



ABERGELLI POWER PROJECT PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

Abergelli Power Ltd

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1 INTRODUCTION

1.1 Overview

1.1.1 This document is the Environmental Impact Assessment (EIA) Preliminary Environmental Information Report (PEIR) for the proposed Abergelli Power Project (hereafter referred to as 'the **Project**'). The PEIR has been prepared by Parsons Brinckerhoff on behalf of Abergelli Power Limited (APL).

1.1.2 The Project proposed is a gas-fired 'peaking' plant which is designed to operate when there is a surge in demand for electricity associated with a particular stress event (e.g where there is a sudden demand in power required by consumers or a sudden drop in power being generated by plants which are constantly operational such as a sudden outage). The principal elements of the Project are:

- A new **Power Generation Plant** in the form of a Simple Cycle Gas Turbine (SCGT) gas fired peaking power generating station fuelled by natural gas and capable of providing a rated electrical output of 50 - 299 Megawatts (MW) comprising:
 - The **Generating Equipment** including the Gas Turbine Generators and Balance of Plant which are located on the **Generating Equipment Site** (see Figure 1.3);
 - A new purpose built **Access Road** either from the Rhyd-y-pandy Road to the north (**Access Road – Option 1**) or the B4489 to the west (**Access Road – Option 2**) to the Generating Equipment Site; and
 - During construction a temporary construction compound (the **Laydown Area**).
- A new **Gas Connection** to bring natural gas to the Generating Equipment from the National Transmission System (NTS); and
- A new **Electrical Connection** to export power from the Generating Equipment to the National Grid Electricity Transmission System (NETS).

1.1.3 The Generating Equipment, Access Road and Laydown Area are together known as the **Power Generation Plant**, and are located within the **Power Generation Plant Site**.

1.1.4 The Power Generation Plant, Gas Connection and Electrical Connection are all integral to the generation of electricity'. The land upon which the

Project would be developed, or which would be required in order to facilitate the development of the Project, is referred to as the '**Project Site**' (see Figure 1.1 and 1.2). Diagram 1.1 shows how the elements of the project relate to each other.

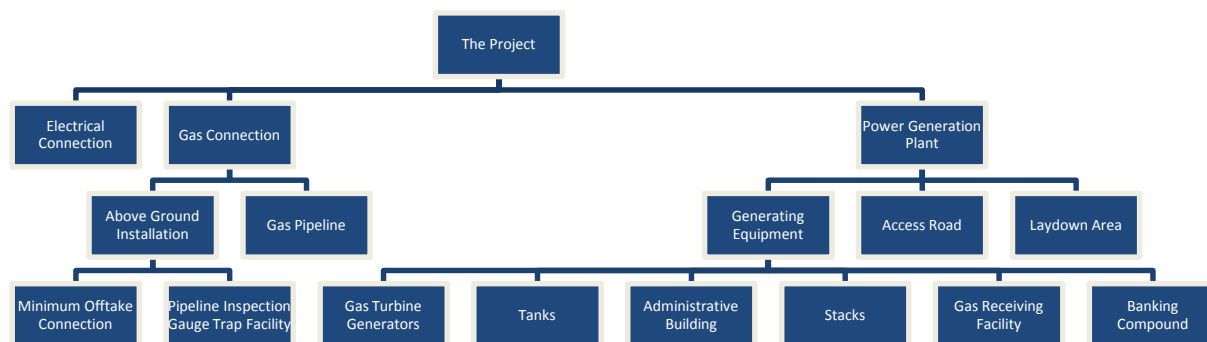


Diagram 1.1: Project Description

1.1.5 The Project would be situated on farmland located north of Swansea within the administrative area of the City and County of Swansea Council (CCS), approximately 1 km southeast of Felindre, 760 m west of Llwynceilyn and 1.4 km north of Llangyfelach (see Figure 1.1). The approximate centre of the Project Site lies at grid reference 265284, 201431.

1.1.6 The Project is described in more detail in Chapter 2, including the options currently under consideration for the Access Road.

1.2 Purpose and Structure of the PEIR

1.2.1 Preliminary Environmental Information is defined in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 as:

'information referred to in Part 1 of Schedule 4 (information for inclusion in environmental statements) which:

(a) has been compiled by the applicant; and

(b) is reasonably required to assess the environmental effects of the development (and of any associated development)'.

1.2.2 The purpose of the PEIR is to enable consultees, including the local community, to understand the environmental effects of the Project so they can provide a comprehensive response.

- 1.2.3 This document presents the environmental information collected to date and an assessment, on a preliminary basis, of the likely significant environmental effects of the Project. The planned activities which still need to be undertaken to complete the EIA include:
- concluding baseline environmental surveys;
 - completing the assessment of the Project and confirming the final design, informed by, inter alia, feedback from stakeholders and public consultation; and
 - designing possible mitigation to address adverse effects.
- 1.2.4 Once complete, the findings of the EIA will be reported in full in the Environmental Statement (ES) to be submitted with the Application for a Development Consent Order (refer to Section 1.3).
- 1.2.5 The PEIR is structured in a similar way to the way the ES will be structured. Chapter 2 provides a description of the Project and the elements that are currently known. Chapter 3 provides a brief summary of the legislation and policy relevant to the EIA of the Project. Chapter 4 describes the generic methodology to be used in assessing the likely significant environmental effects. Chapter 5 describes the alternatives considered so far in the design of the Project. Chapters 6 to 14 set out the methodology, baseline information collected so far and preliminary assessment of likely significant environmental effects for each specialist topic area, including the cumulative effects. Chapter 15 provides a brief summary and conclusion.

1.3 Application for a Development Consent Order

- 1.3.1 In Wales, an onshore electricity generating station is considered to be a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008¹ (PA 2008) if its generating capacity is more than 50 MW. As the proposed Power Generation Plant will have an electrical generating capacity of at least 50 MW, it will be classified as a NSIP under Section 14(1)a and Section 15(2) of the PA 2008. Under Section 31 of the PA 2008, a Development Consent Order is required for development that is or forms part of a NSIP and therefore it is intended that an Application for a Development Consent Order will be submitted to the Planning Inspectorate for examination on behalf of the Secretary of State (SoS).

1.4 Consultation Strategy

Non-Statutory Consultation

¹ Planning Act 2008 <http://www.legislation.gov.uk/ukpga/2008/29/contents>

- 1.4.1 Informal public consultation was carried out on 19th to 21st June 2014 through public exhibitions at Clydach, Felindre and Tircoed.

Statutory Consultation

- 1.4.2 Statutory pre-application consultation with those living in the vicinity of the Project is a requirement under section 47 of the PA 2008. This PEIR has been published in the manner described in the Applicant's Statement of Community Consultation (SoCC), which explains how APL proposes to consult people living in the vicinity of the Project. The SoCC also explains how feedback can be given about the Project and the content of this PEIR. The SoCC is available on the APL website (www.abergellipower.co.uk).
- 1.4.3 Public exhibitions will be held at Llangyfelach, Felindre, Clydach and Tircoed between 22nd and 25th October 2014.
- 1.4.4 The Project is still being developed and refined. Feedback received during the consultation process will help inform the development of the Project and the decisions on its design still to be made.
- 1.4.5 Under Section 42 ('Duty to Consult') of the PA 2008, there is a duty placed on developers to consult certain prescribed bodies as well as local communities. In this respect, APL first met CCS to discuss the Project in April 2014 and will continue to consult with them throughout all phases of the Project.
- 1.4.6 All representations made during the consultation process are being considered carefully and APL will have regard to all relevant responses prior to submission of the Application for a Development Consent Order. The consultation process will be described in the Consultation Report to be submitted with the Application.

1.5 The Applicant

- 1.5.1 The Project Applicant is Abergelli Power Limited (APL). APL is an energy development company established for the Project by Watt Power Limited (WPL).
- 1.5.2 WPL has been established to develop flexible gas fired generation assets to support the UK Government drive to a low carbon economy. Stag Energy provides the resources through a management services agreement with WPL. Stag Energy was founded in 2002 and the company draws on a depth of experience within a team that has created and delivered over 10,000 MW of power generation and related infrastructure projects across the globe, of which 2,500 MW has been delivered in the UK.

- 1.5.3 WPL currently has two other 299 MW projects being brought forward through the planning process. They are Progress Power Ltd at Eye Airfield in Suffolk (www.progresspower.co.uk) and Hirwaun Power Ltd at Hirwaun in South Wales (www.hirwaunpower.co.uk). Both projects are now in the examination phase following acceptance of the Applications for Development Consent Orders by the Planning Inspectorate.
- 1.5.4 WPL is committed to the development of assets to support the UK Government's drive to a low carbon economy. APL recognises the need to balance commercial issues with the environmental benefits and concerns of energy projects and believes this can be responsibly delivered at a local level. The Project and supporting infrastructure will be designed and developed to high quality, safety and environmental standards.
- 1.5.5 Further information on the companies is provided at <http://www.abergellipower.co.uk> or <http://www.wattpowerltd.co.uk>.

1.6 Needs and Benefits of the Project

- 1.6.1 There is considerable national need for this type of development, acknowledged at all levels of Government policy. National planning policy supports the need for new electricity infrastructure due to the current ageing and inevitable closure of older coal fired power plants and the likely increase in demand for electricity over the coming decades.
- 1.6.2 The overarching National Policy Statement for Energy (NPS EN-1)² states that *'gas will continue to play an important role in the electricity sector – providing vital flexibility to support an increasing amount of low-carbon generation and to maintain security of supply'* (paragraph 3.6.2).
- 1.6.3 Gas is a reliable fuel source. It is acknowledged by the Government as being essential to a low-carbon economy and to underpin the country's energy security. In addition, gas peaking plants such as the Project provide back-up to power generation from renewable sources, particularly wind power, which is an increasingly prevalent but intermittent energy source. Modern gas fired power plants are among the most efficient and cleanest forms of electricity power generation.
- 1.6.4 At present, thermal peaking capacity in the UK is relatively small due to the nature of the electricity generation mix on the NETS. There is therefore a clear and significant requirement for further capacity to meet the projected need for reactive/flexible generation. A dedicated gas fired peaking plant such as the Project could allow for the rapid provision of

² Department of Energy and Climate Change (July 2011) Overarching National Policy Statement for Energy (EN-1) - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/37046/1938-overarching-nps-for-energy-en1.pdf

reserve capacity to the NETS, thus playing a role in meeting the energy requirements of the UK going forward.

2 PROJECT AND SITE DESCRIPTION

2.1 Introduction

- 2.1.1 The Project Site and elements of the Project are described below. The description is based on a 'Rochdale Envelope' approach (i.e. a single project with a range of parameters). The scope of each of the technical assessments has been based on the parameters provided below. Assessing a worst-case realistic configuration from within the parameters enables an assessment of the 'realistic worst case' likely significant environmental effects within each technical assessment. Section 4.9 below explains the approach to identifying and assessing the worst case scenario for each topic chapter in this PEIR. It is acknowledged that the parameters may be refined during the design process for the Project and as a consequence of the feedback received following consultation. If this occurs the modified parameters will be described and taken into account in the EIA as appropriate.

2.2 The Project Site

- 2.2.1 The Project Site (see Figure 1.1) is located on farmland north of Swansea, approximately 1 km southeast of Felindre, 760 m west of Llwynceilyn and 1.4 km north of Llangyfelach. The land is currently used for sheep and horse grazing as well as horse training and breeding. The western extent of the Project Site encompasses National Grid's 'Swansea North' electrical substation (comprising a 132kv and 400kv substation) and Felindre Gas Compressor Station. In addition, areas within the Project Site have, in the past, been subject to a variety of permissions for mineral extraction, inert landfill and other commercial activities.
- 2.2.2 The Project Site will be accessed from Junction 46 of the M4. From the M4 there are two access options being considered at this stage (as shown in Figure 1.1 and Diagram 2.1): Option 1 from the north via the Rhyd-y-pandy Road utilising the existing farm road which runs north/south through Abergelli Farm; or Option 2 from the west via the B4489 utilising the existing National Grid road and then via agricultural land to the west of the Generating Equipment Site and land following the southern boundary of the Gas Compressor Station.
- 2.2.3 Ground levels at the Project Site vary from approximately 146 m AOD in the north-west corner to 80 m AOD along the southern perimeter with ground levels generally falling in a southerly and south easterly direction towards the Afon Llan and its tributaries.

- 2.2.4 The Power Generation Plant Site will be located primarily within fields used for grazing bounded by a mixture of drainage ditches, fencing and defunct hedgerows with substantial gaps in them. The Generating Equipment Site and Laydown Area are divided into two areas by a soft surface horse training track known as 'the gallops' with a block of broadleaved woodland to the east classified as Ancient Woodland and a Site of Importance for Nature Conservation (SINC). There are also further blocks of Ancient Woodland to the west surrounding Swansea North electrical substation and Felindre Gas Compressor Station and the access road leading to these facilities from the B4490. The land within the Generating Equipment Site is at approximately 90 m above Ordnance Datum (AOD) and gently slopes down towards the south.
- 2.2.5 The Gas Connection will follow a route corridor as shown on Figure 1.1 and Diagram 2.1 located to the north of the Generating Equipment Site crossing grazing fields bound by hedgerows and ditches. It will vary between 30 m and 100 m in width depending on the working area required. The fields are interspersed by small deciduous copses, some of which are classified as Ancient Woodland and SINC's to the north, northeast and northwest of the Generating Equipment Site, as identified on Figure 8.1 and 8.2.
- 2.2.6 The Electrical Connection will follow a route corridor of approximately 30 m in width identified in Figure 1.1 and Diagram 2.1. It will be located to the southwest of the Generating Equipment Site passing through grass fields and following the southern boundary of the Gas Compressor Station.

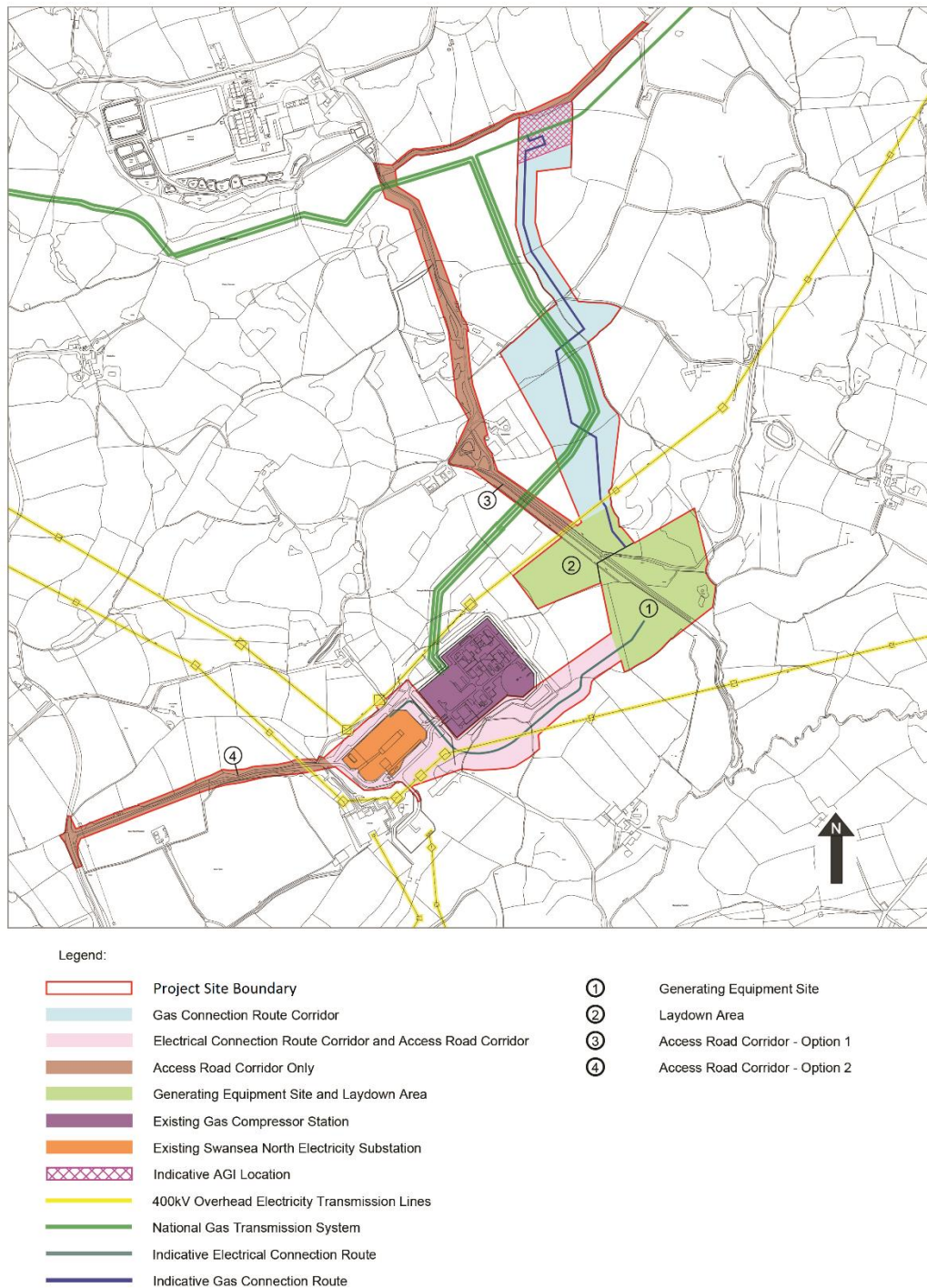


Diagram 2.1: Indicative plan showing the main elements in the Project Site

2.3 The Surrounding Area

2.3.1 The area surrounding the Project Site is partly rural with some urban fringe development (e.g. Park and Ride Facilities) and a substantial amount of utilities infrastructure in the area. Gas NTS Pipelines, and a water pipeline cross the Project Site and there is also a network of electricity pylons which lead to and from National Grid's two electrical substations to the southwest of Abergelli Farm. Furthermore a Water Treatment Works is located to the northwest while the Cefn Betingau Solar Park is located to the east of Project Site.

2.3.2 The closest residential dwellings to the Project Site are:

- Abergelli Farmhouse approximately 620 m to the north of the Generating Equipment Site;
- Llwynhelig approximately 590 m to the south east of the Generating Equipment Site;
- Felin Wen Farm approximately 830 m to the east of the Generating Equipment Site;
- Lletty Morfil Farm approximately 740 m to the west of the Generating Equipment Site;
- Cefn-betingau approximately 650 m to the north east of the Generating Equipment Site; and
- Maes-eglwys approximately 440 m to the south of the Generating Equipment Site.

2.3.3 These dwellings are identified on Figure 1 of Appendix 7.1 as Noise Sensitive Receptors.

2.3.4 Within the Project Site there is a small landfill and the remains of Abergelli Colliery, both of which are located north of Abergelli Farmhouse.

2.3.5 Other features of the area include a number of existing public footpaths, bridleways and tracks located in and around the Project Site, linking it to the wider area. In addition, within the Project Site there are a number of springs with their associated streams and drainage ditches which discharge into the Afon Llan. The Afon Llan links with the Afon Lliw and the River Loughor, which discharges into the Bristol Channel.

2.4 Relevant Planning History

2.4.1 Abergelli Farm has previously been subject to a series of planning applications for mineral extraction, inert landfill and other commercial activities.

- 2.4.2 Swansea City Waste Disposal Company Ltd gained planning permission for 'excavation and removal of inert material from landfill site and restoration' at Abergelli Farm in February 2003 (CCS Ref: 2002/0312). This consent was subsequently extended to allow the excavation and removal of inert material until 31st December 2010 (2007/0907).
- 2.4.3 In May 2003, planning permission was granted for the change of use of land at Abergelli Farm from agricultural use to a horse racing training/facility ground (CCS Ref: 2003/0561). Subsequently, CCS granted planning permission for the construction of a stable block in August 2004 (CCS Ref: 2004/0415) and for the construction of two detached dwelling houses to provide Horse Trainers and Stable Hands accommodation (CCS Ref: 2004/0329).
- 2.4.4 Abergelli Glas Ltd gained planning permission for a 10MW solar farm at land at Abergelli Farm, adjacent to the north-east of the Project Site, in May 2013 (CCS Ref: 2013/0135). This consent has since been the subject of a Non-Material Amendment (NMA) application to reduce the number of buildings, solar panels, height of fence, height of framework and to omit the met mast (SCC Ref: 2014/1313/NMA).
- 2.4.5 As a result of recent planning applications, the Project Site at Abergelli Farm currently comprises fields and farmland used for sheep and horse grazing as well as horse training and breeding.
- 2.4.6 The area surrounding the Project Site is predominantly rural but is characterised by a substantial amount of utilities infrastructure.
- 2.4.7 In August 2008, National Grid Electricity Transmission PLC gained planning permission for the construction of a new 400kV electricity substation at a site approximately 1km to the south-west of the Project Site, at Heol Llangyfelach in Felindre, (CCS Ref: 2007/2733). Subsequently, the proposals were modified and planning permission was granted for the amended scheme in November 2008 (CCS Ref: 2008/1685). In association with the 400kV electricity substation, planning permission was granted for an overhead electricity line diversion in April 2008 (CCS Ref: 2007/2827) the construction of an amenity building in July 2010 (CCS Ref: 2010/0539).
- 2.4.8 A 9 MW solar park, consisting of 135,000 PV panels, 9 inverter/transformer cabins and a single control building at land at Cefn Betingau Farm, approximately 1.5km to the south-east of the Project Site, was granted planning permission in August 2013 (CCS Ref: 2013/0865).

2.5 Power Generation Plant

- 2.5.1 The Generating Equipment will be designed as a SCGT peaking plant. A peaking plant is designed to operate when there is a surge in demand for electricity associated with a particular stress event (e.g. where many people across the country boil kettles following the end of a popular television programme or where there is a sudden drop in power being generated from plants which are constantly operational such as a sudden outage). It will be fired by natural gas supplied by a new underground gas pipeline connecting the Power Generation Plant to the existing NTS. It will have a rated electrical output of between 50 - 299 MW (enough to power the equivalent of 400,000 homes).
- 2.5.2 The main equipment in a SCGT is a Gas Turbine Generator, comprising the following components:
- Inlet air filter;
 - Air compressor;
 - Combustion chamber;
 - Power turbine(s); and
 - Exhaust silencer.
- 2.5.3 Air on entering the gas turbines, will be compressed and natural gas injected into the air. The natural gas will then burn in the combustion chamber producing hot, high pressure gases. The gas will then expand across the blades of the gas turbine driving the electrical generators to produce electricity.
- 2.5.4 The waste gases and heat produced from this process will then be released to the atmosphere via between one and five stacks (chimneys). The stack(s) will contain equipment which will reduce emissions released to the atmosphere. Diagram 2.2 shows a simple schematic of a SCGT operation.

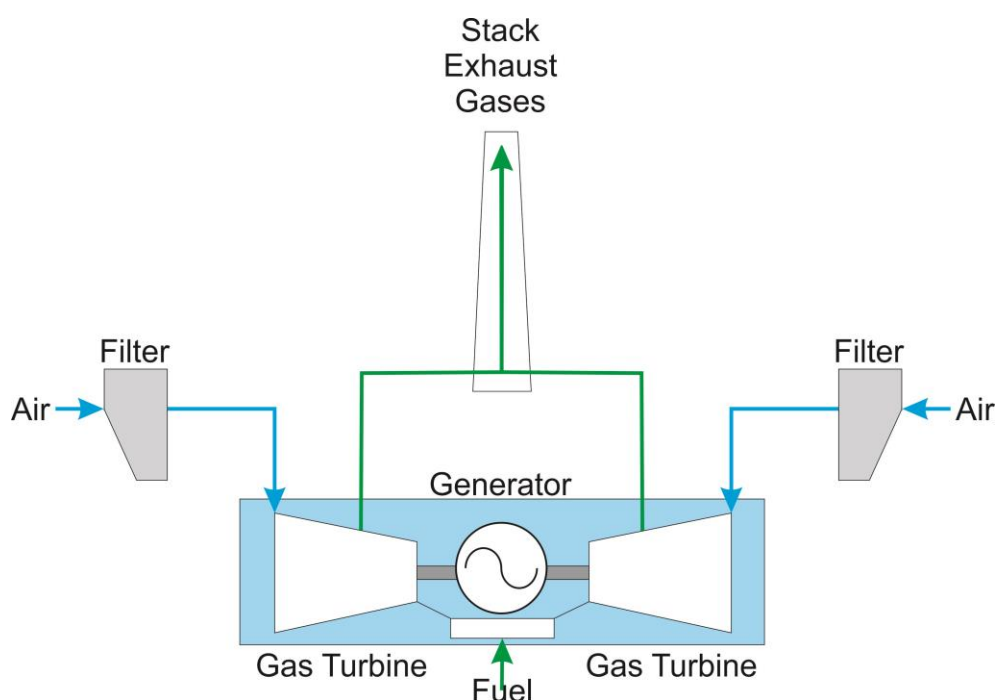


Diagram 2.2: Schematic of SCGT Operation

2.5.5

The maximum area for the Generating Equipment Site will be 6 ha. The Generating Equipment may be sited in a number of locations within the wider Generating Equipment Site depending on its final design. The Generating Equipment Site may also be reduced in size during the design process with any changes acknowledged in the ES. Table 2.1 provides indicative dimensions for the main plant items which will be present at the Generating Equipment Site.

Table 2.1: Indicative Dimensions of Main Plant Items

Plant Item	Indicative Dimensions (m)
Gas Turbine Generators (plant dimensions)	Gas turbine plant housing incorporating 1 gas turbine units where 3, 4 or 5 generators are constructed with dimensions 36 m (length) x 30 m (width) x 15 m (height) OR Gas turbine enclosure incorporating 1 gas turbine unit where 1 or 2 generators are constructed with dimensions 82 m (length) x 36 m (width) x 24 m (height)
Stacks (dimensions)	Up to 5 no. stacks 35 m (minimum height) to 40 m (maximum height), and up to 10 m (diameter)
Administration/ workshop/ control building	1 no. building Up to 29 m (length) x up to 23 m (width) x up to 6 m (height)
Water tank	1 no. tanks.

