assessment and DEMP once contractor appointed	Up to **Minor adverse** (not significant) on the basis that mitigation is employed such that the BS 5228 ABC noise limits are met and the **Section 9.7** mitigation guidance is followed	St, T, D
	Evening/Night-time Noise effects on all residential NSRs	**Moderate/major adverse** (significant)	Further detailed assessment and DEMP once contractor appointed	**Minor adverse** (not significant) on the basis that mitigation is employed such that the BS 5228 ABC noise limits are met and the **Section 9.7** mitigation guidance is followed	St, T, D

Significant effects in **bold**
Note: Lt = long term, Mt = medium term, St = short term, P = permanent, T = temporary, D = direct and In = indirect

9.11. REFERENCES

Aberdeenshire Council (2016). SGN 2 New Development: Submission Guidance Note on the Information required for an Assessment of the Noise Impact of Proposed New Developments to be undertaken in Connection with a Planning Application. Available online: https://www.aberdeenshire.gov.uk/media/15346/20160120-final-noise-guidance-for-new-developments.pdf

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