Plant Item	Indicative Dimensions (m)
	18 m (length) x 18 m (width) x 15 m (height)
Gatehouse	4.5 m (height) x 9 m (length) x 8 m (width)
Banking Compound	65 m (length) x 60 m (width) x 5 m (height)
Maintenance Compound	50 m (length) x 45 m (width) x 3 m (height of fence, otherwise flat)
Black start diesel generator	5 m (height) x 13 m (length) x 5 m (width)
Gas Receiving Facility	1 no. gas receiving facility 60 m (length) x 46 m (width) x 3 m (height)

2.5.6 A temporary Laydown Area for the storage of plant and equipment during construction will be provided adjacent to the Generating Equipment Site as shown in Figure 1.1. It is not proposed that land will be required for a permanent maintenance/laydown area during operation.

2.5.7 A new purpose built Access Road will be constructed within the Power Generation Plant Site. Two options are being considered for access to the Generating Equipment Site via Junction 46 of the M4 (see Section 2.11).

2.6 Gas Connection

2.6.1 The Gas Connection will be in the form of a new underground gas pipeline connection (the Pipeline) and above ground installation (AGI) and is required to connect the Generating Equipment to the existing high pressure NTS Pipeline (Feeder 28) in order to provide a reliable supply of fuel.

2.6.2 Connection of the Pipeline to the NTS will require an Above Ground Installation (AGI) to be installed which will comprise: a Minimum Offtake Connection (MOC) facility, which will be owned by National Grid Company (NGC); and a Pipeline Inspection Gauge (PIG) Trap Facility (PTF) which will be owned by APL.

2.6.3 The MOC (approximately 40 m x 30 m) will contain:

- Remotely operable valve (ROV);
- Control and instrumentation kiosk; and
- Electrical supply kiosk.

2.6.4 The PTF (approximately 40 m x 30 m) will contain:

- PIG launching facility;

- Emergency control valve (possible);
- Isolation valve;
- Control and instrumentation kiosk; and
- Electrical supply kiosk.

2.6.5 Termination of the Gas Connection will be at a PTF on the Generating Equipment Site. A further facility known as the Gas Receiving Facility (GRF) will be situated downstream of the PTF within the Generating Equipment Site. The PTF will contain the following equipment:

- PIG receiving facility;
- Emergency control valve (possible); and
- Isolation valves.

2.6.6 The GRF will contain the following equipment:

- Metering, heating, filtering, compression and pressure regulation equipment;
- Isolation valve;
- Electricity supply kiosk; and
- Control and instrumentation kiosks.

2.6.7 The PTF and GRF will be sited close to each other and if possible they will be joined on a single plot.

2.6.8 The AGI (both the MOC and PTF) will be located in the north of the Project Site, on the southern side of the Rhyd-y-pandy road leading to Felindre. Once complete, maintenance access will be taken from that road. The Gas Connection will then follow a route corridor shown on Figure 1.1 running in southerly direction to the Generating Equipment Site. It will be approximately 1.4 km in length. It will cross the NTS in two locations.

2.6.9 The laying of the Gas Connection will involve the excavation of a trench, temporary stockpiling of the soil and then subsequent backfilling with soil.

2.7 Electrical Connection

2.7.1 The Electrical Connection will comprise all the necessary elements to enable power to be exported from the Generating Equipment to the NETS such as new electrical circuits in the form of an underground cable. The terminal point between National Grid and APL is assumed to be the

400kV circuit breaker in the Swansea North 400kv substation. The Electrical Connection will be approximately 900 m in length.

- 2.7.2 The route (see Figure 5.1) leaves the Generating Equipment Site passing through farmland to the east and south-east of the National Grid Gas Compressor Station. The route crosses into National Grid's land to the east of tower 4YW251 heading towards the National Grid Swansea North substation. Once within National Grid's land the Electrical Connection turns to the north-west to run outside the substation and parallel with the substation fence line through what is understood to have been part of the site works area during construction. The Electrical Connection then turns into the substation close to the northern corner.
- 2.7.3 The route is known to pass under 400 kV overhead transmission lines and under wood pole overhead distribution lines. The route crosses watercourses, in the form of streams or drainage ditches, at a number of locations. The route is understood to cross a local transmission service high pressure gas pipeline within the field to the east of tower 4YW251; this crossing will be at close to a right-angle.
- 2.7.4 It is anticipated that the underground cable circuit will be installed using a single open cut trench along the route. Where the route enters National Grid land it may be necessary, due to the slope, and crossing of a watercourse and hedgerow, for the cable to be installed underground by directional drilling, for around 70 m in length. Directional drilling is used to avoid obstacles. A bore is made between two points on the surface and a polymeric pipe is pulled through to form a duct. The cable can then be pulled into the duct.
- 2.7.5 Due to the change in elevation, a special cable support construction, such as the use of clamps with cable snaking to support the weight of the cable up the slope, may be required where the route rises from the boundary of the National Grid substation to the north-east corner of the substation. Within the National Grid substation it is likely that the cables will be installed in filled surface troughs.
- 2.7.6 The Electrical Connection will cross an existing Public Right of Way (PRoW) shown on Figure 12.4. During construction, a bridge will be installed so that disruption to the users of the PRoW will be minimised.

2.8 Carbon Capture Readiness and Carbon Capture and Storage

- 2.8.1 With a rated electrical output of less than 300MW, the Project will be below the threshold set out in Directive 2009/31/EC³ (as transposed by

³ Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006

The Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013) and National Policy Statement EN-1 and EN-2 for when operators of combustion plants are required to have assessed the feasibility of: a storage site, transport facilities and economic considerations of the capture of carbon dioxide (CO₂) produced as a result of the combustion process. Therefore it is not considered necessary to assess the viability of CO₂ capture or include it further in this report.

2.9 Waste

- 2.9.1 A Construction Environmental Management Plan (CEMP) will be prepared for approval by the local authority prior to commencement of construction. Measures for controlling waste will include, amongst others, the stockpiling of excavated spoil and testing for Waste Acceptance Criteria, to determine whether it can be re-used on- or off-site, and the testing and removal, as appropriate, of any water from de-watering activities which will be handled by a suitably licensed waste contractor.
- 2.9.2 All construction waste will be dealt with in a manner that complies with relevant legislation and (upon leaving the Project Site) waste will be treated and disposed of by suitably licensed contractors.
- 2.9.3 The laying of the Electrical Connection will involve the excavation of a trench or directional drilling, temporary stockpiling of the soil and then subsequent backfilling with soil. No significant surplus waste materials are expected to arise from this activity.
- 2.9.4 The laying of the Gas Connection will involve the excavation of a trench, temporary stockpiling of the soil and then subsequent backfilling with soil, and the construction of the AGI. No significant surplus waste materials are expected to arise from this activity.
- 2.9.5 Small amounts of solid waste will arise from the Power Generation Plant during operation and will include both hazardous and non-hazardous in nature.
- 2.9.6 Final types and volumes have not yet been confirmed but will be restricted to the following:
- General office wastes;
 - Used gas turbine air intake filters. These are typically replaced annually for generating station operating constantly and hence will require much less frequent replacement for a 1,500 hour/year peaking plant as proposed;

- Other miscellaneous wastes;
- Small quantities of water from compressor blade washing;
- Separated oil/sludge from any oil/water separators on site; and
- Used oil, chemicals or chemical containers.

- 2.9.7 Only small quantities of potentially hazardous waste from the above list will be stored on the Generating Equipment Site at any time (final types and volumes have not yet been confirmed). Such substances will be held in secured containers to prevent contaminant migration. All waste management practices will be in full accordance with regulatory requirements and with industry best practice. Waste will be treated and disposed of by licensed contractors.
- 2.9.8 No waste is predicted to arise during the operational phase from the Electrical and Gas Connections.
- 2.9.9 A range of waste types are likely to arise during decommissioning and will include materials such as structural steel, metal cladding and roofing, and block and concrete waste, all of which will be suitable for recovery and reuse or recycling. Redundant Generating Equipment will include turbines, ducting and pipework, generators and associated machinery and controls. These will be dominated by valuable metals and other materials suitable for specialist commercial recycling and could also involve re-use of equipment elsewhere. It is not predicted that significant quantities of residual waste requiring disposal will arise.
- 2.9.10 It is proposed that the cabling associated with the Electrical Connection will be left in-situ following end of use. It is proposed that the buried pipework, and cabling associated with Gas Connection will be left in-situ following end of use. The AGI will be decommissioned and left in situ. The MOC will remain live in case it is reused in the future, but everything downstream will be isolated from it. All below ground pipework will be nitrogen purged and capped.
- 2.9.11 There is good provision of waste management capacity in South West Wales to cover all types of waste arisings. The most up to date information is from the Regional Waste Plan 1st Review⁴ (Neath Port Talbot County Borough Council (co-ordinating authority), August 2008).
- 2.9.12 All wastes generated as part of the operational phase will be handled and stored under appropriate waste management legislation e.g. Environmental Protection Act 1990 and the Environmental Permitting (England and Wales) Regulations 2010.

⁴ http://www.walesregionalwasteplans.gov.uk/south_west/regional_waste_plan_first_review.html

2.10 Electric and Magnetic Fields (EMFs)

2.10.1 There are no external electric fields associated with underground cables as explained in the BICC Electric Cables Handbook⁵. Electric fields associated with underground cable are contained by the sheath of the cable itself. The public will thus not be exposed to electric fields from the proposed underground cables associated with the Project.

2.11 Access and Traffic

2.11.1 There are two proposed options for the Access Road as shown in Figure 1.1. Table provides a comparable description of the two routes.

Table 2.1: Access Route Comparison

Criteria	Access Option 1 J46, M4 to Generating Equipment Site	Access Option 2 J46, M4 to Generating Equipment Site
Route	Via Pant Lasau Road, Rhyd-y-Pandy Road and unnamed roads leading to Felindre	Via B4489
Length (km)	7.85	3.6
Public Road condition up to Private means of access	Predominantly narrow rural	Single-carriageway
Private Road condition	Farm track	Tarmacked track with a further new road to be constructed
Description of works	Existing track widened to 6m between points C and D on Figure 2.1. Localised upgrades and widening to be undertaken between points D and E. Track crosses utilities and watercourses in the following locations <ul style="list-style-type: none"> • NTS Pipeline (Feeder 28) 2no. Pipes • NTS Pipeline (Feeder 28) 3no. Pipes 	New access track to be constructed between points A and B on Figure 2.1. Track crosses utilities and watercourses in the following locations <ul style="list-style-type: none"> • 400kv cable • Watercourse • Hp Its pipeline • Watercourse
Other considerations	Emergency vehicle access to Morriston Hospital	Existing Park and Share scheme and proposed Park and Ride scheme for B4489

⁵ Electric Cables Handbook, 3rd Edition. BICC Cables, Blackwell Science Ltd, October 1997. Chapter 2 section Electromagnetic Fields.

- 2.11.2 Car parking will be provided within the compound of the Generating Equipment Site during construction and decommissioning. The Project will consider the Council's policy on parking standards during the operational phase of the Project and consider sustainable transport methods.
- 2.11.3 It is estimated that the construction and decommissioning phases will result in approximately 200 car or van trips per day and around 150 HGV deliveries per day during the peak construction/decommissioning period. This assumes a 22 month construction period, as per similar peaking plants, with the peak of HGV deliveries occurring during the first quarter of construction (months 1 to 3) and the peak of car and van trips occurring during the fifth quarter of construction (months 13 to 15). The car or van trips would be limited to the start and end of the working day whilst HGV trips would be spread across the day.
- 2.11.4 During the operational period, it is anticipated that approximately three people would be present on site during each shift. With three shifts per day, this would equate to 18 two-way car trips.

2.12 Timescales

- 2.12.1 Construction and commissioning of the Project will take approximately 22 months starting in late 2018. The main works associated with the construction phase will be excavation and site levelling for new foundations, potential piling (if required) and the laying of the Gas and Electrical Connections, as well as construction of the Generating Equipment.
- 2.12.2 The Generating Equipment will be designed to have a minimum operational life of 25 years, and after its operational life it will be decommissioned or re-powered depending on the nature of the electricity market and energy mix at the time. For the purposes of the EIA, it will be assumed that the Generating Equipment will be decommissioned. It does not make a material difference to the assessment how long the operational life is.
- 2.12.3 Decommissioning will comprise the removal of all Generating Equipment items and restoration of the Project Site to a similar condition compared to before the construction of the Project. This process will also take approximately 22 months. It is likely that some underground structures, including the Gas and Electrical Connections may be capped and left in situ to avoid any adverse environmental effects associated with their removal. Due regard will be paid to all best practice guidelines and legislation on decommissioning of projects which are relevant at the time

of the decommissioning activities. Where possible, items of plant will be recycled or reused.

2.13 Embedded Mitigation

2.13.1 Mitigation which forms part of the Project is known as embedded mitigation and reflects standard practice, particularly during construction. This section describes the measures which are considered to be embedded mitigation for the purposes of the preliminary assessment.

Construction

2.13.2 A Construction Environmental Management Plan (CEMP) will be prepared to mitigate environmental effects during construction. This will include the following dust mitigation measures:

- Records of dust and air quality complaints to be kept, including likely causes and mitigation measures to reduce effects if appropriate;
- Keep site perimeter, fences etc. clean.
- Consideration of weather conditions, dust generating potential of material to be excavated prior to commencement of works;
- Plan site layout to maximise distance from plant/stockpiles etc. to sensitive receptors;
- Dusty materials should be removed from site as soon as possible.
- Loads entering and leaving the site with dust generating potential should be covered and wheel washing facilities made available;
- No idling of vehicles;
- Vehicles to comply with site speed limits (15mph on hard surfaces, 10mph on unconsolidated surfaces);
- Water assisted sweeping of local roads to be undertaken if material tracked out of site; and
- Install hard surfacing as soon as practicable on site and ensure that they are maintained in good condition.
- Exposed soils should be revegetated as soon as practicable. Near residential properties or sensitive ecosystems (<50m), use hessian/mulches etc. where not possible to revegetate or cover with topsoil;

- Minimise dust generating activities, particularly near residential receptors/sensitive ecosystems during prolonged dry, dusty weather unless damping / other suppressants are used;
- Ensure an adequate water supply to site and use water as dust suppressant where applicable;
- Ensure any site machinery is well maintained and in full working order;
- Ensure equipment available for cleaning spills etc available at all times; and
- Sand and aggregates should be stored away from sensitive receptors and screened/shielded. Similarly concrete batching should take place away from receptors.

2.13.3 The following hydrological measures will also be included:

- Any surface water with the potential to be contaminated by hydrocarbons to be passed through oil/grit interceptors prior to discharge to sewer;
- Measures will be taken to ensure that no leachate, or any surface water that has the potential to be contaminated, will be allowed to enter directly or indirectly any water course, underground strata or adjoining land;
- Water inflows to excavated areas will be minimised by the use of lining materials, good housekeeping techniques and by the control of drainage and construction materials in order to prevent the contamination of ground water. Site personnel will be made aware of the potential impact on ground and surface water associated with certain aspects of the construction works to further reduce the likelihood of accidental effects;
- Refuelling of construction vehicles and equipment will be restricted to a designated area with appropriately designed fuel tanks and bunds and suitable operating procedures.
- Siting of stockpiles a minimal distance from watercourses to avoid pollution runoff and adhering to best practice working guidelines to avoid spillages near watercourses; and
- All oil and chemical storage tanks and areas where drums are stored will be surrounded by an impermeable bund. Single tanks will be within bunds sized to contain 110 per cent of capacity and multiple tanks or drums will be within bunds sized to contain the greater of 110 per cent of the capacity of the largest tank or 25 per cent of the total tanks contents.

- 2.13.4 In relation to the Gas Connection, the following measures will also be implemented:
- Access roads/haul routes will be constructed to effectively manage drainage;
 - Soil bunds will be placed strategically so that drainage catchments are not diverted or altered;
 - Temporary wheel washing facility will be installed to prevent transfer of soil onto nearby public roads if necessary;
 - If deemed necessary, temporary drainage routes/silt fences will be constructed (of geo-textile);
 - Care will be taken during construction to ensure that silt laden water does not enter watercourses. This will be achieved by plugging existing drains, intercepting surface water above the working width and where appropriate by leaving filter strips of unstripped topsoil along main watercourses/ditches. Topsoil will be replaced over post-construction drains as soon as possible to prevent site water from getting into drains;
 - Any de-watering pumping will be undertaken using an appropriately sized pump at such a rate to avoid disturbance or erosion of stream banks;
 - De-watering pipes will be carefully positioned; and
 - All pumps, pipes and connections used during construction will be regularly inspected.
- 2.13.5 Risks to construction workers during the construction phase of the Project will be mitigated by the correct implementation of Health and Safety measures, such as suitable working methods and the correct use of personal protective equipment (PPE). PPE will be site-specific and based on the outcome of the residual risks identified from the human health risk assessment. This may include, but is not limited to the use of hard hat, eye protection, appropriate gloves, overalls and hearing protection. For further guidance, reference should be made to the Health and Safety Executive document EH40 Workplace Exposure Limits'54.
- 2.13.6 The ground investigation will be undertaken in line with British Standard BS5930: The Code of Practice for Site Investigations (BSE, October 1999) and ISO10175: Investigation of Potentially Contaminated Sites (BSE, 2001).
- 2.13.7 The CEMP will include a Site Waste Management Plan (SWMP).

Operation

- 2.13.8 The embedded mitigation for the operational phase of the Project involves setting an appropriate stack height to allow sufficient dispersion of emissions prior to locations of potential exposure of human and ecosystem receptors and the use of sufficient emissions abatement to ensure emissions remain within the limits set by the IED.

3 REGULATORY AND POLICY BACKGROUND

3.1 Introduction

3.1.1 This chapter summarises the main regulatory and policy framework that is relevant to the EIA of the Project at international, national and local levels.

3.1.2 A comprehensive review of potentially relevant policy and evidence will be undertaken during the pre-application process. A detailed description of the planning policy background and its relevance to the Project will be provided in the Planning Statement, which will be produced as a separate document in support of the Application for a Development Consent Order.

3.2 European Union

3.2.1 The EU Directives of particular relevance to the Project with respect to environmental requirements are listed below:

- Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive)⁶;
- Directive 2003/35/EC of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC (the Public Participation Directive)⁷;
- Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (the Industrial Emissions Directive (IED))⁸;
- Directive 1992/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive)⁹;
- Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds (the Birds Directive)¹⁰; and

⁶ European Council Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the EIA Directive)

⁷ European Council Directive 2003/35/EC of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/EC (the Public Participation Directive)

⁸ European Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (the Industrial Emissions Directive (IED))

⁹ Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive)

¹⁰ Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive)

- Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe (the Ambient Air Quality Directive)¹¹.

3.3 Nationally Significant Infrastructure Projects and Planning Act 2008

- 3.3.1 The Project is categorised as a NSIP and will be examined by PINS with the decision on the Application for a Development Consent Order made by the SoS under the regime established by the PA 2008 as described in Chapter 1.
- 3.3.2 The Infrastructure Planning (EIA) Regulations 2009 (the EIA Regulations)¹² and regulation 5(2)(a) of The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009¹³ impose procedural requirements, in particular, the carrying out of EIA in relation to Applications for Development Consent Orders. All development in Schedule 1 (Schedule 1 development) requires EIA to be carried out. Development in Schedule 2 (Schedule 2 development) requires an EIA to be carried out if the Project is likely to have significant effects on the environment.
- 3.3.3 The Project has been identified as a Schedule 1 development and therefore the Applicant is carrying out an EIA for the Project in accordance with the EIA Regulations. The findings of the EIA will be summarised in an ES which will be submitted alongside the Application for a Development Consent Order.

3.4 National Policy Statements

- 3.4.1 PA 2008 required new policy to inform decisions on NSIPs in England and Wales. Policy for such infrastructure is set out in National Policy Statements (NPS). Those that are potentially relevant to the consideration of the Application for a Development Consent Order are:
- The Overarching National Policy Statement for Energy (NPS EN-1);
 - The National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (NPS EN-2)¹⁴; and

¹¹ Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe (the Ambient Air Quality Directive)

¹² The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 No. 2263

¹³ The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 No. 2264

¹⁴ Department of Energy and Climate Change (July 2011) National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (EN-2)

- NPS EN-4 National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines¹⁵.

3.4.2 As set out in NPS EN-1 (Overarching National Policy Statement for Energy), *'this NPS, when combined with the relevant technology-specific energy NPS, provides the primary basis for decisions'* (Paragraph 1.1.1). The decision-maker *'should start with a presumption in favour of granting consent to applications for energy NSIPs'* (paragraph 4.1.2) and on the basis that the urgent national need for such projects is settled.

3.5 Welsh Planning Policy

3.5.1 Decisions must also be taken by the SoS having regard to the local impact reports and any other matters which the SoS *'thinks are both important and relevant to its decision'* (Section 104 of the PA 2008), which may include Planning Policy Wales (PPW), Technical Advice Notes (TANs), Unitary Development Plans (UDPs), Local Development Plans (LPDs) or other local policy documents.

3.5.2 PPW sets out the land use planning policies of the Welsh Government (WG) and is supplemented by 21 topic based TANs. TANs prescribe the government's policies on various planning issues that shape the preparation of development plans. The principles and objectives of TANs prescribe the overarching national guidance for specific individual environmental topics.

3.5.3 TANs potentially relevant to the Project include:

- TAN 5: Nature Conservation and Planning;
- TAN 6: Planning for Sustainable Rural Communities;
- TAN 11: Noise;
- TAN 12: Design;
- TAN 15: Development and Flood Risk; and
- TAN 18: Transport.

3.6 Local Planning Policy

3.6.1 The City and County of Swansea Unitary Development Plan (UDP, November 2008) is the most up to date Development Plan covering the administrative area within the City and County of Swansea and is used in the determination of planning applications. The UDP sets out a range of policies and proposals relating to future development, and deals with

¹⁵ Department of Energy and Climate Change (July 2011) National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipeline (EN4)

the use and conservation of land and buildings within the City and County up to 2016.

3.6.2 The UDP has allocated the land within the Project Site for coal (Policy R2) as well as sand and aggregate resource management (Policy R4).

3.6.3 The UDP is to be replaced within the next few years by the Swansea Local Development Plan (LDP). The Preferred Strategy was published in July 2013¹⁶ for consultation. The Local Development Preferred Strategy is a strategic level planning document that sets out the broad approach being taken to ensure the City and County of Swansea is developed in a sustainable manner over the period to 2025.

3.7 Other Relevant Policy and Guidance

3.7.1 The following are considered to be potentially relevant policy and guidance in considering the potential impact of the Project:

- The Electricity Market Reform (2012)¹⁷;
- A Low Carbon Revolution: Wales' Energy Policy Statement (2010)¹⁸;
- Environment Strategy for Wales (2006)¹⁹;
- The UK Climate Change Risk Assessment (CCRA) (2012)²⁰;
- Gas Generation Strategy (2012)²¹;
- National Infrastructure Plan (2013)²²;
- Annual Energy Statement (2013)²³; and
- Energy Wales – A Low Carbon Transition²⁴.

¹⁶ The City and County of Swansea (July 2013) Preferred Strategy

¹⁷ Department of Energy and Climate Change (May 2012) Electricity Market Reform: Policy Overview

¹⁸ Welsh Assembly Government (March 2010) A Low Carbon Revolution – The Welsh Assembly Government Energy Policy Statement

¹⁹ Welsh Assembly Government (May 2006) Environment Strategy for Wales

²⁰ Department for Environment, Food and Rural Affairs (January 2012) UK Climate Change Risk Assessment: Government Report

²¹ Department of Energy and Climate Change (December 2012) Gas Generation Strategy

²² HM Treasury (December 2013) National Infrastructure Plan 2013

²³ Department of Energy and Climate Change (October 2013) Annual Energy Statement 2013

²⁴ Welsh Government (March 2012) Energy Wales: A Low Carbon Transition

4 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

4.1 Introduction

4.1.1 This Chapter describes the scope of the EIA and structure of related ES for the EIA that is being undertaken to accompany the Application for a Development Consent Order in accordance with the EIA Regulations.

4.1.2 Although the sections below deal with the Project as a whole, it is anticipated that the ES technical chapters will be sub-divided allowing the assessment of effects during the construction, operation and decommissioning phases, description of mitigation measures and residual effects to be addressed separately for the Power Generation Plant, Gas Connection and Electrical Connections as well as together for the overall Project.

4.1.3 In accordance with the PA 2008 and the EIA Regulations, the EIA process for the Project has included the following:

- Establishing, through consultation, the scope of the EIA including obtaining a Scoping Opinion from the SoS;
- Consideration of any potential technical and environmental alternatives;
- Establishing a comprehensive understanding of the existing baseline environmental conditions for the Project Site and the relevant study areas for each topic;
- Identifying the potential environmental effects resulting from the Project;
- Determining how the potential environmental effects can be avoided, reduced or off-set through informed design and/or further mitigation and how its benefits may be enhanced;
- Assessing the significance of the potential environmental effects in conjunction with other effects arising from the Project and those from other reasonably foreseeable neighbouring developments and/or sources (cumulative effects); and
- Proposing options as to how any significant adverse residual effects will be mitigated, managed and monitored.

4.2 Screening

4.2.1 No formal Screening Opinion has been sought from PINS as the Project falls within Schedule 2 of the Infrastructure Planning (Environmental

Impact Assessment) Regulations 2009²⁵ and has the potential to result in significant environmental effects.

4.3 Scoping

4.3.1 APL requested a Scoping Opinion from PINS in July 2014. The request was supported by a Scoping Report that described the anticipated significant environmental issues that will require detailed evaluation as part of the EIA process. The formal Scoping Opinion was received in August 2014. It has allowed for agreement on the potential likely significant environmental effects of the Project and, therefore, the aspects of the environment on which the EIA should focus.

4.3.2 The Scoping Report²⁶ and Opinion²⁷ can be found on the Planning Inspectorate's website and APL's website. The Applicant's responses to the matters raised in the Scoping Opinion are set out in Appendix 4.1.

4.3.3 The site that was considered in the Scoping Report is shown in Figure 1.2.

4.3.4 Further consultation with those bodies that commented on the Scoping Report was also carried out in August and September 2014 including:

- Natural Resources Wales;
- South and West Wales Wildlife Trust;
- Abertawe Bro Morgannwy;
- Civil Aviation Authority;
- Ministry of Defence;
- CADW;
- Brecon Beacons National Park Authority;
- City and County of Swansea Council;
- Network Rail; and
- The Coal Authority.

4.4 Scope of the Preliminary Assessment

4.4.1 The PEIR sets out the findings of the preliminary assessment of the Project as explained in Section 1.2. Each topic chapter describes what

²⁵ National Infrastructure Planning (EIA) Regulations 2009
<http://www.legislation.gov.uk/ukxi/2009/2263/contents/made>

²⁶ <http://infrastructure.planningportal.gov.uk/projects/wales/abergelli-power/?ipcsection=docs>

²⁷ <http://infrastructure.planningportal.gov.uk/projects/wales/abergelli-power/?ipcsection=docs>

assessment work been undertaken in the PEIR and what further work will be undertaken to prepare the ES.

4.4.2 To allow for a precautionary approach, the assessments in this PEIR are based on a realistic worst case scenario specific to each topic based on the Rochdale Envelope parameters as described in Chapter 2.

4.4.3 The ES will be accompanied by a 'No Significant Effects Report' subject to consultation with Natural Resources Wales (NRW). This is a requirement of Regulation 5(2)(l) of the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009 and assesses all effects on nature conservation and geological features.

4.5 Environmental Baseline

4.5.1 In undertaking an EIA for any project it is important to identify the environmental baseline for the potential receptors which may be affected by the Project in respect of, for example, noise, ecology, air quality. In the preliminary assessment, this has allowed the effects of the Project to be compared and/or combined with the existing quality of the environment in order to ensure an informed assessment of the potential effects and to allow the identification of the most appropriate mitigation which could be employed to minimise any adverse effects.

4.5.2 To establish the baseline, a study area that is appropriate for each assessment topic has been identified. Next, a range of environmental data has been gathered from a combination of sources in respect of the study area in order to inform the preliminary assessment. This has included:

- Documentary information on the Power Generation Plant Site, Gas Connection and Electrical Connection routes, and their surroundings within each relevant study area, including information available from the previous environmental impact assessment work for other projects;
- Field survey information, including: Phase 2 ecological surveys; landscape character assessments; background noise levels; ground conditions/contaminated land assessments, location of sensitive receptors and traffic levels on the road network; and
- Data held by both statutory and non-statutory consultees.

4.6 Assessment Methodology

4.6.1 The significance of environmental effects resulting from the construction, operation (including all maintenance activities) and decommissioning of the Project has been categorised using a series of matrices. These have

been developed in each topic chapter to describe the sensitivity of receptors and resources which have the potential to be impacted by the Project and the magnitude of any impacts that are likely to arise. The sensitivity of receptors and resources and magnitude of impact have been cross-referenced to give an overall assessment of the effects for any potential impact. Where it is not possible to quantify impacts, qualitative assessments have been carried out, based on available knowledge and professional judgement. These will be further developed in the ES.

- 4.6.2 In order to provide a consistent approach and enable comparison of effects upon different environmental components, the assessments generally follow the structure and use the terminology outlined below in Tables 4.1 to 4.3. However, for some sections, significance criteria may differ depending on the assessment methodology used. Each technical chapter in the PEIR clearly identifies and explains any specific criteria used as well as defining what constitutes a significant impact and/or effect.

Table 4.1: Determining Receptor Sensitivity

Sensitivity	Example
Very High	Internationally designated sites (e.g. Ramsar, Special Protection Area, World Heritage Site)
High	Nationally designated sites (e.g. Sites of Special Scientific Interest (SSSI), designated landscape, National Parks, Principal Aquifers).
Medium	Regionally designated ecology, heritage sites, secondary aquifers, minor watercourses
Low (or lower)	Locally designated ecology, heritage sites, areas of hardstanding, brownfield land, industrial site, low ecological value.
Negligible	No sensitivity to change

Table 4.2: Determining Magnitude of Impact

Magnitude		Example
Major	Adverse	A permanent or long term adverse impact on the integrity and value of an environmental attribute or receptor
	Beneficial	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality
Moderate	Adverse	An adverse impact on the integrity and/or value of an environmental attribute or receptor, but recovery is possible in the medium term and no permanent impacts are predicted

Magnitude		Example
	Beneficial	Benefit to, or addition of, key characteristics, features, or elements or improvement of attribute quality
Minor	Adverse	An adverse impact on the value of an environmental attribute or receptor, but recovery is expected in the short term and there will be no impact on its integrity
	Beneficial	Minor benefit to, or addition of key characteristics, features or elements; some beneficial impact on attribute or a reduction in the risk of a negative impact occurring
Negligible	Adverse	Very minor loss
	Beneficial	Very minor benefit
No change		No change will be perceptible, either positive or negative

Table 4.3: Determining Significance of Effect

		Magnitude of Impact				
		No Change	Negligible	Minor	Moderate	Major
Receptor Sensitivity	Very High	Neutral	Slight	Moderate	Large	Very Large
	High	Neutral	Slight	Moderate	Large	Large
	Medium	Neutral	Slight	Slight	Moderate	Large
	Low	Neutral	Slight	Slight	Slight	Moderate
	Negligible	Neutral	Neutral	Neutral	Neutral	Neutral

4.6.3 Unless otherwise stated, effects of moderate significance or above are considered to be 'Significant' for the purposes of the EIA Regulations.

4.7 Mitigation and Monitoring

4.7.1 Full consideration has been given to the potential mitigation measures which could be used to ensure that any potentially significant adverse environmental effect of the Project is minimised.

4.7.2 In the hierarchy of mitigation, likely significant adverse effects should, in the first instance, be avoided altogether; where this is not possible such effects should then reduce and, finally, off-set.

4.7.3 Potential mitigation measures described in the PEIR include embedded mitigation through design/standard control measures (which will be used to produce an initial assessment of impact) and any further specific mitigation required (which will be taken into account to produce an

assessment of residual effects). Embedded mitigation is described in Section 2.13.

4.8 Indirect/Secondary Effects, Impact Interactions and Cumulative Effects

4.8.1 Indirect and secondary effects are those which arise as a result of a direct/primary effect. For example, deterioration of water quality in a watercourse due to an effluent discharge (which will be a direct effect) could have an indirect/secondary effect on aquatic biodiversity. These are considered as an inherent part of the assessment in each topic chapter.

4.8.2 The interrelationships between impacts will be considered in the ES.

4.8.3 Cumulative effects occur when a receptor is subject to multiple impacts from multiple schemes. Cumulative and indirect/secondary effects are discussed in each topic chapter of this PEIR.

4.8.4 Developments considered within the cumulative assessment include those that are:

- In the process of being built;
- Permitted application(s) but not yet implemented;
- Submitted application(s) not yet determined;
- Projects on the National Infrastructure's programme of projects;
- Projects identified in the relevant development plan (and emerging development plants – with appropriate weight being given as they move closer to adoption) recognising that information on the relevant proposals will be limited; and
- Projects identified in other plans and programmes (as appropriate) which set the framework for future development consent orders/approvals, where such development is reasonably likely to come forward.

4.8.5 At present, it is anticipated that the following developments will be considered as part of the cumulative assessment (see Figure 4.1).

- Planning Application 2013/1221 – Installation of 16 wind turbines (maximum height to blade tip of 127 metres with a hub height of 80 metres), with a maximum generating capacity of 48MW, associated tracks and ancillary infrastructure at Mynydd y Gwair;

- Planning Application 2013/0795 – Installation of four 5 kW wind turbines 120.7 m to tip and associated infrastructure at Myle Coch Mawr;
- Planning Application 2013/0135 – Installation of ground mounted array of solar panels, inverter substations and 2.4 m high fencing on land at Abergelli Farm. This development will be located east of the Gas Connection;
- Planning Application 2013/1639 (Rhyd-y-pandy Solar Park) – Construction of 7 MW solar park consisting of installation of up to 28,250 photovoltaic panels and up to six inverter/transformer cabins, a single control building and provision of security fencing;
- Planning Application 2013/1835 (Felindre Business Park) – Construction of park and ride/share car park (approximately 480 spaces) with new vehicular access, security office, toilet, engineering and associated works, including lighting, fencing, drainage attenuation and landscaping; and
- Planning Application 2014/1022 (Brynwhilach Solar Park) – Construction of 12.69MW solar park consisting of installation of up to 47,000 pv panels and 8 inverter/transformer stations, 2 substations, storage container, new access tracks, security fencing/cctv and associated equipment and infrastructure work.

4.8.6 Further to these individual planning applications, proposed development within the Swansea Vale Development Area will also be considered for assessment of any significant cumulative effects. Swansea Vale is situated approximately 5 km from the Project Site and extends to some 190 ha south of a railway line and the M4.

4.8.7 In addition, during the EIA other developments may be identified if more information becomes publicly available and if so the above list will be updated.

4.9 Project Scenario for Assessment (the "Rochdale Envelope")

4.9.1 There are several configuration options of SCGT plant available to generate up to 299 MW at the Project Site. These different options mainly relate to the number of gas turbine generator units used at the Generating Equipment Site. Each gas turbine generator unit consists of one or two gas turbines venting to a single stack. The Application will be flexible enough to allow APL to achieve a 299 MW Project by building between one to five gas turbine generator units.

- 4.9.2 The other integral supporting infrastructure at the Generating Equipment Site including water tanks, administration building, stores, electricity banking compound, GRF and gatehouse will remain constant, no matter how many gas turbine generator units are used.
- 4.9.3 Additionally, the Gas Connection and Electrical Connection route corridor options will also remain the same. Only one route option for the Gas connection and the Electrical Connection is considered in this PEIR.
- 4.9.4 Air quality sensitivity tests (Appendix 6.1) have indicated that a minimum stack height of 35 m will be required for adequate dispersion of exhaust gases and to meet legislative air quality targets (i.e. IED). This takes into consideration potential differences in technology choices available from different Original Equipment Manufacturers (OEMs), the requirement to fit constant emissions monitors (CEMS) and silencers into the stack. This height applies to all technology choices and is not dependent on the number of units present at the Generating Equipment Site. Therefore if one gas turbine generator is used, one stack of 35 m will be required and if five gas turbine generators are used, five stacks of 35 m each will be required. A maximum height of 40 m has been assumed for the purpose of the Landscape and Visual Impact and Cultural Heritage Assessments as a 'realistic worst-case' scenario.
- 4.9.5 In accordance with PINS Advice Note 9²⁸ (Rochdale Envelope), rather than assess every possible iteration for the Project, the assessments presented in the PEIR (and the ES when it is prepared) are based on an assessment of the realistic 'worst case' scenario from within the Project parameters. This allows flexibility for the Applicant whilst ensuring that the likely significant environmental effects are identified.
- 4.9.6 Taking the above into consideration, it has been determined that for all topic areas to be addressed in the EIA apart from socio-economics, a realistic 'worst case' scenario from the perspective of environmental effects will be five gas turbine generator units. In addition, for all topic areas except air quality, the highest stack height (40 m) represents the 'worst case'. For air quality the lowest stacks (35 m) represent the 'worst case' due to lower dispersion but, in addition to the lowest stack height, the highest stack height will be assessed in the air quality chapter of the ES so that the EIA contains a complete assessment of the realistic worst case scenario. The ES will contain an explanation in each chapter of why the scenario assessed represents the worst case for that topic.
- 4.9.7 For the preliminary assessment, it has been assumed that the Power Generation Plant will operate for 1500 hours per year in the noise and

²⁸ <http://infrastructure.planningportal.gov.uk/wp-content/uploads/2013/05/Advice-note-9.-Rochdale-envelope-web.pdf>

air quality assessments. In the noise assessment, it is assumed that the Power Generation Plant will operate at night to represent the worst case scenario. Where there is the possibility that intermittent operation could give rise to more significant effects than continuous operation (for example start-up noise) this has been considered in the noise and air quality assessments. This issue is not relevant to any other topic chapters.

4.10 Transboundary Effects

- 4.10.1 Due to the nature and location of the Project, it is considered that there will be no effects caused by the Project that will affect any other EU State. A Transboundary Screening assessment has been undertaken by the Examining Authority which confirms this approach²⁹.
- 4.10.2 The only activity that may result in any effect in another State is if construction materials are sourced outside the United Kingdom. However, effects at the point of extraction of minerals or point of manufacture and transport of materials used in the Project will be considered in the EIA for that development and are therefore scoped out of this EIA and are not considered further.

²⁹ <http://infrastructure.planningportal.gov.uk/Document/2670507>

5 ALTERNATIVES

5.1 Introduction

5.1.1 This Chapter describes the alternative sites and technologies considered for the Project so far.

5.2 Alternative Project Sites

5.2.1 The choice of site for the Power Generation Plant has been carefully considered with various sites investigated throughout the country and a number of relevant factors looked at during this process in accordance with paragraph 4.4.1 of the NPS EN-1 and NPS EN-2. Key factors included in the selection of the Power Generation Plant Site are:

- It is in close proximity to a suitable Electrical Connection point;
- It is in close proximity to a suitable Gas Connection point;
- It is in a developed setting dominated by the Felindre Gas Compressor Station and National Grid's Swansea North substation; and
- It has a well-developed road network and access to the Project Site.

5.3 Project Site Boundary

5.3.1 Figure 1.2, which was originally in the Scoping Report submitted to PINS in July 2014, shows an 'opportunity area' for the Gas and Electrical Connections. Following design refinement, one route option has now been identified for each of these connections as explained below in Section 5.6 and 5.7.

5.3.2 The Project Site boundary outlined in red on Figure 1.1 has therefore been reduced in size to take account of the decision taken on these route options. The Applicant has also sought to avoid areas which have been identified as being environmentally sensitive as a result of ongoing ecological surveys, such as an area of woodland to the north east of the Power Generation Plant Site and the area of Rhos pasture to the north west.

5.4 Power Generation Plant

5.4.1 As a peaking plant, the Generating Equipment will operate for up to 1,500 hours per year as described in Section 1.1.

5.4.2 Given these parameters, it has been determined that a SCGT plant is the preferred and most appropriate technology choice for the Project.

- 5.4.3 There are several alternative types of SCGT plant available to generate up to 299 MW. SCGT plants often use aero-derivative gas turbines (i.e. turbines derived from aeronautical applications), primarily because of their suitability for frequent start-ups, flexibility, high efficiency and high-availability maintenance techniques. For the aero-derivative case, APL envisages using three, four or five individual aero-derivative turbine generators to achieve 299 MW.
- 5.4.4 However, 'industrial' type gas turbines can also be used which are typically larger and often more suited to longer operational hours. They offer similar efficiency but less fast loading flexibility. Industrial gas turbines differ from aeronautical designs in that the casings, rotors and blading are of heavier construction. For the industrial gas turbine case, it is anticipated that one or two individual industrial gas turbine generators will be used to achieve 299 MW.
- 5.4.5 A stack height sensitivity study (Appendix 6.2) has been undertaken for the Project to determine the minimum stack height for the Gas Turbine Generators, required for adequate dispersion of emissions and to meet legislative air quality targets. This height will apply to all technology choices, as discussed above, and will not be dependent on the number of units present at the Generating Equipment Site. A maximum height of 40 m has also been applied as the realistic worst case scenario.
- 5.4.6 The Application will therefore be flexible enough using the Rochdale Envelope approach to allow APL to achieve a 299 MW Project by building between one to five Gas Turbine Generators, with up to five exhaust gas flue stacks.
- 5.4.7 In terms of design evolution of the Project, the following technology options were originally considered for the 299 MW Power Generation Plant: SCGT plant; Combined Cycle Gas Turbine (CCGT) plant; and Reciprocating Gas Engines (RGE) plant.
- 5.4.8 A SCGT is an internal combustion engine which converts heat into work using gases as a working medium. Air is compressed in a multi-stage bladed compressor, liquid oil or gas fuel is added and burnt in combustors and the resulting very hot gases are expanded through stages of turbine blades to drive both the compressor and a generator. The exhaust gases are discharged to atmosphere. Gas turbines are similar in technology to aircraft jet engines.
- 5.4.9 CCGT describes the addition of a steam turbine to the gas turbine cycle such that the hot exhaust gases are passed through a Heat Recovery Steam Generator ('HRSG' or 'boiler') to convert pure water to high pressure steam which is used to drive a steam turbine generator. This cycle can produce around 50% more electricity with no additional fuel.

- 5.4.10 SCGT is considered to be the most suitable technology choice for the Project based on the following environmental, technical and feasibility considerations:
- Visual impact: SCGT plant require shorter stack(s) compared to CCGT plant and therefore are less visually intrusive in views from the surrounding environment;
 - Water resources: the water requirement of a SCGT plant is significantly lower than for a CCGT plant;
 - Noise and available space: noise levels from a SCGT plant will typically be lower than for an RGE plant. A larger number of RGE units will be required at the Generating Equipment Site to generate up to 299 MW. Spatially this may not be possible and the noise levels will overall be lower;
 - Financial: based on the current electricity market, it is essential that the Power Generation Plant of the size proposed is cost effective and competitive, as it will be called upon to operate flexibly to balance out the National Grid and meet changing demands of customers. SCGT plants are better suited to this type of operational regime; and
 - Start-up times: SCGT plants are able to start up and shut down much quicker than similar sized CCGT plants and are, therefore, better suited to meeting variable demands.
- 5.4.11 The potential for using CHP opportunities with these technologies was also considered. However it is not technically or economically feasible with a peaking power station because the profile for the generation of electrical energy from the station cannot be guaranteed to coincide with the required heat demand profile of any potential customer.

5.5 Access Road

- 5.5.1 There are two options for road access which are being consulted upon at this stage which are described in Section 2.11.
- 5.5.2 Option 1 for the access road is from the north via the Rhyd-y-pandy Road and the existing access road west of Brynheulog past Abergelli Farm which will need to be extended to the Generating Equipment Site, as shown on Figure 1.2. The development of this option would involve widening of the existing track to 6 m and localised upgrades along the existing road network (see Figure 2.1 to 2.4). The track crosses the NTS Pipeline (Feeder 28). It runs parallel to a water pipeline but does not cross it.

- 5.5.3 Option 2 is from the west via the B4489, along the access road to National Grid's two electrical substations and Felindre Gas Compressor Station and then along a purpose built Access Road to be constructed, across undeveloped land to the Generating Equipment Site as shown on Figure 1.2. A new track will be constructed along part of the route (see Figure 2.1). The track will cross a 400kv cable, two watercourses and an LTS pipeline.

5.6 Electrical Connection

- 5.6.1 A grid connection assessment was undertaken for the Project Site in March 2014 in order to define and evaluate the options available for connecting the Generating Equipment to the NETS. The most suitable point of connection is currently anticipated to be a cable terminal chamber on the Gas Insulated Switchgear (GIS) circuit at the point where the underground cable emerges to facilitate its connection into the NETS.
- 5.6.2 Both underground cables and overhead lines were considered. Underground cables were identified as the preferred option due to the limited visual impact. This also takes into account the cumulative effect of adding more overhead lines to an area that already includes several overhead lines.
- 5.6.3 Due to proximity of the site to the North Swansea 400 kV substation it is assumed the connection will be to that substation.
- 5.6.4 The Electrical Connection Opportunity Area (see Figure 2.1), to the south west of the Generating Equipment Site, is the area within which the route for the Electrical Connection has been identified. In July 2014, the chosen route (as described in Section 2.7) was identified during a site walkover of the Electrical Connection Opportunity Area. A limited number of route corridor options for the Electrical Connection were considered, as the most appropriate option i.e. the shortest, most direct route from the Generating Equipment Site to the substation, requiring the least amount of land take and avoiding any statutory designated sites or valued habitats, was available (see Figure 5.1). This negated the need to assess any less favourable options.
- 5.6.5 The suitability of the ground conditions for proposed route and the location of utilities will need to be confirmed through site investigation.
- 5.6.6 If Access Option 1 is chosen as the preferred access option, the Electrical Connection will be installed below the road in order to reduce the amount of land required.

5.7 Gas Connection

- 5.7.1 A Gas Connection Feasibility Study was undertaken in March 2014 to define and evaluate the options available for connecting the Generating Equipment to a suitable source of fuel gas. This identified Feeder 28 of the NTS or a nearby LTS HP Pipeline as possible connection points. The location of these in relation to the Project Site is shown on Figure 5.1.
- 5.7.2 Investigations to identify specific route corridor options to the NTS or LTS HP Pipelines were carried out. The Gas Connection will be situated within the Gas Connection Opportunity Area which extends north and south from the Generating Equipment Site as shown on Figure 1.2.
- 5.7.3 Four connection options (shown on Figure 5.2) listed below were explored and further refined to a single Gas Connection route during the investigations. All routes lead from the AGI at the northern Project Site Boundary, across fields to link to the Generating Equipment Site. Due regard has been paid to relevant factors including environmental, planning, safety, engineering and constructability in selecting the preferred route.
- Option 1 was approximately 1.7 km in length including no major road crossings, four minor road crossings, no major water crossings and two minor water crossings. This Option was a feasible route option although it presented some major risks in regards to the impacts on protected species and their habitats and proximity to the development of two Solar Farms.
 - Option 2 was approximately 1.2 km in length including no major road crossings, one minor road crossings, no major water crossings and one minor water crossing. This Option was preferred as it represented the shortest distance avoiding habitats which have been identified as favourable for protected species and the risks associated to crossings of major gas assets. Although this route was not favoured due to the perceived simplicity of the LTS option, it is the better of the NTS options available. A major risk remains in the possibility of routeing either through the proposed solar farm or alongside and parallel to Feeder 28.
 - Option 3 was approximately 1.4 km in length including no major road crossings, one minor road crossing, no major water crossings and three minor water crossings. Option 3 was considered the most viable alternative to Option 2. The route must cross Feeder 28 and must allow for an HDD crossing technique.

- Option 4 was approximately 0.4 km in length including no major road crossings, no minor road crossings, no major water crossings and one minor water crossing. Option 4 is the LTS option. The route is relatively simple with one minor crossing, though this comes at the cost of allowing little buffer capacity and will require negotiation with Wales and West Utilities in regards to their availability of fuel gas capacity.

5.7.4 Option 3 was the chosen Gas Connection. Although it was not the shortest route, it had lower risks than Option 2 that were associated with routing the Gas Connection between the solar farm to the north and Feeder 28. It also avoided habitats which were identified as having the potential for protect species during the Phase One Habitat Survey (see Chapter 8).

5.7.5 Details of the studies and related assessment undertaken will be provided in the ES that will accompany the Application.

6 AIR QUALITY

6.1 Introduction

6.1.1 This chapter provides the air quality preliminary environmental assessment of the proposed Abergelli Power Project based upon assessment carried out up to end of September 2014. The Project is set out in Chapter 2 which forms the primary basis for the assessment carried out to date.

6.1.2 The following factors have specifically been taken account of in this preliminary assessment. The project assessment scenario is based on the possible worst case land take to accommodate the Project Site, and a minimum stack height of 35 m which presents a worst case scenario from an air quality point of view. The assessment has considered potentially significant effects which may be caused by the construction, operation and decommissioning of the Project on noise sensitive receptors in and around the vicinity of the Project Site.

6.1.3 Embedded mitigation in relation to ecology consists of the production of a CEMP (see Section 2.13). Monitoring will ensure the measures are effective.

6.2 Approach

Relevant Policy and Guidance

6.2.1 The air quality assessment in the PEIR has taken account of planning policy and guidance set out in Section 3, as well as the following documents:

- UK Air Quality Strategy³⁰ (1997, revised in 2000 and 2007);
- Environment Act 1995;
- Air Quality (Wales) Regulations 2000;
- Air Quality (Wales) (Amendment) Regulations 2002;
- Air Quality Standards (Wales) Regulations 2010;
- Environmental Permitting (England and Wales) (EP) Regulations 2007;
- Habitats and Species (England and Wales) Regulations 2010;

³⁰ Air Quality Strategy for England, Wales, Scotland and Northern Ireland, 2007, Department for Environment, Food and Rural Affairs

- Local Air Quality Management Technical Guidance LAQM TG(09) (Defra, 2009), including supplementary guidance published by Defra through its website;
- Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 1, Air Quality (HA207/07);
- Environment Agency (EA) Horizontal Guidance H1 Environmental Risk Assessment, Annex F (Emissions to Air, 2011);
- Air Pollution Information System (APIS) indicative critical load values: Recommended values within nutrient nitrogen critical load ranges for use in air pollution impact assessments published through its website;
- Institute for Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction, 2014; and
- Development Control – Planning for Air Quality, 2010 Update, Environment Protection UK (EPUK).

Assessment Methodology

- 6.2.2 The section sets out the assessment methodology and all preliminary investigations carried out to inform this PEIR have followed this methodology. Discussions with the Environmental Health Officers (EHO) at CCS and NRW are on going to agree the final assessment methodology for the ES.

Study Area

- 6.2.3 In relation to construction and decommissioning impacts, whilst small particles (<10 µm) can travel distances in excess of 1 km, the majority of large dust particles generated by construction activities (greater than 30 µm) are deposited within 100 m of sources, and intermediate sized particles (10-30 µm) are likely to travel up to 200-500 m. However, as the particles are transported downwind, their concentration reduces rapidly due to the action of atmospheric dispersion.
- 6.2.4 Following the IAQM guidance on the assessment of construction dust, impacts on human receptors are only considered within 350 m of potential dust sources and ecological receptors are only considered within 100 m of activities. The potential dust sources include: areas of specific construction activities; the route of the Gas and Electrical Connection; and all public and private roads within 500 m of the Project Site. Outside of this study area, it is reasonable to conclude that construction impacts will be negligible.

- 6.2.5 In relation to operational impacts, the study area extends 10 km in all directions from the Generating Equipment Site for both ecological and human receptors. This distance conforms to the EA guidelines (H1 – Annex F) on the assessment of impacts. There are no operational impacts on local air quality anticipated from the Gas and Electrical Connections.

Sources of Baseline Data

- 6.2.6 Baseline air quality in the study area has been assessed with reference to the reports prepared by CCS under the requirements of the Local Air Quality Management regime and the mapped data provided by Defra and APIS.
- 6.2.7 Project specific monitoring has not been undertaken since the existing data holdings are sufficient to characterise current air quality in the study area, as demonstrated in the following sections.

Construction Assessment

- 6.2.8 The IAQM guidance on the assessment of construction impacts provides distance based criteria for qualitatively assessing dust/particulate matter impacts from construction activities. The assessment criteria consider the scale and nature of the works, classed as small, medium or large, as well as the proximity of the receptors. The potential for dust emissions from four different types of activity are assessed, namely:

- Demolition (which is not applicable to this Project);
- Earthworks;
- Construction; and
- Trackout (the movement of dust/mud offsite on haulage vehicles wheels and bodies onto the public road network where it may be resuspended by other vehicles).

- 6.2.9 The assessment has four stages:
- Determination of the magnitude of potential dust generating activities of the Project (termed dust emissions class);
 - Determination of the sensitivity of receptors - identification of sensitive land uses, the proximity and number of receptors, background PM₁₀ concentrations and site specific factors;
 - Assessment of the risk of effects in the absence of mitigation; and
 - Assessment of the significance of the effects following mitigation.

- 6.2.10 The assessment uses a matrix based approach and the significance of construction dust effects is assessed in accordance with IAQM guidance. This explains how the aim for all construction activity should be to prevent significant effects on receptors through the use of effective mitigation. The assessment of the significance of effects, in accordance with IAQM guidance, therefore assumes the principle of mitigation being in place at all times, as would be the case on properly managed construction sites.
- 6.2.11 The guidance considers that the implementation of effective on-site mitigation will be sufficient to ensure that effects are not significant. Nonetheless, it is important to consider specific characteristics of the Project Site and the surrounding area to ensure a robust assessment of dust impacts in relation to this conclusion.
- 6.2.12 For the PEIR report, a high level assessment of risks and potential impacts has been undertaken which essentially draws on the conclusions of the IAQM guidance that mitigation (the Dust Management Plan) will be in place and will prevent significant effects. For the ES, and following the IAQM guidance, a receptor oriented assessment is currently being undertaken and will consider in greater detail three separate potential effects arising from the emissions of dust and particulate matter, namely:
- Annoyance/loss of amenity due to dust soiling;
 - The risk to health due to an increase in exposure to PM₁₀; and
 - The risk to ecological receptors due to an increase in exposure to dust.

Operational Assessment

- 6.2.13 The air quality assessment for the operational phase follows the EA documents 'Horizontal Guidance Note H1 – Annex (f): Air Emissions'³¹ and the EA Air Quality Modelling and Assessment Unit (AQMAU) 'Air dispersion modelling report requirements (for detailed air dispersion modelling)'³². The conversion of NO_x to NO₂, as applicable for the protection of human health under the UK Air Quality Standards Regulations 2010³³, adopts the approach outlined in the AQMAU Guidance Note 'Conversion Ratios for NO_x and NO₂' (2006)³⁴.
- 6.2.14 As a peaking plant, the operation of the Generating Equipment will be limited through the permitting regime to 1,500 hours per annum. The

³¹ EA (December 2011) Horizontal Guidance Note H1 – Annex (f): Air Emissions

³² EA Air Quality Modelling and Assessment Unit (undated) Air dispersion modelling report requirements (for detailed air dispersion modelling)

³³ The Air Quality Standards Regulations 2010

³⁴ EA Air Quality Modelling and Assessment Unit (2006) Guidance Note 'Conversion Ratios for NO_x and NO₂'

assessment is, therefore, based on the operation of the Generating Equipment, at full load, for 1,500 hours per annum. For the purposes of the air quality assessment this intermittent operation is assessed by assuming full load, continuous operation (to ensure worst case meteorological impacts are included in the model) and scaling the outputs for periods longer than one hour by likely operating hours i.e. 1500 out of a possible 8760 hours for annual mean impacts. No scaling is applied to hourly impacts to ensure a conservative approach, since it is possible that the operation of the Generating Equipment will coincide with poor dispersion conditions.

- 6.2.15 Atmospheric dispersion modelling has been carried out using the Cambridge Environmental Research Consultants (CERC) Air Dispersion Modelling Software (ADMS 5.0). An air dispersion model has been set up that considers the effects of terrain and buildings (as appropriate to the location of the Generating Equipment), together with the most recent available meteorological data covering a consecutive five year period (e.g. 2009 to 2013, inclusive) in accordance with current guidance. This model will be refined during the preparation of the ES as further, more detailed, information becomes available including updated meteorological data.
- 6.2.16 The modelling assessment estimates the mass concentration of NO_x and CO at sensitive receptors using the emission limits as specified in Part 2 of Annex V to the IED. Initial screening runs have been undertaken to determine an acceptable stack height suitable for adequate dispersion based on predicted maximum short term and long term ground level concentrations. The sensitivity tests are presented in Appendix 6.1. Detailed atmospheric dispersion modelling will be undertaken for the ES on the basis of the selected stack height.
- 6.2.17 The results of the detailed dispersion modelling are compared with background levels and relevant standards and guidelines (i.e. the Air Quality Standards Regulations 2010). Direct comparison is made between the long-term and short-term process contributions from the Generating Equipment, the predicted environmental concentrations of relevant substances (i.e. process contribution plus background levels) and the limits and objectives within the relevant Air Quality Standards Regulations 2010. For the ES, model outputs will also be presented as isopleths.
- 6.2.18 The abatement of emissions is discussed in relation to application of Best Available Techniques (BAT), in accordance with the EA Sector Guidance Note for Combustion Activities (EPR 1.01)³⁵ and the UK's position with regards to the on-going review of the EU IPPC Reference Document on

³⁵ EA (March 2009) How to comply with your environment permit. Additional guidance for Combustion Activities (EPR 1.01)

BAT for Large Combustion Plants³⁶. Should additional mitigation prove to be necessary, the severity of impact, frequency of emissions and the resultant environmental risk associated with any residual impact will be examined in the ES.

- 6.2.19 Changes in air quality levels for NO_x are assessed with respect to ecology for European, nationally and locally designated habitat sites. An initial assessment of the increased deposition of both nutrient nitrogen and acid due to nitrogen has been carried out in accordance with the methodologies described in the EA AQMAU 'AQTAG06 Technical Guidance on detailed modelling approach for an appropriate assessment for emissions to air'³⁷. This modelling is being refined for the ES.
- 6.2.20 It is considered that there will not be any noticeable odours associated with the operation of the Generating Equipment at or beyond the boundary of the Generating Equipment Site and therefore it is not considered necessary to undertake a detailed assessment of odour.

Assessment Criteria

- 6.2.21 In relation to ambient pollutant concentration, the criteria used for the assessment of operational impacts are the air quality objectives and limit values set out in Welsh air quality regulation (paragraph 6.2.1). For deposition, no comparable regulated standards exist and the impacts are assessed against critical loads. Critical loads are set for effects due to eutrophication (nitrogen deposition) and acidification (combined action of sulphur and nitrogen deposition). It is reiterated that the critical loads are set at levels below which significant harmful effects do not occur.
- 6.2.22 Critical loads are assigned to habitat classes of the European Nature Information System (EUNIS) to enable consistency of habitat terminology and understanding across Europe. They are given as ranges (e.g. 10-20 kgN/ha/yr) which reflect variations in ecosystem response and soil types across Europe. In the assessment, a conservative approach will be adopted and impacts will be compared to the lower limit of the specified range.
- 6.2.23 For acidification, the critical loads are specified through the definition of a critical load function (CLF) which identifies the combinations of sulphur and nitrogen deposition that will not cause harmful effects. In the CLF, sulphur deposition is plotted against nitrogen deposition (shown below), and the risk of acidification impacts is characterised by the three following quantities:

³⁶ European Commission (July 2006) Integrated Pollution Prevention and Control, Reference Document on Best Available Techniques for Large Combustion Plants

³⁷ EA AQMAU (October 2011) AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air

$CL_{\max}(S)$ – Maximum critical load for sulphur

$CL_{\min}(N)$ – Minimum critical load for nitrogen

$CL_{\max}(N)$ – Maximum critical load for nitrogen

6.2.24 This is shown in Diagram 6.1 below.

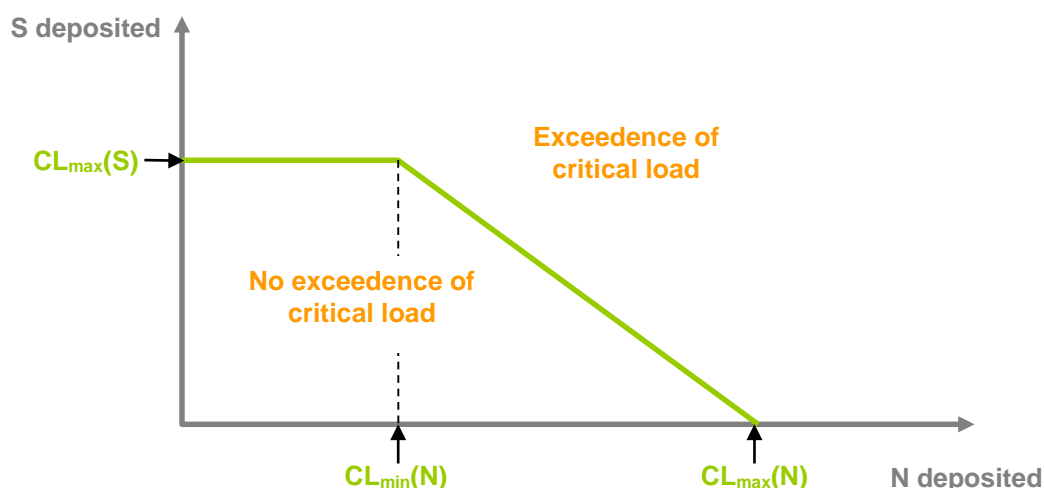


Diagram 6.1: Schematic of Critical Load Function for acidification

6.2.25 The critical loads for the assessment have been taken from the APIS website, using the facility to extract site-specific relevant critical loads³⁸. For any local designated sites, critical loads have been extracted using the search by location tool and the designated feature for the site. These assessment standards will apply to both work undertaken for the PEIR and the ES.

Carbon Dioxide Emissions

6.2.26 The Generating Equipment is proposed to be permitted to operate up to 1,500 hours per annum (actual operational times are likely to be lower, typically 500 hours per annum of operation in 2 – 3 hour tranches) and would emit approximately 0.22 Mt CO₂ per annum, which equates to 0.13% of UK emissions of CO₂ from power stations used for public energy supply in 2012 (192.9 Mt CO₂³⁹), assuming full load operation as a worst case. The Generating Equipment will utilise natural gas, considered to have lower carbon content than other fossil fuels. According to the 2014 Defra emission factors, natural gas emits 0.184

³⁸ <http://www.apis.ac.uk/src/>

³⁹ Department of Energy & Climate Change 2012 UK Greenhouse Gas Emissions, Final Figures (March 2014)

kg CO₂ per kW hours, whereas burning diesel would emit 0.246kg CO₂ per kW hours. The use of diesel will increase CO₂ emissions to 0.30 Mt. Therefore, with technology presently in use in the UK, a gas fuelled plant provides the most carbon efficient means of electricity production from fossil fuels.

6.2.27 The Generating Equipment is designed to provide electricity during peak times and potentially supplement power generation when other low carbon technologies such as wind are unable to satisfy energy demands. According to the UK's National Policy Statement on Energy (Section 5.2 of NPS EN-1), maintaining fossil fuel power stations are vital as they can ensure reliable electricity supply and provide diversity in the UK's energy mix. As such, the Project is aligned with the UK climate change goals as it is a tool in the transition to a low carbon economy.

6.2.28 The UK's National Policy Statement (paragraph 5.2.2 of NPS EN-1) also states that the "Government has determined that CO₂ emissions are not reasons to prohibit the consenting of projects" and that the "IPC does not, therefore, need to assess individual applications in terms of carbon emissions against carbon budgets and this section [NPS EN-1, Section 5.2 Air quality and emissions] does not address CO₂ emissions". The proposal's carbon emissions are considered marginal and therefore, considering current policy, impacts on climate change from CO₂ emissions are not considered significant.

Significance Criteria

6.2.29 Table 6.1 shows the significance criteria set by EPUK for assessing local air quality impacts. The significance of any effect is determined by both the magnitude of the change in concentration resulting from the Project and the total ambient pollution concentration with the Project in operation. The latter criteria can be considered as a proxy for the sensitivity of the receiving environment as used in the generic significance assessment methodology set out in Section 4 of this PEIR i.e. where pollutant concentrations exceed the air quality objective with the Project in operation, the receptors can be considered to have very high sensitivity to air quality impacts, conversely, where pollutant concentrations are well below the objective, the receptors have low sensitivity to impacts.

6.2.30 Table 6.2 shows that the significance of an impact increases as the total pollution level increases.

6.2.31 The EPUK criteria apply directly to the assessment of impacts against air quality objectives. For the assessment, their applicability has been extended to the assessment of impacts on ecosystems from the deposition of nitrogen against critical loads.

Table 6.1 Significance criteria for assessing local air quality impacts. Acceptable impacts are shaded in green.

Sensitivity	Absolute Concentration/Deposition in relation to Objective/Limit Value	Change in Concentration (as a % of the objective or critical load)			
		Imperceptible (<1%)	Small (1-5%)	Medium (5-10%)	Major (>10%)
Very High	Above objective with scheme	Negligible	Minor adverse	Moderate adverse	Substantial adverse
High	Just below objective with scheme (90% - 100% of objective)	Negligible	Minor adverse	Moderate adverse	Moderate adverse
Medium	Below objective with scheme (75% - 90% of objective)	Negligible	Negligible	Minor adverse	Minor adverse
Low	Well below objective with scheme (<75% of objective)	Negligible	Negligible	Negligible	Minor adverse

6.2.32 In setting an appropriate stack height for the Generating Equipment, it was considered that:

- The significance of the effect should be negligible everywhere;
- The impact of the operation of the Generating Equipment should be imperceptible in magnitude where concentrations/deposition levels exceed or are at significant risk of exceeding an air quality objective or critical load; and
- Where there is a low risk of exceedence of an air quality objective or critical load, the magnitude of the ground level impact should be medium or less (<10% of any standard) everywhere or else total pollutant concentrations should be well below any assessment standard.

6.2.33 That is to say, any effect should lie within the area shaded in green in Table 6.1 and considered not significant in EIA terms for air quality.

6.2.34 This approach is consistent with EA guidance (H1 Annex f) on screening of significant effects which states that the process contributions can be considered insignificant if the long term process contribution is <1% of the long term environmental standard. The guidance further states that the 1% threshold is based on the judgement that it is unlikely that an emission at this level will make a significance contribution to air quality since process contributions will be small in comparison to background levels, even if a standard is exceeded.

Limitations

6.2.35 This assessment has the following limitations and assumptions:

- The background concentrations considered in the assessment will be based on existing data sources as no site specific monitoring will be undertaken. These data are, however, considered to represent a robust assessment and will be interpreted conservatively in the Environmental Assessment; and
- The detailed assessment of construction impacts is currently being undertaken.

Consultation and Consultation Responses

- 6.2.36 Appendix 4.1 provides a summary of scoping responses and set out the actions that have been undertaken, or will be undertaken to address them.

6.3 Baseline Conditions and Receptors

Local Air Quality Management

- 6.3.2 In its 2013 Progress Report⁴⁰, CCS stated that exceedences of the annual NO₂ objective have been recorded in a number of locations, primarily within the City of Swansea. It included the areas of Hafod, Sketty and Fforestfach that form part of the existing Air Quality Management Area (AQMA) declared for traffic related NO₂. Further exceedences have been recorded at the areas of Uplands, Mumbles and St Thomas. CCS is considering extending the AQMA to include Uplands and will undertake further monitoring at Mumbles and the City Centre.
- 6.3.3 The CCS AQMA is located 4.5 km south of the Project Site. Concentrations of air pollutants at the Project Site are expected to be well within the relevant air quality objectives.
- 6.3.4 There are a number of continuous monitoring stations in CCS. A summary of the monitoring data for the most relevant automatic monitoring stations is presented in Table 6.2.
- 6.3.5 The monitoring data from the roadside stations (Swansea AURN and Morriston Groundhog) show widespread compliance with the annual NO₂ objective of 40 µg/m³. Recorded concentrations at the Cwm Level Park urban background station are slightly lower than the roadside stations in 2011 and 2012 and range from 19.6 to 23.4 µg/m³.
- 6.3.6 Concentrations of particulate matter at the two roadside monitoring stations show widespread compliance with the annual objective of 40 µg/m³.

⁴⁰ City and County of Swansea, Air Quality Progress Report, June 2013

Table 6.2 Local Authority automatic monitoring data in the study area ($\mu\text{g}/\text{m}^3$)

Site Name	Type	Within AQMA	Distance from Site	2010	2011	2012
Nitrogen Dioxide						
Swansea Roadside AQMA	Roadside	Y	5.5km south	27.8	25.6	26.0
Morrison Groundhog	Roadside	N	4km south	22.6	21.1	23.4
Cwm Level Park	Urban Back ground	Y	5km south	23.4	20.9	19.6
Particulate Matter						
Swansea Roadside AQMA	Roadside	Y	5.5km south	15.8	14.7	17.8
Morrison Groundhog	Roadside	N	4km south	16.7	18.0	13.9

6.3.7 CCS operates a network of NO_2 diffusion tubes focused on roadside locations mainly at busy junctions and narrow and congested roads. The Project Site is at a rural location and therefore monitoring data from the NO_2 diffusion tube network are not considered relevant to inform air quality baseline at the Project Site. NO_2 concentration recorded by diffusion tube network, range from 21.8 – 55.5 $\mu\text{g}/\text{m}^3$ with the AQMA and 12.7 – 48.8 $\mu\text{g}/\text{m}^3$ outside the AQMA in 2012. The closest diffusion tube locations are at Cwmrhydyceirw and Clydach, 2 km south and 3 km east of the Project Site respectively. Concentrations at Clydach ranged from 29.2 – 34.7 $\mu\text{g}/\text{m}^3$ in 2012. Concentrations at Cwmrhydyceirw ranged from 22.6 – 33.1 $\mu\text{g}/\text{m}^3$ in 2012.

6.3.8 In summary, NO_2 and particulate matter concentrations across the operational study area are generally very low, both in rural and suburban areas. At the roadside, outside of urban areas, concentrations are higher but likely to be well within the air quality objectives. In larger urban areas (Swansea), pockets of poor air quality exist at the roadside but the closest AQMA is more than 4.5 km from the Project Site.

6.3.9 No monitoring of pollutants relevant to this assessment including nitrogen oxide or carbon monoxide is undertaken by CCS in the study area. Baseline concentrations of these pollutants are presented in the following section.

Mapped Background Pollutant Concentrations

6.3.10 Defra provides mapped background pollutant concentrations for the UK on a 1 km x 1 km grid. For nitrogen oxides and particulate matter, data have been provided by Defra as hindcasts/predictions for all years from 2010 to 2030. For CO, data have been provided for 2001 with factors to project data to later years.

6.3.11 The background pollutant concentrations are currently well within the air quality objectives for the protection of human health and ecosystems (Table 6.3). It is anticipated that concentrations will, in general, decrease over time as result of a predicted overall reduction in emissions from all emission sources and sectors, both in the UK and in Europe. However, the rate of improvement is uncertain, particularly in the short to medium term and, as such, the quantitative assessment of impacts does take into account this expected improvement in air quality. Nevertheless, the implications for the likely improvement in air quality over time are considered qualitatively.

Table 6.3 Background pollutant concentrations from Defra mapped data for 2014.

Annual Mean Concentration $\mu\text{g}/\text{m}^3$				
Location	Nitrogen Oxides NO _x	Nitrogen Dioxide NO ₂	Particulate Matter PM ₁₀	Carbon Monoxide
Objective	30 $\mu\text{g}/\text{m}^3$	40 $\mu\text{g}/\text{m}^3$	40 $\mu\text{g}/\text{m}^3$	10,000 $\mu\text{g}/\text{m}^3$
Project Site	12.1	9.5	12.7	95
Study Area Range	9.1 – 26.3	7.3 – 19.1	10.3 – 15.2	0 – 120

6.3.12 A comparison of the mapped Defra concentrations for 2014 with concentrations monitored at automatic monitoring sites by NRW indicated that the upper range of mapped data for the study area are aligned with concentrations recorded at the roadside and urban background locations. It is anticipated that concentrations at the Project Site will be significantly lower to concentrations recorded at roadside and urban background sites. This is reflected in the mapped data for the Project Site in Table 6.3.

6.3.13 Short term background pollutant concentrations (averaging periods ≤ 8 hours and, on a precautionary basis, 24 hours) will be set to twice the annual mean background concentration. This follows EA/NRW guidance.

Human Receptors

- 6.3.14 The area is largely rural in character, interspersed with small residential settlements including:
- Felindre;
 - Morriston;
 - Pant-lasau;
 - Llwynceilyn; and
 - Llangyfelach.
- 6.3.15 The City of Swansea lies more than 5 km (to the south of the M4) from the Project Site.
- 6.3.16 Sensitive receptors are also located along the proposed access road options. They include residential properties along B4489, Pant Lasau Road, Rhyd-Y-Pandy Road.

Ecological sites

- 6.3.17 The area includes numerous nature conservation sites relevant to the air quality assessment. Following the EA Annex F – Air Emissions guidance, the assessment should consider the ecological designated sites listed in Chapter 8 and shown on Figure 8.1 and 8.2.
- 6.3.18 The main ecological value of the Project Site lies with the marshy grassland or ‘purple moor-grass and rush pastures’, ‘ponds’ and the ‘Lowland mixed deciduous woodland’ which are all Section 42 habitats under the NERC Act and are located within SINC.
- 6.3.19 Background levels of nitrogen and sulphur deposition will be extracted from the APIS website.

6.4 Power Generation Plant Assessment

Construction/Decommissioning

- 6.4.1 A screening of potential air quality impacts from the Power Generation Plant during construction/decommissioning is presented in Table 6.4. Impacts from decommissioning are considered to mirror construction impacts and therefore they are assessed collectively.

Table 6.4 Findings of Preliminary Assessment of Effects of Power Generation Plant during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment and Laydown Area				
Human receptors within 350 m of Generating Equipment and Laydown Area (Residents within Abergelli Farm)	Impacts due to proximity to dust generating activities such as preparation and construction and demolition during decommissioning and due to vehicle and plant exhaust emissions. Impacts will be temporarily and localised in nature.	Preparation of a Dust Management Plan (DMP) as part of the Construction Environmental Management Plan (CEMP). The CEMP will detail practice methods of limiting dust on site during construction and decommissioning.	Effects are anticipated to be slight adverse (Temporary).	A detailed qualitative assessment using the IAQM guidance will be undertaken.
Ecological sites within 100 m of Generating Equipment and Laydown Area (Lletty-Morfil SINC and Ancient Woodland)			Effects are anticipated to be slight adverse (Temporary).	A detailed qualitative assessment using the IAQM guidance will be undertaken.
Access Road – Option 1				
Human receptors within 50 m of construction traffic route (Residents along B4489)	Impacts from vehicle exhaust emissions and high impacts from fugitive dust due to proximity to access roads. Impacts will be temporarily and localised in nature.	Preparation of a Construction Traffic Management Plan to minimise increase congestion and vehicle emissions during works as described in Chapter 12.	Effects are anticipated to be slight/moderate adverse (temporary).	No further assessment of vehicle exhaust emission is required as construction traffic numbers are expected to be small. Fugitive dust effects from movement on access roads will be assessed qualitatively using the IAQM guidance.
Ecological sites within 50 m of construction traffic route) (Lletty-Morfil SINC, Felindre Grasslands SINC, Waun Garn Wen SINC)	Impacts from vehicle exhaust emissions and fugitive dust due to proximity to access road. Impacts will be temporarily and localised in nature.	Preparation of a Construction Traffic Management Plan to minimise increase congestion and vehicle emissions during works.	Effects are anticipated to be slight adverse (temporary).	
Access Road – Option 2				
Human receptors within	Impacts from vehicle exhaust	Preparation of a CTMP to	Effects are anticipated to be	No further assessment of

50 m of construction traffic route) (Residents along Pant Lasau Road, Rhy-Y-Pandy Road)	emissions and high impacts from fugitive dust due to proximity to access roads. Impacts will be temporarily and localised in nature.	minimise increase congestion and vehicle emissions during works.	slight/moderate adverse (temporary).	vehicle exhaust emission is required as construction traffic numbers are expected to be small. Fugitive dust effects from movement on access roads will be assessed qualitatively using the IAQM guidance
Ecological sites within 50 m of construction traffic route) (Pant Lasau SINC, Rhyd-Y-Pandy Valley and Grasslands SINC, Rhos Fawr SINC)	Impacts from vehicle exhaust emissions fugitive dust due to proximity to access road. Impacts will be temporarily and localised in nature.	Preparation of a Construction Traffic Management Plan to minimise increase congestion and vehicle emissions during works.	Effects are anticipated to be slight adverse (temporary).	

Operation

6.4.2 A screening of potential air quality impacts from the Power Generation Plant during operation is presented in Table 6.5.

Table 6.5: Findings of Preliminary Assessment of Effects of Power Generation Plant during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment				
Human receptors in the vicinity of the stacks (Residents within Abergelli Farm) Ecological sites in the vicinity of the stacks (Lletty-Morfil SINC and Ancient Woodland)	Impacts from emissions to air due to proximity to the stack.	The Generating Equipment will operate as a peaking plant, with operations limited to 1,500 hours per year. This operating limit will be set out in the site permit and will not be exceeded. In addition, embedded mitigation measures will include:	Effects are anticipated to be slight adverse (temporary).	A detailed quantitative assessment using ADMS 5 air dispersion model will be undertaken.

		incorporating stack(s) of sufficient height to achieve adequate dispersal of pollutants; and using flue gas cleaning equipment if required to ensure that all emissions are within concentrations permitted by legislation and guidance.		
Access Road – Option 1				
Human receptors along the road network in the vicinity of the Project Site.	Imperceptible impacts from vehicle exhaust emissions	There are no mitigation measures needed as effects are imperceptible.	Effects are anticipated to be neutral.	No further assessment of vehicle exhaust emission is required as operational traffic numbers are expected to be small.
Ecological sites along the road network in the vicinity of the Project Site.	Imperceptible impacts from vehicle exhaust emissions	There are no mitigation measures needed as effects are imperceptible.	Effects are anticipated to be neutral.	No further assessment of vehicle exhaust emission is required as operational traffic numbers are expected to be small.
Access Road – Option 2				
Human receptors along the road network in the vicinity of the Project Site.	Imperceptible impacts from vehicle exhaust emissions.	No mitigation measures needed as effects are imperceptible.	Effects are anticipated to be neutral.	No further assessment of vehicle exhaust emission is required as operational traffic numbers are expected to be small.
Ecological sites along the road network in the	Imperceptible impacts from vehicle exhaust emissions	No mitigation measures needed as effects are imperceptible.	Effects are anticipated to be neutral.	No further assessment of vehicle exhaust emission is required as

vicinity of the Project Site.				operational traffic numbers are expected to be small.
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6.5 Gas Connection

Construction/Decommissioning

- 6.5.1 A preliminary assessment of potential air quality impacts from the Gas Connections during construction/decommissioning is presented in Table 6.7. Impacts from decommissioning are considered to mirror construction impacts and therefore they are assessed collectively.

Table 6.7 Findings of Preliminary Assessment of Effects of Gas Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Gas connection				
Human receptors within 50 m of Gas Connection route	Impacts from vehicle exhaust emissions fugitive dust. Impacts will be temporarily and localised in nature.	Preparation of a Construction Traffic Management Plan to minimise increase congestion and vehicle emissions during works.	Effects are anticipated to be slight/moderate adverse (temporary).	No further assessment of vehicle exhaust emission is required as construction traffic numbers are expected to be small. Fugitive dust effects from movement on access roads will be assessed qualitatively using the IAQM guidance
Ecological sites within 50 m of Gas Connection route	Impacts from vehicle exhaust emissions fugitive dust due to proximity to access road. Impacts will be temporarily and localised in nature.	Preparation of a Construction Traffic Management Plan to minimise increase congestion and vehicle emissions during works.	Effects are anticipated to be slight adverse (temporary).	

- 6.5.2 Assessment of the effects during operation has been scoped out of this assessment.

6.6 Electrical Connection

Construction/Decommissioning

- 6.6.1 A preliminary assessment of potential air quality impacts from the Electrical Connection during construction/decommissioning is presented in Table 6.8. Impacts from decommissioning are considered to mirror construction impacts and therefore they are assessed collectively.

Table 6.8 Findings of Preliminary Assessment of Effects of Electrical Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Electrical Connection				
Human receptors within 50 m of Electrical Connection route corridor	Impacts from vehicle exhaust emissions and fugitive dust. Impacts will be temporarily and localised in nature.	Preparation of a Construction Traffic Management Plan to minimise increase congestion and vehicle emissions during works.	Effects are anticipated to be slight/moderate adverse (temporary).	No further assessment of vehicle exhaust emission is required as construction traffic numbers are expected to be small. Fugitive dust effects from movement on access roads will be assessed qualitatively using the IAQM guidance
Ecological sites within 50 m of Electrical Connection route	Impacts from vehicle exhaust emissions and fugitive dust. Impacts will be temporarily and localised in nature.	Preparation of a Construction Traffic Management Plan to minimise increase congestion and vehicle emissions during works.	Effects are anticipated to be slight adverse (temporary).	

- 6.6.2 Assessment of the effects during operation has been scoped out of this assessment as there will be no effects resulting from the operation of the Electrical Connection.

6.7 Public Health

- 6.7.1 The ES will consider the potential impacts on human receptors from emissions to air from the Project by making reference to the air quality objectives (see Table 6.1). The air quality objectives are health based criteria that ensure that pollutant concentrations do not cause adverse health effects. Therefore impacts on public health will be considered as part of the assessment of impacts on human receptors.

6.8 Project (as a whole)

- 6.8.1 The effects of the project as a whole will mirror the effects of the Power Generation Plant. During operation, potential impacts relate only to the

Generation Plant and, during construction, rigorous application of mitigation measures outlined in Section 2.13 will ensure that any effects are, at worst, slight adverse.

6.9 Cumulative Effects

Construction/Decommissioning

- 6.9.1 There are a number of reasonably foreseeable developments in the vicinity of the Project Site (see Section 4.8). The most relevant in regards to air quality is a solar project located at Abergelli Farm, north east of the Project Site. Depending on the construction schedule of the solar project and the Project, potential cumulative effects might arise, particularly in the residential receptors in Abergelli Farm as well as residential properties along the access routes. The cumulative assessment of the ES will consider any potential in-combination effects during construction in the event that the projects are constructed in parallel.
- 6.9.2 Further consultation with CCS and NRW during the ES preparation will confirm whether any further development is anticipated in proximity to the Project.
- 6.9.3 It is anticipated that any cumulative effects can be mitigated through the implementation of a CEMP (as outlined in Section 2.13) and a CTMP. Therefore is reasonable to assume that after mitigation effects will be minor adverse and, moreover, temporary.

Operation

- 6.9.4 The reasonably foreseeable developments presented in Section 4.8 are not associated with significant emissions as they are mainly renewable energy projects (wind and solar). It is therefore reasonable to assume that potential effects from the Power Generating Plant will remain unchanged after considering the currently known committed developments. Therefore cumulative effects during operations based on current knowledge will be minor.
- 6.9.5 Further consultation will be sought with CCS and NRW to determine a definitive list of significant emission sources to consider as part of the air quality assessment in the ES.

6.10 Summary and Conclusions

- 6.10.1 It is considered unlikely that there will be permanent residual effects associated with the construction of the Project. The effects relating to construction activities are all temporary.

6.10.2 Effects during operation of the Power Generation Plant are not expected to be significant i.e. impacts outside of the area shaded in light green in the significant table (Table 6.1). A detailed stack sensitivity assessment has been undertaken to ensure that dispersion of emissions is sufficient and significant effects do not arise in nearby human and ecological receptors. In addition stack emission monitoring, undertaken as part of the operation of the Generating Equipment to meet Environmental Permitting Regulations, will ensure that emissions meet the prescribed limits of the IED.

6.10.3 Table 6.9 presents a summary of the findings of the preliminary assessment.

Table 6.9 Summary of Effects

	Receptor name and description	Potential Mitigation	Preliminary Assessment of Residual Effects
Power Generation Plant			
Construction / Decommissioning	Residents in Abergelli Farm and along the access roads	See Section 2.13. Preparation of CTMP.	Slight adverse (Temporary)
	Ecological receptors in the vicinity of the Power Generation Plant.	See Section 2.13. Preparation of CTMP.	Slight adverse (Temporary)
Operation	Residents in Abergelli Farm	Monitoring of stack emissions	Slight adverse
	Ecological receptors in the vicinity of the Power Generation Plant and along the access roads	Monitoring of stack emissions	Slight adverse
Gas Connection			
Construction / Decommissioning	Human and ecological receptors in the vicinity of the gas connection route	See Section 2.13. Preparation of CTMP.	Slight adverse (Temporary)
Electrical Connection			
Construction / Decommissioning	Human and ecological receptors in the vicinity of the electrical connection route	See Section 2.13. Preparation of CTMP.	Slight adverse (Temporary)
Project (as a whole)			
Construction / Decommissioning	Human and ecological receptors in the vicinity	See Section 2.13. Preparation of CTMP.	Slight adverse (Temporary)

	of the Power Generation Plant and along the access roads.		
Operation	Human and ecological receptors in the vicinity of the Power Generation Plant and along the access roads.	Monitoring of stack emissions	Slight adverse
Cumulative Effects			
Construction / Decommissioning	Human and ecological receptors in the vicinity of the Power Generation Plant and along the access roads.	See Section 2.13. Preparation of CTMP.	Slight adverse (Temporary)
Operation	Human and ecological receptors in the vicinity of the Power Generation Plant and along the access roads.	Monitoring of stack emissions	Slight adverse

7 NOISE AND VIBRATION

7.1 Introduction

7.1.1 This chapter provides the noise and vibration preliminary environmental assessment of the proposed Abergelli Power Project based upon assessment carried out up to end of September 2014. The proposed development is set out in Chapter 2 which forms the primary basis for the assessment carried out to date.

7.1.2 The following factors have specifically been taken account of in this preliminary assessment. The project assessment scenario is based on the possible worst case land take to accommodate the Project Site which presents a worst case scenario from a noise and vibration point of view. The assessment has considered potentially significant effects which may be caused by the construction, operation and decommissioning of the Project on noise sensitive receptors in and around the vicinity of the Project Site.

7.1.3 Embedded mitigation in relation to ecology consists of the production of a CEMP (see Section 2.13). Monitoring will ensure the measures are effective.

7.2 Approach

Relevant Policy and Guidance

7.2.1 The noise assessment in the PEIR has taken account of planning policy and guidance set out in Section 3, as well as the following documents:

- The Environmental Noise (Wales) (Amendment) Regulations 2009;
- The Noise Action Plan for Wales;
- British Standard (BS) 7445 'Description and Measurement of Environmental Noise'; BS 4142 'Method for rating industrial noise affecting mixed residential and industrial areas'; EA Horizontal Guidance H3 Part 2: Noise assessment and control;
- World Health Organisation (WHO) Guidelines for Community Noise;
- BS 5228 'Noise and vibration control on construction and open sites';
- BS 6472 (2008) 'Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hertz (Hz) to 80 Hz)'; and
- BS 7385 (1993) 'Evaluation and Measurement for Vibration in Buildings'.

Assessment Methodology

- 7.2.2 The assessment methodologies used in the PEIR are the same as those that will be adopted for the EIA. However, the level of detail available at the PEIR stage is only sufficient to form preliminary conclusions and more detailed information will be required for the EIA.
- 7.2.3 Construction and decommissioning noise and vibration assessments of the Project has been undertaken following the guidance in British Standard (BS) 5228⁴¹. The assessment has been undertaken as a desk study and involved:
- Identification of construction and decommissioning activities that produce significant noise and vibration; and
 - Prediction of noise and vibration using the methodology contained within BS5228.
- 7.2.4 The exact construction and decommissioning methodologies are unlikely to be defined until the construction contractor is appointed, which is likely to be after the submission of the Application for a Development Consent Order. However, in the absence of this information, an outline construction programme has been developed based on knowledge and experience of other similar developments. Additionally, the typical make up of construction equipment at each stage of the Project programme has been ascertained in the same way. For ground improvement works (e.g. piling) the noise and vibration assessment has paid due regard to the ground conditions at the Generating Equipment Site. Where uncertainties exist, realistic worst case assumptions have been used.
- 7.2.5 The quantification of impacts has been undertaken by comparison with agreed project criteria or limits either from previous schemes and relevant guidance and standards such as BS5228, BS6472⁴² and BS7385⁴³, or local legislative requirements. The desk study has outlined suitable measures for the mitigation of construction and decommissioning impacts, and an assessment of residual effects and effects.
- 7.2.6 Table 7.1 sets out the construction noise significance threshold taken from BS 5228 for day, night, evening and weekend periods.

Table 7.1: Construction Noise Significance Threshold

⁴¹ British Standards Institute (2009) BS 5228-1: Code of practice for noise and vibration control on construction and open sites

⁴² British Standards Institute (2008) BS 6472: Part 1 Guide to human exposure to vibration in buildings

⁴³ British Standards Institute (1993) BS 7385: Part 2 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration

Period	Period Classification	Threshold Level ($L_{Aeq,T}$)
Night-time	23:00 – 07:00	45
Evening & Weekends	Weekdays 19:00 – 23:00 Saturdays 13:00 – 23:00 Sundays 07:00 – 23:00	55
Daytime	Weekdays 07:00 – 19:00 Saturdays 07:00 – 13:00	65

- 7.2.7 There are various indices for expressing the noise levels produced by working sites. However, the L_{Aeq} index is regarded as standard and has been used in this assessment. L_{Aeq} is the equivalent continuous sound level expressed in "A weighted" decibel terms and is, in general, used as a description of environmental noise. It represents the steady sound level, which will produce the same energy as a fluctuating sound, over the same period of time.
- 7.2.8 Vibration from construction activities may impact on adjacent buildings. The criteria used in this assessment relates to the potential for cosmetic damage, not structural damage. The principal concern is generally vibration due to impact piling. Cosmetic damage is most likely to occur within the first 20 m of piling activities; damage is less likely to occur at greater distance. Likely levels of vibration at given distances can be predicted from existing piling vibration data.
- 7.2.9 BS7385 establishes the basic principles for carrying out vibration measurements and processing the data with regard to evaluating vibration impacts on buildings. Table 7.2 provides recommended peak particle velocity (PPV) vibration limits for transient excitation for different types of buildings (as set out in BS7385: Part 2, 1993).

Table 7.2: Peak Particle Velocity (ppv) limits for Cosmetic Damage¹

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	
Un-reinforced or light framed structures. Residential or light commercial type buildings ²	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

¹ Values referred to are at the base of the building.

² At frequencies below 4 Hz a maximum displacement of 0.6 mm (zero to peak)

should not be exceeded.

- 7.2.10 Due to the minimum distance of a 230 m to the closest neighbouring structure (NG Compressor Station), a detailed construction vibration assessment has not been included in the PEIR.
- 7.2.11 Operational noise for the PEIR has been assessed using preliminary data. The operational noise for the EIA will utilise more detailed information and assess the impact using the methodology from a combination of: BS4142⁴⁴; BS8233⁴⁵; and WHO Guidelines for Community Noise⁴⁶, as appropriate. The likelihood of complaints about noise from industrial developments will be predicted using the following criteria from BS4142:
- When subtracting the background level from the rating level, the greater the difference, the greater the likelihood of complaints;
 - A difference of around +10 dB or more indicates that complaints are likely;
 - A difference of around +5 dB is of marginal significance; and
 - If the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.
- 7.2.12 The guidance contained in BS8233 will also be used to assess the effects on indoor ambient noise levels in living rooms and bedrooms of NSRs when they are unoccupied.
- 7.2.13 The WHO 'Guidelines for Community Noise' provides health-based guidance on suitable noise levels intended to avoid or minimise community annoyance by noise. The guidance provides guideline noise levels for both indoor and outdoor areas.
- 7.2.14 A baseline noise survey has been undertaken in the vicinity of the Project Site to establish the current baseline noise levels. The monitoring locations for the baseline survey included a selection of the nearest noise sensitive receptors that represents the local area. These locations were agreed in advance with CCS.
- 7.2.15 Following baseline noise measurements, a noise model has been produced using Cadna software (3-dimensional noise propagation software) which models the measured baseline levels at NSRs, together with sound power levels of proposed plant (obtained from relevant

⁴⁴ British Standards Institute (1997) BS 4142: 1997 Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

⁴⁵ British Standards Institute (2014) BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

⁴⁶ World Health Organisation (1999) Guidelines for Community Noise

suppliers). Where sound power levels for proposed plant were not available, suitable data has been substituted, where a realistic worst case scenario has been considered. The noise model highlights the main noise sources and the associated noise levels at the NSR locations. Contour plots will be produced clearly showing noise levels at the Project Site, NSRs and surrounding areas in the EIA.

- 7.2.16 If the model (once the more detailed information has been included in the EIA) shows that there is potential for a significant effect to be generated by noise at any of the NSRs, the level of required noise mitigation would be specified, and measures that could be used to achieve this level of mitigation will be incorporated into the model, to provide a 'with mitigation' scenario.
- 7.2.17 The operation of the Gas Connection is not anticipated to cause any significant increase in background noise or vibration and therefore this element has been scoped out of the assessment.
- 7.2.18 Operational noise from the Electrical Connection has also been scoped out as there will be no significant effects associated with the buried electrical cable.

Significance Criteria

- 7.2.19 Significance criteria for construction noise and vibration have been derived from BS5228, and BS7385. An adapted scale for the description of the significance of construction noise is shown in Table 7.3.

Table 7.3: Significance of Construction and Decommissioning Noise

Impact	Description	Significance
Not significant	Daytime noise levels < ambient L_{Aeq} Vibration levels < 0.15 mm/s	Not Significant
Minor	Daytime noise levels > ambient L_{Aeq} but < 65 dB L_{Aeq} . Vibration levels > 0.15 mm/s, but < 1 mm/s.	Not Significant
Moderate	Daytime noise levels > 65 dB L_{Aeq} but < 70 dB L_{Aeq} . Vibration levels > 1 mm/s but < 3 mm/s.	Significant
Major	Daytime noise levels > 70 dB L_{Aeq} but < 75 dB L_{Aeq} Vibration levels > 3mm/s but < 5 mm/s.	Significant

Impact	Description	Significance
Severe	Daytime noise levels > 75 dB L _{Aeq} Vibration levels > 5 mm/s.	Significant

7.2.20 The significance criteria presented in Table 7.4 has been adopted for the purposes of the assessment of operational noise from the Generating Equipment.

Table 7.4: Significance of Operational Noise

Impact Category	Description	Significance Criteria
Negligible	Noise rating level 10 dB below the existing background noise. Vibration levels greater than 0.15 mm/s, but less than 1 mm/s at 4 Hz or above.	Not Significant
Minor Adverse	Noise rating level not more than 5 dB(A) above existing background noise (BS 4142 “ <i>marginal significance</i> ” criteria). Vibration levels greater than 1 mm/s, but less than 3 mm/s at 4 Hz or above.	Not Significant
Moderate Adverse	Noise rating level between 5 and 10 dB(A) above existing background noise. Vibration levels greater than 3 mm/s, but less than 5 mm/s at 4 Hz or above.	Significant
Major Adverse	Noise rating level more than 10 dB above the existing background noise. Vibration levels greater than 5 mm/s at 4 Hz or above.	Significant

7.2.21 The assumptions relating to the significance of effects are set out in paragraph 4.6.3.

Limitations

7.2.22 No limitations were identified during the preliminary assessment. This will be reviewed as part of the full EIA.

Consultation and Consultation Responses

7.2.23 Appendix 4.1 provides a summary of scoping responses and set out the actions that have been undertaken, or will be undertaken to address them.

7.3 Baseline Conditions and Receptors

7.3.1 There are currently no sources of significant noise or vibration within close proximity to the Project Site other than those associated with nearby agricultural activities, Team Force Swansea Paintball Centre and a skip hire business as well as the M4 motorway approximately 1.5 km to the south. National Grid's two electrical substations and Felindre Gas Compressor Station are assumed to operate within agreed thresholds.

7.3.2 The closest NSRs within 1 km of the Project Site include those within the nearby settlements of Morriston, Pant-lasau, Llwynceilyn and Felindre. In addition there are also isolated dwellings and farmsteads outside of the settlements including but not exclusive to:

- Abergelli Farm;
- Cefn-betingau;
- Maes-eglwys;
- Lletty Morfil Farm;
- Felin-wen;
- Pont Felin-wen;
- Pontbren Llwyd;
- Gors-wen;
- Lletty'r Bugall;
- Brynheulog;
- Taironen;
- Penfeddi Uchaf;
- Penidy Isaf;
- Gellyfedden;
- Rhos fawr;
- Brynawel;
- Brynwhilhach; and
- Lletty'r-scil.

Baseline Noise Survey

7.3.3 Discussions were held with CCS and NRW in August 2014 to agree a study area, a noise survey methodology, and suitable locations for the survey measurement positions. The Study Area is determined by the location of NSRs in relation to the project (see Appendix 7.1, Figure 1).

7.3.4 A noise survey was then undertaken to determine the spread of noise in the area, a number of attended short term sampling measurements were taken at pre-determined NSR over a period of 24hrs. In addition, two unattended long term noise monitors were used, these measured statistical broadband noise levels continuously at two NSR locations for a period of 7 days.

7.3.5 Table 7.5 contains a summary of the NSR measurement locations from the baseline survey. The Baseline Survey Report in Appendix 7.1 describes the exact locations used and provides a location plan to show measurement positions used during the survey.

Table 7.5: NSR Measurement Positions

Location Number	Location TBC	Approximate Distance from Centre of Power Plant Site, m
1	Cefn-betingau	652
2	Felin Wen Farm	828
3	Llwynhelig	587
4	Maes-eglwys	442
5	Lletty Morfil Farm	734
6	Bergelli Farm	621

- 7.3.6 Baseline noise measurements were taken at each of the NSR's between 19th and 26th August 2014. Weather conditions were conducive to successful monitoring with wind speeds less than 5 m/s. Roads were dry, and there was no precipitation at the time of measurement. The measurement microphones were positioned in free field at 1.4 m above ground level and well away from any vertical reflective facades. A wind-shield was used to minimise the effects of wind noise. The ambient temperature was between 13°C and 21°C during the monitoring period.
- 7.3.7 Each measurement recorded the same five statistical parameters (L_{90} , L_{eq} , L_{max} , L_{10} , L_{min} .) in unweighted third octave bands, with the overall figure reported using the A-weighted frequency network.
- 7.3.8 All monitoring was conducted using Class 1 Sound Level Meters. A field calibrator was used to calibrate and check the meter before and after the measurement period with no change in level recorded. Specific details of the equipment used, including serial numbers and calibration dates is provided in Appendix 7.1.
- 7.3.9 To provide a worst case background noise level to assess against the lowest L_{A90} from either the daytime or night time measurements at each NSR have been used.
- 7.3.10 The full results of the baseline noise measurements are presented in the noise monitoring forms in Appendix 7.2. Table 7.6 summarises the lowest L_{A90} measured at each NSR position during the baseline noise survey.

Table 7.6: Summary of Lowest Recorded L_{A90} at each Measurement Position

Measurement Position	Lowest Measured L_{A90} , dB
1 - Cefn-betingau	25

2 - Felin Wen Farm	24
3 – Llwynhelig	30
4 - Maes-eglwys	34
5 - Lletty Morfil Farm	26
6 - Abergelli Farm	25

7.4 Power Generation Plant Assessment

Construction/Decommissioning

Vibration from Construction Activities

- 7.4.1 The identified construction plant/equipment items used in this assessment are not recognised as sources of high levels of vibration. Indeed, even at a close distance of 10 m, PPV levels significantly less than 1 mm/s are generated. For example, a bulldozer will typically generate a PPV of approximately 0.6 mm/s and a “heavy lorry on poor road surface” will generate a PPV of less than 0.1 mm/s. These values are well below limits at which cosmetic building damage becomes likely (15 mm/s). As such, vibration impacts from construction activities are considered to be negligible.

Noise from Construction Activities – Construction Traffic

- 7.4.2 Access roads will be used by construction traffic wherever possible. These access roads are identified as Access Options 1 and 2 in Chapter 2 and the predicted noise impacts for each option are included in Table 7.8. Accordingly, noise generated by construction traffic will increase noise levels on the affected strategic/local roads.
- 7.4.3 However, it is noted that any increases in noise levels will represent a temporary increase which will be restricted to the duration of the construction activities.

Noise from Construction Activities – Power Generation Plant Site

- 7.4.4 Individual assessment of each identified construction plant / equipment item has been undertaken in order to assess the likely noise level at the NSR's.
- 7.4.5 At this stage detailed phasing for construction at the Generating Equipment Site is not available. Preliminary calculations have been undertaken based on typical representative plant items. Sound power level data for each plant item has been taken from BS5228. The

approach used considers all identified construction plant items operating simultaneously to provide a worst case noise prediction.

- 7.4.6 Detailed construction noise calculations are provided in Appendix 7.3. Table 7.7 presents a results summary of the predicted construction noise levels for the Generating Equipment Site at each receptor location.

Table 7.7: Summary of Predicted Construction Noise Levels for the Generating Equipment Site

NSR	Location	Calculated Construction Noise Levels (dB LAeq)	Magnitude of Impact
1	Cefn-betingau	55	Minor
2	Felin Wen Farm	53	Minor
3	Llwynhelig	56	Minor
4	Maes-eglwys	58	Minor
5	Lletty Morfil Farm	54	Minor
6	Abergelli Farm	55	Minor

- 7.4.7 Table 7.7 identifies that the predicted noise levels from the Generating Equipment Site construction activities are predicted to have a minor adverse impact at all NSR locations.

- 7.4.8 Table 7.8 provides a summary of construction noise impacts and mitigation measures for the construction of the Power Generation Plant. Impacts from decommissioning are considered to mirror construction impacts and therefore they are assessed collectively.

Table 7.8: Findings of Preliminary Assessment of Effects of the Power Generation Plant during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment and Laydown Area				
Cefn-betingau	Minor adverse	See Section 2.13.	Slight adverse	Detailed Construction Noise Assessment for full EIA needed when detailed phasing becomes
Felin Wen Farm	Minor adverse			
Llwynhelig	Minor adverse			
Maes-eglwys	Minor adverse			

Lletty Morfil Farm	Minor adverse			available.
Abergelli Farm	Minor adverse			
Access Road – Option 1				
Cefn-betingau	Minor adverse	See Section 2.13.	Slight adverse	Detailed Construction Noise Assessment for the full EIA needed when detailed phasing and traffic flow data becomes available.
Felin Wen Farm	Moderate adverse		Moderate adverse	
Llwynhelig	Minor adverse		Slight adverse	
Maes-eglwys	Minor adverse		Slight adverse	
Lletty Morfil Farm	Minor adverse		Slight adverse	
Abergelli Farm	Minor adverse		Slight adverse	
Access Road – Option 2				
Cefn-betingau	Minor adverse	See Section 2.13.	Slight adverse	Detailed Construction Noise Assessment for full EIA needed when detailed phasing and traffic flow data becomes available.
Felin Wen Farm	Minor adverse		Slight adverse	
Llwynhelig	Minor adverse		Slight adverse	
Maes-eglwys	Minor adverse		Slight adverse	
Lletty Morfil Farm	Minor adverse		Slight adverse	
Abergelli Farm	Minor adverse		Slight adverse	

Operation

Generating Equipment Site

- 7.4.9 A preliminary assessment has been completed using a cumulative sound power level for the typical Generating Equipment options identified for use. From these preliminary calculations the operational noise level from the Generating Equipment Site at each identified NSR location is predicted to range between 40 dB to 47 dB L_{Aeq} . With no mitigation in place these plant noise levels would result in a major noise impact at the receptor locations.

Operational Traffic

- 7.4.10 Either Access Road Options 1 or 2 could be used for access to the Generating Equipment Site for operational staff and for the purpose of maintenance and inspection.
- 7.4.11 Vehicles using either Access Road Option 1 or 2 for operation purposes will be minimal. As such, the level of road traffic noise impact as a result

of the operation of the Generating Equipment Site is considered to be negligible.

7.4.12 Table 7.9 provides a summary of the preliminary operation noise impacts and mitigation measures for the Power Generation Plant.

Table 7.9: Findings of Preliminary Assessment of Effects of Power Generation Plant during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment				
Cefn-betingau	Moderate to Major Adverse	Mitigation measures will include the use of high performance silencers on air filters, inlet systems and exhaust flues. Gas Turbine Generators will be housed in individual acoustic enclosures, of heavy construction.	Slight adverse	Detailed Noise assessment and modelling to be undertaken with results to be presented in the ES.
Felin Wen Farm	Moderate to Major Adverse			
Llwynhelig	Moderate to Major Adverse			
Maes-eglwys	Moderate to Major Adverse			
Lletty Morfil Farm	Moderate to Major Adverse			
Abergelli Farm	Moderate to Major Adverse			
Access Road – Option 1				
Cefn-betingau	Negligible	No mitigation measures needed.	Neutral	No Further assessment or consultation needed.
Felin Wen Farm	Negligible			
Llwynhelig	Negligible			
Maes-eglwys	Negligible			
Lletty Morfil Farm	Negligible			
Bergelli Farm	Negligible			
Access Road – Option 2				
Cefn-betingau	Negligible	No mitigation measures needed.	Neutral	No Further assessment or consultation needed.
Felin Wen Farm	Negligible			
Llwynhelig	Negligible			
Maes-eglwys	Negligible			
Lletty Morfil Farm	Negligible			

Bergelli Farm	Negligible			
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7.5 Gas Connection Assessment

Construction/Decommissioning

Noise from Construction Activities – Construction Traffic

7.5.1 Either Access Road Option 1 or 2 will be used for site access. Accordingly, noise generated by construction traffic using either Access Road Option 1 or 2 will increase noise levels on the affected Strategic/Local Roads.

7.5.2 It is noted that any increases in noise levels will represent a temporary increase which will be restricted to the duration of the construction activities. The noise generated by construction traffic will also vary as day-to-day progress is made along the length of the Gas Connection. As construction progresses along the length of the route, the construction noise sources will move along with it, hence noise levels will reduce.

Noise from Construction Activities

7.5.3 The detailed construction noise calculations are provided in Appendix 7.3. Table 7.10 presents a results summary of the predicted construction noise levels for the Gas Connection at each receptor location.

Table 7.10: Summary of Predicted Construction Noise Levels for the Gas Connection

NSR	Location	Calculated Construction Noise Levels (dB LAeq)	Assessment of Impact
1	Cefn-betingau	54	Minor
2	Felin Wen Farm	52	Minor
3	Llwynhelig	55	Minor
4	Maes-eglwys	56	Minor
5	Lletty Morfil Farm	57	Minor
6	Abergelli Farm	72	Major

7.5.4 Table 7.10 identifies that predicted noise levels from the Gas Connection construction activities is minor at all NSR locations, with the exception of NSR 6 where a major noise impact is predicted. This major noise impact is due to the shorter distance between the noise source and property.

7.5.5 Table 7.11 provides a summary of construction noise impacts for the

construction of the Gas Connection.

- 7.5.6 Impacts from decommissioning are considered to mirror construction impacts and therefore they are assessed collectively.

Table 7.11: Findings of Preliminary Assessment of Effects of Gas Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Gas Connection				
Cefn-betingau	Minor adverse	Site hoarding should be used to block line of sight between construction activities and receptors. See Section 2.13.	Slight adverse	Detailed Noise assessment and modelling to be undertaken as ES stage.
Felin Wen Farm	Minor adverse			
Llwynhelig	Minor adverse			
Maes-eglwys	Minor adverse			
Lletty Morfil Farm	Minor adverse			
Abergelli Farm	Major adverse			

Operation

- 7.5.7 Noise and vibration impacts from the operation of the Gas Connection are considered to be negligible. Therefore, no mitigation or monitoring measures are considered necessary.

Table 7.12: Findings of Preliminary Assessment of Effects of Gas Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Cefn-betingau	Negligible	No Mitigation needed	Neutral	No further assessment of consultations needed.
Felin Wen Farm	Negligible			
Llwynhelig	Negligible			
Maes-eglwys	Negligible			
Lletty Morfil Farm	Negligible			

Abergelli Farm	Negligible			
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7.6 Electrical Connection Assessment

Construction/Decommissioning

Noise from Construction Activities – Construction Traffic

- 7.6.1 There will be noise generated by construction traffic.
- 7.6.2 Either Access Road Option 1 or 2 will be used for site access. Accordingly, noise generated by construction traffic using either Option 1 or 2 will increase noise levels on the affected Strategic/Local Roads.
- 7.6.3 Any increase in noise levels will represent a temporary increase which will be restricted to the duration of the construction activities. The noise generated by construction traffic will also vary as day-to-day progress is made along the length of the Electrical Connection.

Noise from Construction Activities – Electrical Connection

- 7.6.4 There will be noise generated from construction activities.
- 7.6.5 Preliminary calculations have been undertaken based on typical representative plant items.
- 7.6.6 The detailed construction noise calculations are provided in Appendix 7.3. Table 7.13 presents a results summary of the predicted construction noise levels for the Electrical Connection at each receptor location.

Table 7.13: Summary of Predicted Construction Noise Levels for Electrical Connection

NSR	Location	Calculated Construction Noise Levels (dB LAeq)	Assessment of Impact
1	Cefn-betingau	53	Minor
2	Felin Wen Farm	52	Minor
3	Llwynhelig	55	Minor
4	Maes-eglwys	63	Minor
5	Lletty Morfil Farm	60	Minor
6	Abergelli Farm	56	Minor

- 7.6.7 Table 7.13 identifies that the predicted noise levels from the Electrical Connection construction activities are minor at all NSR locations.

7.6.8 Table 7.14 provides a summary of construction noise impacts and mitigation measures for the construction of the main power plant site.

7.6.9 The effects from decommissioning are considered to mirror construction impacts and therefore they are assessed collectively.

Table 7.14: Findings of Preliminary Assessment of Effects of Electrical Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Cefn-betingau	Minor adverse	See Section 2.13.	Slight adverse	Detailed Construction Noise Assessment in full EIA needed when detailed phasing becomes available.
Felin Wen Farm	Minor adverse			
Llwynhelig	Minor adverse			
Maes-eglwys	Minor adverse			
Lletty Morfil Farm	Minor adverse			
Bergelli Farm	Minor adverse			

Operation

7.6.10 Noise and vibration impacts from the operation of the Electrical Connection are considered to be Negligible. Therefore, no mitigation or monitoring measures are considered necessary.

Table 7.15: Findings of Preliminary Assessment of Effects of Electrical Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Cefn-betingau	Negligible	No mitigation needed	Neutral	No further assessment or consultations needed.
Felin Wen Farm	Negligible			
Llwynhelig	Negligible			
Maes-eglwys	Negligible			
Lletty Morfil Farm	Negligible			
Bergelli Farm	Negligible			

7.7 Project (as a whole)

- 7.7.1 The noise and vibration effects of the Gas Connection and Electrical Connection are comparatively minor so the effects of the Project as a whole are the same as described for the Power Generation Plant.

7.8 Cumulative Effects

Construction/Decommissioning

- 7.8.1 Preliminary calculations have been undertaken to predict the potential cumulative noise impacts during the construction phase. These calculations provide the predicted noise impact from construction works being undertaken concurrently on the Power Generation Plant Site, the Gas Connection and the Electrical Connection. The results of the cumulative construction noise assessment are presented in Table 7.16.

Table 7.16: Summary of Predicted Cumulative Construction Noise Levels

NSR	Location	Calculated Cumulative Construction Noise Levels (dB LAeq)	Assessment of Impact
1	Cefn-betingau	59	Minor
2	Felin Wen Farm	57	Minor
3	Llwynhelig	60	Minor
4	Maes-eglwys	65	Moderate
5	Lletty Morfil Farm	62	Minor
6	Abergelli Farm	72	Major

- 7.8.2 The predicted cumulative construction noise levels shown in Table 7.17 are prior to any mitigation being applied. It is anticipated that effects will be reduced to minor at all NSR locations with the application of the noise mitigation measures identified in this study.

- 7.8.3 Any cumulative construction activities from other projects will be considered in the ES

Operation

- 7.8.4 Noise impacts from the operation of the Gas Connection and Electrical Connection are identified in this study as negligible. Therefore, the cumulative operational noise impacts will be equal to the Generating Equipment running in isolation, identified as minor to moderate impact in Table 7.9 (unmitigated).

7.9 Summary and Conclusions

7.9.1 A preliminary noise and vibration impact assessment has been undertaken for the Project. The assessment has included a baseline noise survey and desktop study.

7.9.2 The potential noise and vibration impact study has included the construction/decommissioning and operational phases for the Power Generation Plant, the Electrical Connection and the Gas Connection.

7.9.3 Levels of vibration for all phases of the Project are identified as negligible.

Construction

7.9.4 With the application of identified mitigation options predicted noise impacts during construction range between minor and moderate.

Operation

7.9.5 With the application of identified mitigation options predicted noise impacts are anticipated to range between minor and moderate.

7.9.6 The predicted preliminary noise impacts and mitigation options for the Project are summarised in Table 7.17

Table 7.17: Summary of Effects

	Receptor name and description	Potential Mitigation	Preliminary Assessment of Residual Effects
Power Generation Plant			
Construction / Decommissioning	Cefn-betingau / Minor adverse	See Section 2.13	Effects are anticipated to range between slight and moderate (considering both Option 1 and 2 for road access).
	Felin Wen Farm / Moderate adverse		
	Llwynhelig / Minor adverse		
	Maes-eglwys / Minor adverse		
	Lletty Morfil Farm / Minor adverse		
	Abergelli Farm / Minor adverse		
Operation	Cefn-betingau / Moderate to Major	Turbine filter and ventilation apertures	Slight adverse

	<p>Felin Wen Farm / Moderate to Major</p> <p>Llwynhelig / Moderate to Major adverse</p> <p>Maes-eglwys / Moderate to Major</p> <p>Lletty Morfil Farm / Moderate to Major</p> <p>Abergelli Farm / Moderate to Major adverse</p>	<p>are to be fitted with high performance silencers.</p> <p>The Gas Turbine Generators and major compressors are to be housed in individual acoustic enclosures.</p> <p>High performance silencers will be installed in the outlet duct(s) between the Gas Turbine Generators. Due to the impracticality of screening stack noise, discharge noise will be controlled using these silencers that will be tuned to attenuate low frequencies from the Gas Turbine</p>	
Electrical Connection			
Construction / Decommissioning	<p>Cefn-betingau / Minor adverse</p> <p>Felin Wen Farm / Minor adverse</p> <p>Llwynhelig / Minor adverse</p> <p>Maes-eglwys / Minor adverse</p> <p>Lletty Morfil Farm / Minor adverse</p> <p>Abergelli Farm / Minor adverse</p>	See Section 2.13.	Slight adverse
Operation	<p>Cefn-betingau / Negligible</p> <p>Felin Wen Farm / Negligible</p> <p>Llwynhelig / Negligible</p> <p>Maes-eglwys / Negligible</p> <p>Lletty Morfil Farm / Negligible</p>	No Mitigation measured needed.	Negligible

	Abergelli Farm / Negligible		
Gas Connection			
Construction / Decommissioning	Cefn-betingau / Minor adverse	Site hoarding will be needed to block line of sight from construction activities to NSR locations. See Section 2.13.	Slight adverse
	Felin Wen Farm / Minor adverse		
	Llwynhelig / Minor adverse		
	Maes-eglwys / Minor adverse		
	Lletty Morfil Farm / Minor adverse		
	Abergelli Farm / Major adverse		
Operation	Cefn-betingau / Negligible	No Mitigation measured needed.	Neutral
	Felin Wen Farm / Negligible		
	Llwynhelig / Negligible		
	Maes-eglwys / Negligible		
	Lletty Morfil Farm / Negligible		
	Abergelli Farm / Negligible		
Project (as a whole)			
Construction / Decommissioning	Residential receptors in the vicinity of the Power Generation Plant.	Preparation of a CEMP and a Construction Traffic Management Plan (see Chapter 2).	Range between moderate adverse (Temporary) neutral.
Operation	Residential receptors in the vicinity of the Power Generation Plant and along the access roads.	Operational mitigation measures as listed above.	Range between slight adverse and neutral.
Cumulative Effects			
Construction / Decommissioning	Cefn-betingau / Minor adverse	Site hoarding will be needed to block line of sight from construction activities to NSR locations. See Section 2.13.	Slight to moderate adverse
	Felin Wen Farm / Moderate adverse		
	Llwynhelig / Minor adverse		

	Maes-eglwys / Minor adverse		
	Lletty Morfil Farm / Minor adverse		
	Abergelli Farm / Major adverse		
Operation	Cefn-betingau / Moderate to Major adverse	<p>Turbine filter and ventilation apertures are to be fitted with high performance silencers.</p> <p>The GT(s), and major compressors are to be housed in individual acoustic enclosures.</p> <p>High performance silencers will be installed in the outlet duct(s) between the GT(s). Due to the impracticality of screening stack noise, discharge noise will be controlled using these silencers that will be tuned to attenuate low frequencies from the GT exhausts.</p>	Slight to moderate adverse
	Felin Wen Farm / Moderate to Major adverse		
	Llwynhelig / Moderate to Major adverse		
	Maes-eglwys / Moderate to Major adverse		
	Lletty Morfil Farm / Moderate to Major adverse		
	Abergelli Farm / Moderate to Major adverse		

8 ECOLOGY

8.1 Introduction

8.1.1 This chapter provides the Ecological preliminary environmental assessment of the proposed Abergelli Power Project based upon assessment carried out up to end of September 2014. The proposed development is set out in Chapter 2 which forms the primary basis for the assessment carried out to date.

8.1.2 The following factors have specifically been taken account of in this preliminary assessment. The project assessment scenario is based on the possible works case land take to accommodate the Project Site which presents worst case scenario from an ecological point of view. The assessment has considered potentially significant effects which may be caused by the construction, operation and decommissioning of the Project on ecological resources and receptors in and around the vicinity of the Project Site.

8.1.3 Embedded mitigation in relation to ecology consists of the production of a CEMP (see Section 2.13). Monitoring will ensure the measures are effective.

8.2 Approach

Relevant Policy and Guidance

8.2.1 The EclA in the PEIR has taken account of planning policy and guidance set out in Section 3, as well as the following documents:

- Conservation of Habitats and Species Regulations 2010;
- The Wildlife and Countryside Act 1981 (as amended);
- The Countryside and Rights of Way Act 2000 (CRoW Act);
- The Natural Environment and Rural Communities Act (NERC Act) 2006;
- The Protection of Badgers Act 1992;
- The Hedgerows Regulations (1997);
- UK Post-2010 Biodiversity Framework; and
- Swansea Biodiversity Action Plan (Swansea BAP).

Assessment Methodology

- 8.2.2 The preliminary EclA provides an assessment of any potentially significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. Furthermore opportunities will be taken, where practicable, to conserve and enhance biodiversity and geological conservation interests. NPS EN-1 also requires that lighting effects will be considered on sensitive ecological receptors.
- 8.2.3 The full EclA will be undertaken in accordance with the relevant guidance including the Guidelines for Ecological Impact Assessment (Institute of Ecology and Environmental Management (IEEM), 2006)⁴⁷. Consultation has been undertaken with NRW and CCS to identify any particular issues of concern following the scoping stage.
- 8.2.4 The assessment methodology employed for the EclA involves five key stages:
- Stage 1: Consultations; consultations so far have concentrated on the scoping responses received to date;
 - Stage 2: Baseline Studies and Evaluation of Ecological Receptors; desk studies, Phase 1 Habitat surveys and Phase 2 protected species surveys have been undertaken for the Project;
 - Stage 3: Identification of Valued Ecological Receptors (VER). This has been undertaken during the above steps;
 - Stage 4: Identification and Characterisation of Potential Impacts. Initial impacts and effects are outlined in this PEIR and a further characterisation of impacts and effects will be provided in the final ES; and
 - Stage 5: Assessment of Significant Effects. This stage will be completed as part of the final ES.
- 8.2.5 For the purposes of the EclA, sites, species populations, species assemblages and habitats will be valued using the geographical scale detailed in Table 8.2. The valuation of sites makes use of any established systems, with examples provided in the table. However, professional ecological judgement has been used to attribute value to receptors considered to be of district value or below. The potential likely significant effects on ecological receptors from the Project during construction, operation and decommissioning will be identified and

⁴⁷ Institute of Ecology and Environmental Management (IEEM) (June 2006) Guidelines for Ecological Impact Assessment in the United Kingdom

characterised. In identifying these effects, a number of parameters are taken into account.

8.2.6 The parameters used to determine the nature and magnitude of the impact are centred upon the: size or intensity of the impact, which is measured in relevant terms. For example, the number of individuals lost or gained; area of habitat lost or created; or, the degree of change to existing conditions such as noise or lighting levels. The magnitude of impacts also considered the following:

- Positive or negative – whether the impact will result in net loss or degradation of a Valued Ecological Receptors (VER) or whether it will enhance or improve it;
- Magnitude – the size or intensity of the impact measured in relevant terms, e.g. number of individuals lost or gained, area of habitat lost or created or the degree of change to existing conditions (e.g. noise or lighting levels);
- Duration – the length of time over which the impact occurs;
- Reversibility – the extent to which impacts are reversible either through natural regeneration and succession or through active mitigation; and
- Timing and frequency – consideration of the timing of events in relation to ecological change, some impacts may be of greater magnitude if they take place at certain times of year (e.g. breeding season). The extent to which an impact is repeated may also be of importance.

8.2.7 Furthermore, impacts can be permanent or temporary, direct, secondary or indirect and can be cumulative.

8.2.8 These factors are brought together to assess the magnitude of the impact on particular VERs and, wherever possible, the magnitude of the impact is quantified. Professional judgment is then used to assign the effects on the receptors to one of four classes of magnitude, defined in Table 8.1.

Table 8.1 - Definition of Magnitude

Magnitude	Definition
High	A permanent or long-term effect on the extent or size or integrity of a site, habitat, species assemblage or community, population or group. If adverse, this is likely to threaten its sustainability; if beneficial, this is likely to enhance its conservation status.

Magnitude	Definition
Medium	A permanent or long-term effect on the extent or size or integrity of a site, habitat, species assemblage or community, population or group. A short-term effect which will adversely affect the integrity of a receptor in a permanent manner. If adverse, this is unlikely to threaten its sustainability; if beneficial this is likely to be sustainable but is unlikely to enhance its conservation status.
Low	A permanent, long-term reversible or short-term effect on a site, habitat, species assemblage or community, population or group whose magnitude is detectable but will not threaten/change its conservation status.
Negligible	A short-term reversible effect on the extent, size or integrity of a site, habitat, species assemblage or community, population or group that is within the normal range.

8.2.9 The value of sites, habitats, species assemblages and populations of species is evaluated with reference to both their importance in terms of 'biodiversity conservation' value (which relates to the need to conserve representative areas of different habitats and the genetic diversity of species populations) and their legal status.

8.2.10 A review of the legislation, policy and sensitivity of the ecological receptor is undertaken and the value of the receptor was determined within a geographical context on the following basis:

- International;
- UK;
- National (Wales);
- Regional;
- County;
- District;
- Local;
- Neighbourhood/Site; and
- Negligible.

Table 8.2 - Examples of Criteria used to Evaluate Ecology Receptors

Level of Value	Examples of definitions
International	An internationally important site, e.g. Special Protected Area (SPA), Special Area of Conservation (SAC) or Ramsar site (or a site considered worthy of such designation); a regularly occurring

Level of Value	Examples of definitions
	population of an internationally important species (listed on Annex IV of the Habitats Directive); 1% of the known international population of a particular species.
National (UK)	A nationally designated site, e.g. SSSI, or a site considered worthy of such designation; a viable area of a habitat type listed in Annex 1 of the Habitats Directive, or smaller areas of such habitat which are essential to maintain the viability of a larger whole; any regularly occurring population of a nationally important species, e.g. listed on Schedules 5 and 8 of the Wildlife & Countryside Act (1981); a feature identified to be of Principal Importance in England (under the NERC Act 2006), (also referenced as a feature identified as of priority in the UK BAP) 1% of the known UK population of a particular species.
County	Areas of internationally or nationally important habitats which are degraded but are considered readily restored; viable areas of key habitat identified in Local BAPs, or smaller areas of such habitat which are essential to maintain the viability of a larger whole; a regularly occurring, locally significant number of a nationally important species; 1% of the known population of a particular species within the county.
District	Areas of habitat identified in a sub-county (district/borough) or in the relevant Natural Area profile; district sites that the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves; sites or features that are scarce within the district or borough or which appreciably enrich the district or borough habitat resource; a diverse or ecologically valuable hedgerow network; a regularly occurring population of a species which is large enough to be considered to be of district level importance.
Local	Areas of internationally or nationally important habitats which are degraded and have little or no potential for restoration; a good example of a common or widespread habitat in the local area; a site designated as a Site of Importance for Nature Conservation (SINC); a regularly occurring population of a species which is large enough to be considered to be of local level importance.
Neighbourhood (site and its vicinity, including areas of habitats contiguous with or linked to those on site)	Areas of heavily modified or managed vegetation of low species diversity or low value as habitat to species of nature conservation interest; common and widespread species.
Negligible	No intrinsic nature conservation value associated with habitat. Generally these are areas of hard standing or buildings with no nature conservation interest.

Significance Criteria

- 8.2.11 The significance of the predicted effects on VERs arising from the identified impacts of the Project, including embedded and additional mitigation measures, is assessed. Significance is assessed as negative, positive or not significant.

Adverse Effects

- 8.2.12 For habitat areas and species, an effect is considered to be significant if the conservation status of a VER is compromised by the final design of the Project. Conservation status is defined by the Institute of Ecology and Environmental Management¹ (IEEM) as follows:

- Habitats – “conservation status is determined by the sum of the influences acting on the habitat and its typical species that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area”.
- Species – “conservation status is determined by the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area”.

- 8.2.13 The decision as to whether the conservation status of a VER is likely to be compromised is made using professional judgement based on an analysis of the predicted effects of the Project (including consideration of the specific parameters outlined above).

- 8.2.14 A similar procedure is used for designated sites that are potentially affected by the Project, except that the focus is on the effects on the integrity of each site, defined as “the coherence of ecological structure and function, across a site’s whole area, that enable it to sustain the habitat, complex of habitats and/or levels of populations of species for which it was classified”⁴⁸. This assessment is made with reference to the features for which a site has been classified/notified and involves combining assessments of the effects on the conservation status of each of these features.

Beneficial Effects

- 8.2.15 A positive or ‘beneficial’ effect is considered to be significant if the Project’s activities cause:
- A non-valued ecological receptor to become valued;

⁴⁸ <http://www.cieem.net/glossary>

- Restoration of favourable conservation status for a habitat/species population; and/or,
- Restoration of a site's integrity (where this has been undermined).

8.2.16 Following the assessment of how each VER may be affected and its subsequent level of significance, relevant mitigation and/or compensation measures (in addition to the embedded mitigation) are identified. Once identified, the mitigation will be designed to reduce potential significant negative effects. With respect to nature conservation sites that support protected species, there may also be a legal obligation to provide such mitigation.

8.2.17 The likely effectiveness of all the mitigation is then assessed and the residual effects described.

8.2.18 The assumptions used as to whether an effect is significant or not are set out in paragraph 4.6.3.

8.2.19 It should be noted that the study/survey area used for the baseline ecological surveys covered a larger area than that of the final layout to allow flexibility in the final design location. Therefore some species/habitats recorded mentioned in the baseline reports may not be present in the reduced application boundary.

Desk Study Methodology

8.2.20 A desk study was undertaken to review records of protected/notable species and habitats within a defined study area. The study area radius was 10 km from the Project Site for all statutory designated sites and bat records, 2 km for non-statutory designated sites, and protected/notable species. The respective study area radii were considered suitable for the scale and type of the proposed development.

8.2.21 The South East Wales Biodiversity Records Centre (SEWBRc) was contacted to obtain appropriate data. The web-based database Multi Agency Geographic Information for the Countryside (MAGIC)⁴⁹ was also consulted.

Extended Phase 1 Habitat Assessment

8.2.22 An Extended Phase 1 Habitat Survey was undertaken in February and July 2014. The survey followed standard methodology published by the Joint Nature Conservation Committee⁵⁰ (2010) with habitat types present

⁴⁹ <http://magic.defra.gov.uk/>

⁵⁰ Joint Nature Conservation Committee (2010) *Handbook for Phase 1 Habitat Survey - A Technique for Environmental Audit*, Joint Nature Conservation Committee, Peterborough.

recorded on a Phase 1 habitat map. The purpose of the assessment and survey were to:

- Identify the main habitats present at the Project Site;
- Identify the sensitive ecological receptors (e.g. statutory designated sites) in the vicinity of the Project Site;
- Assess the potential of the Project Site to support protected species; and
- Provide recommendations for further assessment works (e.g. Phase 2 Protected Species Surveys).

8.2.23 Based on the results of the extended Phase 1 Habitat Survey, the following Phase 2 protected species surveys have been carried out or are currently ongoing on and surrounding the Project Site.

Badgers

8.2.24 All potential habitats within and surrounding the Project Site are being surveyed in line with methodologies detailed in 'Surveying Badgers'⁵¹. The survey includes search for and record characteristic signs of badger (*Meles meles*) activity, including: setts, latrine pits, foraging holes, badger hair and paw prints following best practice guidance ('Best Practice Guidelines for Badger Surveys'⁵² issued by Scottish Natural Heritage - these guidelines are also applicable to England and Wales). Potential habitat includes areas of woodland, scrub and hedgerows.

Dormouse

8.2.25 A dormouse (*Muscardinus avellanarius*) survey is being undertaken following a methodology based on those prescribed in best practice guidance (Bright et al, 2006)⁵³. The surveys involve the use of dormouse boxes and nest tubes in areas of woodland, scrub and hedgerows. The survey is designed to detect the presence or absence of dormice.

Otter and Water Vole

8.2.26 A survey for water voles (*Arvicola amphibius*) and otters (*Lutra lutra*) along the banks of the water courses was carried out in accordance with best practice guidelines (Chanin (2003)⁵⁴ and Strachan et al., (2011)⁵⁵

⁵¹ Harris, S. Cresswell, P and Jefferies, D. (1989) Surveying Badgers. The Mammal Society Publication No. 9 Mammal Society

⁵² Scottish Natural Heritage (2003). Best Practice Guidance - Badger Surveys. Inverness Badger Survey 2003. Commissioned Report No. 096.

⁵³ Bright, P. W, Morris, P. A and Mitchell-Jones, A (2006) Dormouse Conservation Handbook, 2nd Edition. English Nature, Peterborough.

⁵⁴ Chanin P (2003) Monitoring the Otter *Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No. 10, English Nature, Peterborough.

⁵⁵ Strachan, R., Moorhouse, T, and Gelling, M. (2011). The Water Vole Conservation Handbook. WILDCRU, Abingdon.

respectively). Signs that water voles may be present were indicated by the presence of feeding remains, characteristic grass lawns, burrows, runs, footprints, latrines and droppings. Signs that otters may be present were indicated by the presence of spraints and footprints.

Bats

- 8.2.27 A roped-access tree survey is being carried out for trees to be removed or modified that have been identified as having potential to support roosting bats. Where the potential for bats to roost in a surveyed tree is confirmed then emergence/re-entry (at dusk and/or dawn) survey will be carried out to confirm the likely use of the tree by roosting bats, and the status of any roost present.
- 8.2.28 In addition bat activity surveys are being carried out across the Project Site in accordance with the guidance provided by Hundt (2012)⁵⁶ which involves walked transect routes carried out monthly between April and October 2014 and an automated survey using static bat detectors. These surveys will determine the species of bats present on the Project Site as well as the spatial distribution and relative activity levels of these species.

Breeding birds

- 8.2.29 The breeding bird survey focuses on the farmland birds (occurring both within the Project Site and a buffer of up to 50 m). Their territories were mapped using surveys based on the British Trust for Ornithology's Common Bird Census (CBC)⁵⁷ methodology with three site visits carried out in mid-April, May and June.

Great Crested Newts

- 8.2.30 Preliminary pond surveys (Habitat Suitability Index Assessment) based on the standard approach detailed in the Herpetological Journal publication; Evaluating the Suitability of Habitat for the Great Crested Newt (*Triturus cristatus*) (GCN)⁵⁸ indicated that there are a number of ponds within 250 m of the Project Site which are potentially suitable for great crested newts. GCN presence/absence surveys were carried out using standard methodologies in accordance with the Great Crested Newt Mitigation Guidelines⁵⁹, between mid-March to mid-June 2014 to establish presence or absence and to estimate population size if great

⁵⁶ Hundt, L. (2012) Bat Surveys: Good Practice Guidelines. 2nd Edition. Bat Conservation Trust, London

⁵⁷ Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. (2000). Bird Census Techniques. 2nd ed. Academic Press, London.

⁵⁸ Oldham, R.S., Keeble, J., Swan, M.J.S. & Jeffcote, M. (2000) *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal 10(4), 143-155

⁵⁹ English Nature (2001). Great Crested Newt Mitigation Guidelines available online at <http://www.naturalengland.org.uk/publication/810429>

crested newts are found during the surveys. More detail on the methodology is provided in Appendix 8.4.

Reptiles

- 8.2.31 A reptile survey is being carried out on the Project Site to establish the presence/absence of reptiles, the species present and the approximate population size. The survey uses artificial refuges (e.g. roofing felt and corrugated tins) to aid in the detection of reptiles and assessment of their distribution and abundance, following good practice guidance, including that set out in the Herpetofauna Worker's Manual (Gent & Gibson, 2003⁶⁰) and Reptile Survey Guidance (Froglife, 1999⁶¹).

Terrestrial and Aquatic Invertebrates

- 8.2.32 The block of marshy grassland to the west of Abergelli Farm, has been surveyed for marsh fritillary butterflies (*Euphydryas aurinia*) following standard methods⁶² for walking transects during late May/June looking for adults and larval webs during mid-August to mid-September.
- 8.2.33 A survey of Lepidoptera (notably moths) has been undertaken in the woodland within the Project Site in late spring and mid-summer. The survey will involve two night-time moth surveys using Skinner or Robinson moth traps fitted with mercury vapour bulbs. Any species hard to identify from external markings alone, and those requiring further confirmation, will be retained and dissected if necessary to ascertain their identity with the use of a stereoscopic microscope.
- 8.2.34 Beetle assemblages in the woodland within the Project Site will be sampled using a method following the Natural England (ISIS) protocol (Drake et al, 2007)⁶³ via hand searches, sweep netting and pitfall trapping. Subsequent laboratory identification will be required for many of the specimens collected.
- 8.2.35 In order to determine the assemblage of aquatic invertebrates present on Project Site, the flowing ditches and ponds will be surveyed.
- 8.2.36 Kick-sampling for aquatic invertebrates will be undertaken at selected locations along ditches or streams. Furthermore the water chemistry status will be determined for watercourses by extracting a single water sample at three locations within as well as upstream and downstream of

⁶⁰ Gent, A.H. & Gibson, S.D. (2003). Herpetofauna Workers' Manual. JNCC, Peterborough.

⁶¹ Froglife (1999). Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10. Froglife, Halesowen.

⁶² <http://www.ukbms.org/Downloads/UKBMS%20Ng2%20-%20Marsh%20Frit%20Webs%20guidance%20notes.pdf>

⁶³ Drake, C.M., Lott, D.A., Alexander, K.N.A. and Webb K (2007) Surveying terrestrial and freshwater invertebrates for conservation evaluation. Natural England Research Report NERR005. Natural England, Peterborough.

the Project Site. Samples will be dispatched to a UKAS accredited laboratory for subsequent analysis.

- 8.2.37 The national pond monitoring survey protocol will be adhered to for surveying ponds which involves timed netting and searches for invertebrates in summer (but may also cover spring and autumn).

National Vegetation Classification Survey

- 8.2.38 National Vegetation Classification (NVC) surveys were undertaken for the potentially important habitats within the Project Site such as the areas within SINCs and Ancient Woodlands. The survey followed standard methodology devised by Joint Nature Conservation Committee (JNCC) NVC Users Handbook⁶⁴.

- 8.2.39 Each parcel of land included in the survey was initially walked by the surveyor to map the broad community types with the aid of aerial photographs. Sample quadrats were then marked out in blocks of vegetation that were considered representative of each community type. A list of all botanical species within that quadrat was composed, with the associated Domin score applied. The lists of species generated were evaluated against the keys and community accounts in the relevant British Plant Community Volume⁶⁵ to establish the closest fit to a NVC community.

Invasive Species

- 8.2.40 A walkover survey of the Project Site was carried out to map all locations where Japanese knotweed (*Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*) are growing. This was done within the period June to July when both species are most in evidence.

Limitations

- 8.2.41 The limitations of the site surveys are set out in the Reports prepared by BSG in Appendix 8.1 to 8.5. The main limitation to all of the surveys was lack of access to land surrounding the Project Site outside of the applicant's control. The robustness of the assessments is discussed in detail in the appended species reports.
- 8.2.42 A further limitation of the preliminary assessment set out in the PEIR is that not all of the surveys were complete. Where this is the case, interim

⁶⁴ JNCC 2006; J.S. Rodwell, National Vegetation Classification User's Handbook

⁶⁵ Rodwell, J. S. (Ed.) (1991). British Plant Communities. Volume 1 Woodlands and Scrub. CUP. Rodwell, J.S. (Ed.) (1991) British Plant Communities. Volume 2 Mires and Heaths. CUP. Rodwell, J.S. (Ed.) (1992) British Plant Communities. Volume 3 Grasslands and Montaine Communities. CUP.

results have been assessed. The surveys will be finalised in time to inform the ES.

Consultation and Consultation Responses

- 8.2.43 Appendix 4.1 provides a summary of scoping responses and set out the actions that have been undertaken, or will be undertaken to address them.

8.3 Baseline Conditions and Receptors

Designated sites

- 8.3.1 A desk-based assessment (DBA) and Extended Phase 1 Habitat Survey was undertaken at the Project Site during February, April and July 2014.
- 8.3.2 The statutory designated sites present within 10 km of the Project Site are summarised in Table 8.3 below and are shown on Figure 8.1:

Table 8.3: Statutory designated sites within 10 km from the Project Site

Site name	Designation
Crymlyn Bog	Ramsar
Burry Inlet	Ramsar
Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd	SAC
Crymlyn Bog / Cors Crymlyn	SAC
Gower Commons / Tiroedd Comin Gwyr	SAC
Burry Inlet	SPA
Crymlyn Bog And Pant Y Sais	NNR
Cadle Heath	LNR
Cwmllywd Wood	LNR
Pant-Y-Sais	LNR
Killay Marsh	LNR
Swansea Canal	LNR
Nant Y Crimp	SSSI
Penllergaer Railway Cutting	SSSI
Penplas Grasslands	SSSI
Glais Moraine	SSSI
Graig Fawr, Pontardulais	SSSI
Burry Inlet And Loughor Estuary	SSSI

Cors Crymlyn / Crymlyn Bog	SSSI
Frondeg	SSSI
Hafod Wennol Grasslands	SSSI
Cefn Gwrhyd, Rhydyfro	SSSI
Fforest Goch Bog	SSSI
Caeau Afon Gwili	SSSI
Gwrhyd Meadows	SSSI
Pant-Y-Sais	SSSI
Blackpill, Swansea	SSSI
Coed Cwm Du, Cilmaengwyn	SSSI
Rhosydd Castell-Du & Plas-Y-Bettws	SSSI
Crymlyn Burrows	SSSI
Cilybebyll	SSSI
Fairwood, Pengwern And Welshmoor Commons	SSSI
Earlwood Road Cutting And Ferryboat Inn Quarries	SSSI
Caeau Nant Garenig	SSSI
Gower	AONB

8.3.3 The non-statutory designated sites present within 2 km of the Project Site are summarised in Table 8.4 below and are shown on Figure 8.2. The Ancient Woodland boundary shown on Figure 8.2 is the latest data set available. However, we note it is due to be updated to show the development of Swansea North Substation on part of that land.

Table 8.4: Non-Statutory designated sites within 2 km from the Project Site

Site name	Designation
No names provided – 101 sections of Ancient Woodland are found within 2 km	Ancient Woodland
Banc Darren Fawr	SINC
Waun Garn Wen	SINC
Lletty-Morfil	SINC
Penllergaer Forest	SINC
Valley Wood	SINC
Mynydd Bach Common	SINC
Llangyfelach Common	SINC
Felindre Grasslands	SINC

Pant Lasau	SINC
M4 corridor	SINC
Rhyd-Y-Pandy Valley and Grasslands	SINC
Rhos Fawr	SINC
Lower Lliw Reservoir	SINC
Cilfaen	SINC
Middle Lliw	SINC
Cefn Forest Stream	SINC
Middle Llan	SINC
Mynydd Gelli-wasted	SINC
Llangyfelach Golf Course & Surrounds	SINC
Cwm Nant-Ddu	SINC
Lougher to Penllergaer railwayline	SINC
Penlleger to Llangefelch Tunnel railway line	SINC
Cwm Rhydyceirw to Birchgrove railway	SINC

Habitats

- 8.3.4 The Project Site is predominantly on pastoral farmland, mostly agriculturally improved but with significant areas of marshy grassland and interspersed by woodland and scrub. Some of the marshy grassland qualifies as a Section 42 habitat 'purple moor-grass and rush pastures' (under the Natural Environment and Rural Communities Act 2006 (NERC)⁶⁶) and is designated as SINC. Furthermore areas of the woodland qualify as Section 42 habitat 'lowland mixed deciduous woodland', some of which is also classified as Ancient Woodland and SINC. The Ancient Woodland and SINC are shown on Figure 8.2.
- 8.3.5 The fields are grazed by horses and sheep and are largely bounded by fences running along the line of defunct hedgerows with large gaps. There are numerous watercourses on site, mostly in the form of ditches or streams along field boundaries. There is a potential for bats, great crested newts, dormice, otters, water voles, reptiles, badger, woodland and farmland bird species and terrestrial and aquatic invertebrates to be located within these habitats. Full details of the habitats located within the Project Site and the potential for protected species and species of conservation importance are provided in Appendix 8.1 to 8.5 and will be updated in the ES.

⁶⁶ Natural Environment and Rural Communities Act 2006

Badgers

- 8.3.6 Signs of badgers were recorded during other surveys so they are known to be present in the wider area, however targeted badger surveys are still on-going and therefore the presence/absence of this species is not currently known.

Dormouse

- 8.3.7 Dormice surveys are currently on-going and therefore the presence/absence of this species is not currently known. No dormice have been found to date, however further checks are yet to be undertaken.

Otter

- 8.3.8 The desk study provided 32 records of otter within the 2 km search radius, with the closest record 0.5 km to the south west of the River Llan. During the 2014 surveys a single fresh otter spraint was found in the stream that runs along the eastern boundary of the Survey Site. No other signs were observed that confirm otter presence in the other water courses within the Survey Site. Full details of the survey are provided in Appendix 8.2.
- 8.3.9 The habitats on site present potential for resting places and some foraging potential however this is limited due to the shallow nature of the streams that reduce the likelihood of fish presence.

Water Vole

- 8.3.10 No recent (within the past 10 years) water vole records were returned by the desk study, however historical records (from 1996) were provided from the River Llan approximately 1.9 km from the Project Site. Full details of the survey are provided in Appendix 8.2.
- 8.3.11 No field signs were observed during the surveys that clearly establish the presence of water vole. Habitats on site present potential for breeding, foraging and commuting water voles.

Bats

- 8.3.12 Roost surveys of buildings within the Survey Site confirmed that at least four buildings contained bat droppings and were confirmed as bat roosts. Droppings from at least three species of bats (pipistrelle species (*Pipistrellus* sp.), long-eared bat species (*Plecotus* sp.) and lesser horseshoe bat (*Rhinolophus hipposideros*)) were found. None of buildings will be directly affected by the Project.

- 8.3.13 35 trees were located within the Survey Site that were considered to present potential to support roosting bats. A total of 31 trees were climbed using ladders or rope access. Emergence and/or re-entry surveys were carried out on eight of these trees and no bats were recorded emerging from or entering these potential tree roosts.
- 8.3.14 Activity surveys across the Project Site are currently on-going and therefore the status of this species is not currently known. However, preliminary activity survey findings recorded at least eight species of bats using the Survey Site; common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), *Myotis* sp., long-eared bat species, noctule (*Nyctalus noctula*), serotine (*Eptesicus serotinus*), lesser horseshoe bat, and greater horseshoe bat (*Rhinolophus ferrumequinum*).
- 8.3.15 Common and soprano pipistrelle bats were recorded during every survey and occurred in most of the Survey Site. *Myotis* species were the next frequently recorded species with the other species being recorded infrequently and in low numbers. The highest numbers of passes were recorded along linear features such as hedges or streams, with lower activity over open fields.

Breeding birds

- 8.3.16 Breeding bird surveys have been undertaken between May-June and the survey results are summarised here. Seven bird 'species of principal importance for nature conservation' as referred to in Section 42 of the NERC Act 2006 (dunnock (*Prunella modularis*), house sparrow (*Passer domesticus*), linnet (*Carduelis cannabina*), lesser redpoll (*Carduelis cabaret*), skylark (*Alauda arvensis*), song thrush (*Turdus philomelos*), and tree pipit (*Anthus trivialis*)) were considered likely to breed on site. All seven S42 species recorded within the Survey Site are also red-listed species of conservation concern in Wales (RSPB, 2009), with the exception of dunnock (which is amber-listed). An additional seven amber-listed species, bullfinch (*Pyrrhula pyrrhula*), mistle thrush (*Turdus viscivorus*), meadow pipit (*Anthus pratensis*), reed bunting (*Emberiza schoeniclus*), common redstart (*Phoenicurus phoenicurus*), whitethroat (*Sylvia communis*) and willow warbler (*Phylloscopus trochilus*) were also considered to have bred. Full details of the survey are provided in Appendix 8.3.

Great Crested Newts

- 8.3.17 GCN presence/absence surveys have been undertaken and likely absence of species was recorded in all waterbodies subject to survey. All waterbodies within the Project Site and one pond situated within 250 m from the Project Site boundary (total of five ponds) were included in

the surveys, one pond was considered unsuitable and seven ponds within 250 m from the Project Site boundary could not be accessed for the 2014 surveys. Given that as the suitable ponds within the Survey Site were not occupied by GCNs, and no GCN records have been located within 7 km of the Survey Site, it is unlikely that GCNs are present in the inaccessible ponds. Therefore for the purposes of this assessment the absence of GCN is assumed in all waterbodies within 250 m from the Project Site boundary. Full details of the survey are provided in Appendix 8.4.

Reptiles

- 8.3.18 Reptile presence/absence surveys across the Project Site are currently on-going, however to date common lizard (*Zootoca vivipara*) and grass snakes (*Natrix natrix*) were found present indicating a high common lizard population and a medium sized grass snake population.

Terrestrial and Aquatic Invertebrates

- 8.3.19 Terrestrial and aquatic invertebrate surveys across the Project Site are currently on-going and therefore the results for this species group are not currently known. Surveys to date were carried out during June-July 2014 for moths, marsh fritillary (adults), terrestrial Coleoptera⁶⁷, and aquatic macroinvertebrates (in ponds). A total of 217 species were recorded from the Survey Site. One species is Red Data Book (insufficiently known⁶⁸), two are nationally scarce and ten are species of principal importance for nature conservation under Section 42.
- 8.3.20 Surveys are ongoing with the second survey (of two) scheduled in August (moths), late August-September 2014 (marsh fritillary larvae), and September 2014 (terrestrial Coleoptera). A survey of all watercourses/streams with running water within the Survey Site is also scheduled for September 2014. One survey of all ponds (containing water at the time of the survey) within the Survey Site was carried out in July and is sufficient for the purposes of the assessment.

National Vegetation Classification Survey

- 8.3.21 NVC surveys have been undertaken and the survey results are currently being analysed.

⁶⁷ Beetles.

⁶⁸ The category insufficiently known refers to species for which insufficient data exists to assign that species to another RDB category, e.g. rare or vulnerable.

Invasive Species

- 8.3.22 Invasive species surveys across the Project Site were completed and five species of plant included on Part II of Schedule 9 of the WCA 1981 were recorded during the survey: Japanese knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*), rhododendron (*Rhododendron ponticum*), floating pennywort (*Hydrocotyle ranunculoides*) and montbretia (*Crocasmia x crocosmiiflora*). The final design will seek to avoid the locations where these species were recorded where possible. Should this not be possible suitable mitigation measures will be put in place. The need and/or extent of required mitigation will depend on the final design and cannot be detailed at this stage.

8.4 Power Generation Plant Assessment

Construction/Decommissioning

- 8.4.1 Given that the majority of ecological surveys are currently on-going the preliminary assessment of construction/decommissioning impacts presented below provides a general overview of the potential effects on likely ecological receptors
- 8.4.2 Impacts from decommissioning are considered to mirror construction impacts and therefore they are assessed collectively.

Table 8.5: Findings of Preliminary Assessment of Effects of the Power Generation Plant during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment and Laydown Area				
Statutory Designated Sites (International importance: Cymlyn Bog Ramsar, SAC; Burry Inlet Ramsar, SPA; Carmarthen Bay and Estuaries SAC; Gower Commons SAC)	No direct impacts are envisaged given that the closest site is situated 5.8 km away from the Power Generation Plant Site. A Habitat Regulations Assessment (HRA) Screening will be conducted to identify any potential impacts	See Section 2.13	Effects are anticipated to be slight/moderate adverse.	A Habitat Regulations Assessment (HRA) Screening will be conducted. This exercise will determine the requirement for an Appropriate Assessment in view of the Project.

	on internationally designated sites.			
Statutory Designated Sites (National importance such as NNR, LNR, SSSI and AONB)	No direct impacts are envisaged given that the closest site is situated 1.3 km away from the Power Generation Plant Site. Indirect impacts envisaged in the form of habitat degradation and pollution.	See Section 2.13	Effects are anticipated to be slight/moderate adverse.	None
Non-Statutory Designated Sites (SINC and Ancient Woodland)	Situated within Lletty Morfil SINC and adjacent to Ancient Woodland. Indirect impacts envisaged in the form of habitat loss, degradation and pollution.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be slight/moderate adverse.	None
Habitats (improved grassland, semi-improved grassland, marshy grassland, dense scrub, scattered trees – pond and wet ditches)	Direct impacts on these habitats are envisaged to be permanent (Generating Equipment Site) and temporary (Laydown Area) habitat loss, habitat fragmentation, habitat degradation and indirect impacts of pollution.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.
Otter	Impacts on this species include direct mortality, disturbance,	Due to the mobile nature of this species a pre-construction	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.

	habitat loss, habitat fragmentation and habitat degradation.	check will be undertaken of the suitable habitats subject to direct impacts. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project. See Section 2.13.		
Water vole	This species was not found present during the 2014 surveys although habitats present suitability. No impacts are envisaged, however due to mobile nature of this species a pre-construction check will be undertaken of the suitable habitats subject to direct impacts.			
GCN	Likely absence of GCN was recorded in all waterbodies subject to survey in 2014 (total of five ponds). One pond was considered unsuitable and seven ponds within 250 m from the Project Site boundary could not be accessed for the 2014 surveys. For the purposes of this assessment the absence of GCN is assumed in all waterbodies within 250 m from the Project Site boundary.			
Breeding Birds	Impacts on this species group include direct mortality, disturbance, habitat loss, habitat fragmentation and habitat degradation.	See Section 2.13. Given the sensitive nature of breeding birds all vegetation clearance will be undertaken outside the main breeding season to avoid disturbance and direct mortality. Specific mitigation measures will include the provision of new habitat to suitably replace any habitat areas which would be permanently lost through development of the Project. Additional enhancement	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.

		measures could include the provision of bird boxes in suitable locations.		
Badgers, Bats, Dormice, Reptiles, Terrestrial and Aquatic Invertebrates	As surveys are currently on-going for these species and species groups a preliminary assessment is not undertaken at this stage. Bats, reptiles and noteworthy terrestrial invertebrates were found present and impacts on these species and species groups are envisaged to be similar to impacts presented for other species and species groups above such as otters and breeding birds. Potential mitigation would include timing of works to avoid impacts if possible, provision of an outline CEMP and provision of new suitable habitat to replace any habitat areas which would be permanently lost through development of the Project. Additional enhancement measures will be considered if possible such as provision bat boxes, provision of suitable reptile hibernaculas and creation of woodpiles for terrestrial invertebrates.			
Access Road – Option 1	Please note that preliminary assessment for likely ecological receptors presented above for the Generating Equipment Site and Laydown Area is also applicable for the Access Road Options and only specific details are drawn out separately.			
Non-Statutory Designated Sites (SINC and Ancient Woodland)	Direct impacts are envisaged on the edge of Waun Garn Wen SINC and Rhos Fawr SINC of habitat loss through the widening of the existing access track. Indirect impacts envisaged in the form of habitat degradation and pollution.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.
Habitats (woodland improved grassland, semi-improved grassland, marshy grassland, dense scrub, scattered trees, standing water – wet ditches)	Direct impacts on these habitats are envisaged to be permanent habitat loss, habitat fragmentation, habitat degradation and indirect impacts of pollution.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.

		the Project.		
Access Road – Option 2	Please note that preliminary assessment for likely ecological receptors presented above for the Generating Equipment Site and Laydown Area is also applicable for the Access Road Options and only specific details are drawn out separately.			
Non-Statutory Designated Sites (SINC and Ancient Woodland)	Direct impacts on the Lletty Morfil SINC, Felindre Grassland SINC and Ancient Woodland due to habitat loss. Indirect impacts on the remainder of the above sites and the adjacent sites is envisaged in the form of habitat degradation and pollution.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be Slight adverse. This is due to potential loss of Ancient Woodland which cannot be replaced.	Final design to be decided which will inform the extent of habitat loss.
Habitats (woodland improved grassland, semi-improved grassland, marshy grassland, dense scrub, scattered trees, standing water – wet ditches)	Direct impacts on these habitats are envisaged to be permanent habitat loss, habitat fragmentation, habitat degradation and indirect impacts of pollution.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be moderate/large adverse. This is due to potential loss of Ancient Woodland which cannot be replaced.	Final design to be decided which will inform the extent of habitat loss.

Operation

8.4.3 Given that some of ecological surveys are currently on-going, the preliminary assessment of operation impacts presented below provides a general overview of the potential effects on likely ecological receptors.

Table 8.6: Findings of Preliminary Assessment of Effects of Power Generation Plant during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment				
Statutory Designated Sites (International importance: Ramsar, SAC, SPA)	Indirect impacts envisaged will be from pollution in the form of air deposition.	The HRA Screening and any subsequent assessments will ensure that mitigation will be built in the design.	Effects are anticipated to be slight/moderate adverse.	HRA Screening and Air Quality modelling is required to inform this assessment.
Statutory Designated Sites (National importance such as NNR, LNR, SSSI and AONB)	Indirect impacts envisaged will be from pollution in the form of air deposition.	The Air Quality regulatory requirements will ensure that mitigation will be built in the design.	Effects are anticipated to be slight/moderate adverse.	Air Quality modelling is required to inform this assessment.
Non-Statutory Designated Sites (SINC and Ancient Woodland)	Indirect impacts envisaged will be from pollution in the form of air deposition.	The Air Quality regulatory requirements will ensure that mitigation will be built in the design.	Effects are anticipated to be slight/moderate adverse.	Air Quality modelling is required to inform this assessment.
Habitats	Indirect impacts envisaged will be from pollution in the form of air deposition.	The Air Quality regulatory requirements will ensure that mitigation will be built in the design.	Effects are anticipated to be slight/moderate adverse.	Air Quality modelling is required to inform this assessment.
Otter	Impacts on this species include direct mortality, disturbance and habitat degradation from pollution.	Any suitable habitat that may be created during construction will be connected through appropriate landscaping to the wider landscape to reduce risk of mortality and disturbance from operational activities.	Effects are anticipated to be slight/moderate adverse.	The need for habitat creation will be assessed once final design is produced.

Water vole	This species was not found present during the 2014 surveys although habitats present suitability. No impacts are envisaged.			
GCN	Likely absence of GCN was recorded in all waterbodies subject to survey in 2014 (total of five ponds). One pond was considered unsuitable and seven ponds within 250 m from the Project Site boundary could not be accessed for the 2014 surveys. For the purposes of this assessment the absence of GCN is assumed in all waterbodies within 250 m from the Project Site boundary.			
Breeding birds	Impacts on this species group include disturbance from operation activities (increased lighting) and habitat degradation from pollution.	Any compensatory habitat created will be taken into account when designing the lighting schedule for the Project Site to ensure minimal light spillage and directional lighting therefore ensuring that is not lit and suitable for use as nesting, commuting and refuge for wildlife.	Effects are anticipated to be slight/moderate adverse.	The need for habitat creation will be assessed once final design is produced and lighting schedule will take account of ecological receptors.
Badgers, Bats, Dormice, Reptiles, Terrestrial and Aquatic Invertebrates	As surveys are currently on-going for these species and species groups a preliminary assessment is not undertaken at this stage. Bats, reptiles and noteworthy terrestrial invertebrates were found present and impacts on these species and species groups are envisaged to be similar to impacts presented for other species and species groups above such as otters and breeding birds. Potential mitigation would include measures to reduce disturbance from operation activities (lighting schedule will take account of presence of bats).			
Access Road – Option 1	Please note that preliminary assessment for likely ecological receptors presented above for the Generating Equipment and Laydown Area is also applicable for the Access Road Options and only specific details are drawn out separately.			
Non-Statutory Designated Sites (SINC and Ancient Woodland)	Indirect impacts envisaged in the form of habitat degradation and pollution from increased traffic levels.	None	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.
Access Road – Option 2	Please note that preliminary assessment for likely ecological receptors presented above for the Generating Equipment and Laydown Area is also applicable for the Access Road Options and only specific details are drawn out separately.			
Non-Statutory Designated Sites (SINC and Ancient Woodland)	Indirect impacts envisaged in the form of habitat degradation and pollution from increased traffic levels.	None	Effects are anticipated to be moderate/large adverse. This is due to presence of the Ancient Woodland which is likely to be a more	Final design to be decided which will inform the extent of habitat loss.

			sensitive receptor.	
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8.5 Gas Connection Assessment

Construction/Decommissioning

8.5.1 Construction and decommissioning impacts are envisaged to be mainly temporary with permanent impacts associated with AGI component only.

8.5.2 Impacts from decommissioning are considered to mirror construction impacts and therefore they are assessed collectively.

Table 8.7: Findings of Preliminary Assessment of Effects of Gas Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Statutory Designated Sites (International importance: Ramsar, SAC, SPA)	No direct impacts are envisaged given that the closest site is situated 6.6 km away from the Gas Connection. A Habitat Regulations Assessment (HRA) Screening will be conducted to identify any potential impacts on internationally designated sites.	See Section 2.13.	Effects are anticipated to be slight/moderate adverse.	A Habitat Regulations Assessment (HRA) Screening will be conducted. This exercise will determine the requirement for an Appropriate Assessment in view of the Project.
Statutory Designated Sites (National importance such as NNR, LNR, SSSI and AONB)	No direct impacts are envisaged given that the closest site is situated 1.7 km away from the Gas Connection. Indirect impacts envisaged in the form of habitat degradation and pollution.	See Section 2.13.	Effects are anticipated to be slight/moderate adverse.	None
Non-Statutory Designated Sites (SINC and Ancient	Three SINCS (Lletty Morfil, Rhyd-Y-Pandy Valley and	An outline CEMP will be drafted and appended to the ES. If	Effects are anticipated to be slight/moderate	None

Woodland)	Grasslands Rhos Fawr) are situated adjacent to the boundary. Direct impacts will be avoided through design. Indirect impacts envisaged in the form of habitat degradation and pollution.	necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	adverse.	
Habitats	Direct impacts on these habitats are envisaged to be permanent and temporary habitat loss, habitat fragmentation, habitat degradation and indirect impacts of pollution.	An outline CEMP will be drafted and appended to the ES. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.
Otter	Impacts on this species include direct mortality, disturbance, habitat loss, habitat fragmentation and habitat degradation.	Due to the mobile nature of this species a pre-construction check will be undertaken of the suitable habitats subject to direct impacts. An outline CEMP will be drafted and appended to the ES. If necessary, further, specific mitigation measures will include the consideration for provision of new	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.

		habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.		
Water vole	This species was not found present during the 2014 surveys although habitats present suitability. No impacts are envisaged.			
GCN	Likely absence of GCN was recorded in all waterbodies subject to survey in 2014 (total of five ponds). One pond was considered unsuitable and seven ponds within 250 m from the Project Site boundary could not be accessed for the 2014 surveys. For the purposes of this assessment the absence of GCN is assumed in all waterbodies within 250 m from the Project Site boundary.			
Breeding Birds	Impacts on this species group include direct mortality, disturbance, habitat loss, habitat fragmentation and habitat degradation.	Given the sensitive nature of breeding birds all vegetation clearance will be undertaken outside the main breeding season to avoid disturbance and direct mortality. An outline CEMP will be drafted and appended to the ES. Further, specific mitigation measures will include the provision of new habitat to suitably replace any habitat areas which would be permanently lost through development of the Project. Additional enhancement measures could include the provision of bird boxes in suitable locations.	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.
Badgers, Bats, Dormice, Reptiles, Terrestrial and	As surveys are currently on-going for these species and species groups a preliminary assessment is not undertaken at this stage. Bats, reptiles and noteworthy terrestrial invertebrates were found present and impacts on these species and species groups are envisaged to be similar to impacts presented			

Aquatic Invertebrates	for other species and species groups above such as otters and breeding birds. Potential mitigation would include timing of works to avoid impacts if possible, provision of an CEMP and provision of new suitable habitat to replace any habitat areas which would be permanently lost through development of the Project. Additional enhancement measures will be considered if possible such as provision bat boxes, provision of suitable reptile hibernaculas and creation of woodpiles for terrestrial invertebrates
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Operation

8.5.3 As the Gas Connection will be underground, impacts are envisaged in relation to the AGI component only.

Table 8.8: Findings of Preliminary Assessment of Effects of Gas Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Effects are anticipated to be slight/moderate adverse.	Further assessments and consultation to be undertaken
Statutory Designated Sites (International importance: Ramsar, SAC, SPA)	No impacts envisaged	n/a	Effects are anticipated to be slight/moderate adverse.	n/a
Statutory Designated Sites (National importance such as NNR, LNR, SSSI and AONB)	No impacts envisaged	n/a	Effects are anticipated to be slight/moderate adverse.	n/a
Non-Statutory Designated Sites (SINC and Ancient Woodland)	Indirect impacts envisaged will be from pollution in the form of run off.	The water drainage regulatory requirements will ensure that mitigation will be built in the design.	Effects are anticipated to be slight/moderate adverse.	n/a
Habitats	Indirect impacts envisaged will be from pollution in the form of run off.	The water drainage regulatory requirements will ensure that mitigation will be built in the design.	Effects are anticipated to be slight/moderate adverse.	n/a

Otter	Impacts on this species include direct mortality, disturbance and habitat degradation from pollution.	Any suitable habitat that may be created during construction will be connected through appropriate landscaping to the wider landscape to reduce risk of mortality and disturbance from operational activities.	Effects are anticipated to be slight/moderate adverse.	The need for habitat creation will be assessed once final design is produced.
Water vole	This species was not found present during the 2014 surveys although habitats present suitability. No impacts are envisaged.			
GCN	Likely absence of GCN was recorded in all waterbodies subject to survey in 2014 (total of five ponds). One pond was considered unsuitable and seven ponds within 250 m from the Project Site boundary could not be accessed for the 2014 surveys. For the purposes of this assessment the absence of GCN is assumed in all waterbodies within 250 m from the Project Site boundary.			
Breeding birds	Impacts on this species group include disturbance from operation activities (increased lighting) and habitat degradation from pollution.	Any compensatory habitat created will be taken into account when designing the lighting schedule for the Project Site to ensure minimal light spillage and directional lighting therefore ensuring that is not lit and suitable for use as nesting, commuting and refuge for wildlife.	Effects are anticipated to be slight/moderate adverse.	The need for habitat creation will be assessed once final design is produced and lighting schedule will take account of ecological receptors.
Badgers, Bats, Dormice, Reptiles, Terrestrial and Aquatic Invertebrates	As surveys are currently on-going for these species and species groups a preliminary assessment is not undertaken at this stage. Bats, reptiles and noteworthy terrestrial invertebrates were found present and impacts on these species and species groups are envisaged to be similar to impacts presented for other species and species groups above such as otters and breeding birds. Potential mitigation would include measures to reduce disturbance from operation activities (lighting schedule will take account of presence of bats).			

8.6 Electrical Connection Assessment

Construction/Decommissioning

- 8.6.1 Construction and decommissioning impacts are envisaged to be mainly temporary with permanent impacts associated with the Sealing End Compound (SEC) component only.
- 8.6.2 Effects from decommissioning are considered to mirror construction effects and therefore they are assessed collectively.

Table 8.9: Findings of Preliminary Assessment of Effects of Electrical Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Statutory Designated Sites (International importance: Ramsar, SAC, SPA)	No direct impacts are envisaged given that the closest site is situated 6.3 km away from the Electrical Connection. A Habitat Regulations Assessment (HRA) Screening will be conducted to identify any potential impacts on internationally designated sites.	See Section 2.13.	Effects are anticipated to be slight/moderate adverse.	A Habitat Regulations Assessment (HRA) Screening will be conducted. This exercise will determine the requirement for an Appropriate Assessment in view of the Project.
Statutory Designated Sites (National importance such as NNR, LNR, SSSI and AONB)	No direct impacts are envisaged given that the closest site is situated 1.6 km away from the Electrical Connection. Indirect impacts envisaged in the form of habitat degradation and pollution.	See Section 2.13.	Effects are anticipated to be slight/moderate adverse.	None
Non-Statutory Designated Sites (SINC and	Two SINC's (Lletty Morfil and Felindre	See Section 2.13. If necessary,	Effects are anticipated to be slight/moderate	None

Ancient Woodland)	Grasslands) and one Ancient Woodland are situated adjacent to the Electrical Connection. Direct impacts will be avoided through design. Indirect impacts envisaged in the form of habitat degradation and pollution.	further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	adverse.	
Habitats	Direct impacts on these habitats are envisaged to be permanent and temporary habitat loss, habitat fragmentation, habitat degradation and indirect impacts of pollution. Direct impacts on the woodland will be avoided through design.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.
Otter	Impacts on this species include direct mortality, disturbance, habitat loss, habitat fragmentation and habitat degradation.	See Section 2.13. Due to mobile nature of this species a pre-construction check will be undertaken of the suitable habitats subject to direct impacts. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.

		through development of the Project.		
Water vole	This species was not found present during the 2014 surveys although habitats present suitability. No impacts are envisaged.			
GCN	Likely absence of GCN was recorded in all waterbodies subject to survey in 2014 (total of five ponds). One pond was considered unsuitable and seven ponds within 250 m from the Project Site boundary could not be accessed for the 2014 surveys. For the purposes of this assessment the absence of GCN is assumed in all waterbodies within 250 m from the Project Site boundary.			
Breeding Birds	Impacts on this species group include direct mortality, disturbance, habitat loss, habitat fragmentation and habitat degradation.	Given the sensitive nature of breeding birds all vegetation clearance will be undertaken outside the main breeding season to avoid disturbance and direct mortality. Further, specific mitigation measures will include the provision of new habitat to suitably replace any habitat areas which would be permanently lost through development of the Project. Additional enhancement measures could include the provision of bird boxes in suitable locations. See Section 2.13.	Effects are anticipated to be slight/moderate adverse.	Final design to be decided which will inform the extent of habitat loss.
Badgers, Bats, Dormice, Reptiles, Terrestrial and Aquatic Invertebrates	As surveys are currently on-going for these species and species groups a preliminary assessment is not undertaken at this stage. Bats, reptiles and noteworthy terrestrial invertebrates were found present and impacts on these species and species groups are envisaged to be similar to impacts presented for other species and species groups above such as otters and breeding birds. Potential mitigation would include timing of works to avoid impacts if possible and provision of new suitable habitat to replace any habitat areas which would be permanently lost through development of the Project. Additional enhancement measures will be considered if possible such as provision bat boxes, provision of suitable reptile hibernaculas and creation of woodpiles for terrestrial invertebrates.			

Operation

8.6.3 As the Electrical Connection will be underground, impacts are envisaged in relation to the SEC component only.

Table 8.10: Findings of Preliminary Assessment of Effects of Electrical Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Statutory Designated Sites (International importance: Ramsar, SAC, SPA)	No impacts envisaged	n/a	n/a	n/a
Statutory Designated Sites (National importance such as NNR, LNR, SSSI and AONB)	No impacts envisaged	n/a	n/a	n/a
Non-Statutory Designated Sites (SINC and Ancient Woodland)	No impacts envisaged	n/a	n/a	n/a
Habitats	No impacts envisaged	n/a	n/a	n/a
Otter	No impacts envisaged	n/a	n/a	n/a
Water vole	This species was not found present during the 2014 surveys although habitats present suitability. No impacts are envisaged.			
GCN	Likely absence of GCN was recorded in all waterbodies subject to survey in 2014 (total of five ponds). One pond was considered unsuitable and seven ponds within 250 m from the Project Site boundary could not be accessed for the 2014 surveys. For the purposes of this assessment the absence of GCN is assumed in all waterbodies within 250 m from the Project Site boundary.			
Badgers, Bats, Dormice, Reptiles, Terrestrial and Aquatic Invertebrates	As surveys are currently on-going for these species and species groups a preliminary assessment is not undertaken at this stage. Bats, reptiles and noteworthy terrestrial invertebrates were found present and similarly to otters and breeding birds presented above no operation impacts are envisaged for these species.			

8.7 Project (as a whole)

- 8.7.1 The nature of the impacts on ecological receptors for the Project (as a whole) is expected to be as per those detailed in the Tables above. However, their effects can not be quantified and assessed at this stage given that this will be informed by the indicative design. Impacts at a Project level on the European statutory designated sites will be assessed in the HRA Screening.

8.8 Cumulative Effects

Construction/Decommissioning

- 8.8.1 Cumulative effects will be considered in the ES for the three elements of the Project together (Project as a whole) as well as in combination with other schemes as detailed at Section 4.8.
- 8.8.2 Cumulative effects in combination with the proposed solar farm at Abergelli Farm are likely to result in low-medium effects on various ecological receptors given its proximity to the project site.

Operation

- 8.8.3 The neighbouring schemes consist of wind turbines and solar panels with very small operational impacts. Given the proximity of one solar panel scheme low to medium cumulative effects may occur depending on final design however this will be assessed in detail in the ES.

8.9 Summary and Conclusions

- 8.9.1 The table below summarises the likely potential effects on ecological receptors.

Table 8.11: Summary of Effects

	Receptor name and description	Potential Mitigation	Preliminary Assessment of Residual Effects
Power Generation Plant			
Construction / Decommissioning	Indirect impacts envisaged in the form of habitat degradation and pollution. A Habitat Regulations Assessment (HRA) Screening will be conducted to identify	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be	Effects are anticipated to be slight/moderate adverse.

	any potential impacts on internationally designated sites.	permanently lost through development of the Project.	
	Direct impacts in the form of permanent and temporary habitat loss, habitat fragmentation, habitat degradation.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be slight/moderate adverse.
	Impacts on species in the form of direct mortality and disturbance.	Due to mobile nature of this species a pre-construction check will be undertaken of the suitable habitats subject to direct impacts.	Effects are anticipated to be slight/moderate adverse.
Operation	Indirect impacts envisaged will be from pollution in the form of air deposition.	The HRA Screening and any subsequent assessments will ensure that mitigation will be built in the design. The Air Quality regulatory requirements will ensure that mitigation will be built in the design.	Effects are anticipated to be slight/moderate adverse.
	Impacts on species include direct mortality, disturbance and habitat degradation from pollution.	Any suitable habitat that may be created during construction will be connected through appropriate landscaping to the wider landscape to reduce risk of mortality and disturbance from operational activities.	Effects are anticipated to be slight/moderate adverse.
Power Generation Plant with Access Option 1			
Construction / Decommissioning	Direct impacts are envisaged on the edge of Waun Garn Wen SINC and Rhos Fawr SINC of habitat loss through the widening of the existing access	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably	Effects are anticipated to be slight/moderate adverse.

	track. Indirect impacts envisaged in the form of habitat degradation and pollution.	replace any habitat areas which will be permanently lost through development of the Project.	
Operation	Indirect impacts envisaged in the form of habitat degradation and pollution from increased traffic levels.	None	Effects are anticipated to be slight/moderate adverse.
Power Generation Plant with Access Option 2			
Construction / Decommissioning	Direct impacts on the Lletty Morfil SINC, Felindre Grassland SINC and Ancient Woodland resulting may occur. Indirect impacts on the remainder of the above sites and the adjacent sites is envisaged in the form of habitat degradation and pollution.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be slight/moderate adverse. This is due to potential loss of Ancient Woodland which cannot be replaced.
Operation	Indirect impacts envisaged in the form of habitat degradation and pollution from increased traffic levels.	None	Effects are anticipated to be moderate/large. This is due to presence of the Ancient Woodland which is likely to be a more sensitive receptor.
Gas Connection			
Construction / Decommissioning	Direct impacts on designated sites will be avoided through design. Indirect impacts envisaged in the form of habitat degradation and pollution.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be slight/moderate adverse.
	Direct impacts on habitats are envisaged to be permanent and temporary habitat loss, habitat fragmentation and habitat degradation.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat	Effects are anticipated to be slight/moderate adverse.

		areas which will be permanently lost through development of the Project.	
	Impacts on species include direct mortality and disturbance.	Due to mobile nature of this species a pre-construction check will be undertaken of the suitable habitats subject to direct impacts.	Effects are anticipated to be slight/moderate adverse.
Operation	Indirect impacts envisaged will be from pollution in the form of run off.	The water drainage regulatory requirements will ensure that mitigation will be built in the design.	Effects are anticipated to be slight/moderate adverse.
	Impacts on species include direct mortality and disturbance.	Any suitable habitat that may be created during construction will be connected through appropriate landscaping to the wider landscape to reduce risk of mortality and disturbance from operational activities.	Effects are anticipated to be slight/moderate adverse.
Electrical Connection			
Construction / Decommissioning	Direct impacts on designated sites will be avoided through design. Indirect impacts envisaged in the form of habitat degradation and pollution.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development of the Project.	Effects are anticipated to be slight/moderate adverse.
	Direct impacts on habitats are envisaged to be permanent and temporary habitat loss, habitat fragmentation and habitat degradation.	See Section 2.13. If necessary, further, specific mitigation measures will include the consideration for provision of new habitat to suitably replace any habitat areas which will be permanently lost through development	Effects are anticipated to be slight/moderate adverse.

		of the Project.	
	Impacts on species include direct mortality and disturbance.	Due to mobile nature of species a pre-construction check will be undertaken of the suitable habitats subject to direct impacts.	Effects are anticipated to be slight/moderate adverse.
Operation	No impacts envisaged	n/a	n/a
Project (as a whole)			
Construction / Operation / Decommissioning	<u>Designated sites</u> Impacts in the form of permanent and temporary habitat loss, habitat fragmentation, habitat degradation.	Impacts on a Project level on the European statutory designated sites will be assessed in the HRA Screening. The level of mitigation required for all sites will depend on indicative design.	Not known
	<u>Habitats</u> Impacts in the form of permanent and temporary habitat loss, habitat fragmentation, habitat degradation	Impacts on a Project level will depend on the final design and cannot be detailed at this stage	Not known
	<u>Species</u> Impacts in the form of direct mortality and disturbance	Impacts on a Project level will depend on the final design and cannot be detailed at this stage	Not known
Cumulative Effects			
Construction / Decommissioning	Cumulative effects in combination with other schemes are likely to result in low to medium impacts on various ecological receptors.		
Operation	The neighbouring schemes consist of wind turbines and solar panels with very small operational impacts. Given the proximity of one solar scheme low to medium cumulative effects may occur depending on final design however this will be assessed in detail in the ES.		

9 WATER QUALITY AND RESOURCES

9.1 Introduction

9.1.1 This chapter provides the water quality and resources preliminary environmental assessment of the proposed Abergelli Power Project based upon assessment carried out up to September 2014. The Project is set out in Chapter 2 which forms the primary basis for the assessment carried out to date.

9.1.2 The Project assessment scenario is as described in Chapter 2. The assessment scenario considers both access road options and assumes that surface water abstractions may be required for domestic water uses. Gas turbines that require water injection have already been ruled out therefore large scale abstraction for process water is not expected. This scenario is considered an appropriate worst case for assessment of water quality and resources impacts

9.1.3 The assessment assumes that sustainable drainage systems in accordance with current guidance will be used at the site to minimise impacts on flood risk and water quality and standard construction best practices will be followed (such as water protection measures in a CEMP) to reduce impacts on water quality. Embedded mitigation in the Project is described Section 2.13.

9.2 Approach

Relevant Policy and Guidance

9.2.1 The water assessment presented in the PEIR has taken account of planning policy and guidance set out in Section 3, as well as the following documents:

- Water Framework Directive (2000/60/EC);
- Flood and Water Management Act 2010;
- Flood Risk Regulations 2009; and
- Environmental Permitting (England and Wales) Regulations 2010.

Assessment Methodology

9.2.2 This preliminary assessment takes account of the existing status of, and impacts of the Project on water quality, water resources and physical characteristics of the water environment including any potential eutrophication impacts. The assessment has been undertaken using a risk based approach to determine the level of potential impacts by using a Source-Pathway-Receptor model to identify which receptors could

realistically be impacted by a given action. This included any sources of pollution that have the potential to impact on surface water bodies.

- 9.2.3 This preliminary assessment is based on a site visit and desk-based review of potential receptors. Hydrological features have been identified from OS mapping with information on geology, water quality and flood risk obtained from the Environment Agency website.
- 9.2.4 All aspects of supply, demand and disposal of water and process effluents have been addressed for the construction, operational and decommissioning phases. For the ES, potential discharge locations for site surface waters and process waste waters will be identified and a site drainage plan, which may incorporate a sustainable drainage system (SUDS), will be discussed at a high level.
- 9.2.5 There are not anticipated to be any significant impacts on key water bodies resulting from the Project through physical works to them.
- 9.2.6 Where projects are away from or unlikely to interact with any watercourses, it is likely that a Water Framework Directive (WFD) Report will be scoped out. However, if NRW does require the inclusion of a WFD Report, it will be incorporated within the ES. The requirement for a WFD Report will be confirmed with NRW once there is more certainty in the proposed layout and need for watercourse crossings.
- 9.2.7 This chapter provides a summary of existing baseline conditions with regards to water resources, flood risk and drainage, and assesses the potential impacts of the proposed works on water resources, flood risk and drainage. The chapter also advises on recommended mitigation measures, if required, and summarises any likely residual effects.
- 9.2.8 The study area generally includes features within 1 km of the Project Site boundary. However, more distant features that may be hydraulically connected to the Project Site have also been considered.

Significance Criteria

- 9.2.9 The methodology adopted for the assessment of effects of the Project on the water environment is detailed in Chapter 4. Guidance for estimating importance of the attribute, magnitude of the impact and significance of the effects is provided in Table 9.1, Table 9.2 below and Table 4.3.

Table 9.1 Estimating the importance of water environment attributes

Importance	Criteria	Example
Very high	Attribute has a high quality and rarity on regional or national scale	<p>Water body of very good chemical or biological quality, i.e. Water Framework Directive (WFD) Class 'High'.</p> <p>Site protected/designed under EU or UK habitat legislation (Special Areas of Conservation (SAC), Special Protection Area (SPA), Site of Special Scientific Interests (SSSI), Water Protection Zone (WPZ), Ramsar site, species protected by EU legislation.</p> <p>EC designated Salmonid fishery.</p> <p>Principal aquifer providing a regionally important resource or supporting site protected under EC and UK habitat legislation.</p> <p>Source Protection Zone (SPZ) 1. A source used for public or local potable water supply.</p> <p>Water body of high amenity value, including areas of bathing and where water emersion sports are regularly practised.</p> <p>Floodplain or defence protecting more than 100 residential properties from flooding.</p> <p>Areas which must be operational during a flood. With reference to TAN15, these include the emergency services.</p>
High	Attribute has a high quality and rarity on local scale	<p>Water body of good chemical and biological quality, i.e. WFD Class 'Good'</p> <p>Species protected under UK legislation</p> <p>EC designated Cyprinid fishery.</p> <p>Principal aquifer providing locally important resource or supporting river ecosystem. SPZ 2. A source used for domestic non-potable water supply.</p> <p>Water body of a moderate amenity value including public parks, boating, non-contact water sports, popular footpaths adjacent to watercourses, or watercourses running through housing developments/town centres.</p> <p>Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding.</p> <p>Areas which are highly vulnerable to flooding. With reference to TAN 15, these can include power stations, residential units, educational facilities and waste management sites.</p>
Medium	Attribute has a medium	Water body of fair chemical or biological quality, i.e. WFD Class 'Moderate'.

Importance	Criteria	Example
	quality and rarity on local scale	<p>Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ 3.</p> <p>Water body of particular local social/cultural/educational interest. Water body of low amenity value with only casual access, e.g. along a road or bridge in a rural area.</p> <p>Floodplain or defence protecting 10 or fewer industrial properties from flooding.</p> <p>Areas which are less vulnerable to flooding. With reference to TAN 15, these can include retail, commercial, general industry, transport and utilities infrastructure.</p>
Low	Attribute has a low quality and rarity on local scale	<p>Water of poor or bad chemical or biological quality, i.e. WFD Class 'Poor'</p> <p>Low sensitivity aquatic ecosystem.</p> <p>Non-Aquifer.</p> <p>Water body of no amenity value, seldom used for amenity purposes, in a remote or inaccessible area.</p> <p>Floodplain with limited constraints and a low probability of flooding of residential and industrial properties.</p> <p>Areas which are considered to be water-compatible. With reference to TAN 15, these can include flood control infrastructure, boatyards and marinas.</p>
Negligible	No sensitivity to change	

Table 9.2: Estimating the magnitude of an impact

Importance	Criteria	Example
Major adverse	Results in loss of attribute and / or quality and integrity of the attribute	<p>Loss or extensive change to a fishery / designated nature conservation site.</p> <p>Loss of, or extensive change to, an aquifer / groundwater supported designated wetlands.</p> <p>Change to the environmental status/classification of a water feature, including water quality classification.</p> <p>Changes to site resulting in an increase in discharge/runoff of > 75% with flood/sewerage exceedance potential.</p> <p>Increase in peak flood level (1% annual probability event (ape)) > 100 mm.</p> <p>Loss of flood storage areas.</p>

Importance	Criteria	Example
Moderate adverse	Results in effect on integrity of attribute, or loss of part of attribute	<p>Partial loss or change to a fishery / designated nature conservation site. Loss in the productivity of a fishery.</p> <p>Partial loss or change to an aquifer/ groundwater supported designated wetlands.</p> <p>Pollution of a receiving water body, but insufficient to change the environmental status/classification, including water quality classification.</p> <p>Changes to site resulting in an increase in discharge/runoff of > 50% with flood/sewerage exceedance potential.</p> <p>Increase in peak flood level (1% ape) > 50 mm.</p>
Minor adverse	Results in some measurable change in attribute's quality or vulnerability	<p>Potential low risk of some pollution to a surface water or groundwater body, but insufficient to cause loss in quality, fishery productivity or biodiversity.</p> <p>Changes to site resulting in an increase in discharge/runoff of > 25% with flood/sewerage exceedance potential.</p> <p>Increase in peak flood level (1% ape) > 10 mm.</p>
Negligible adverse	Results in negative effect on attribute, but of insufficient magnitude to affect the use or integrity	<p>The proposed scheme is unlikely to affect the integrity of the water environment.</p> <p>No measurable impact upon an aquifer.</p> <p>Negligible change in peak flood level (1% ape) < 10 mm</p>
No change	No change to attribute's quality or vulnerability	No change to surface water quality, groundwater quality, drainage or flood risk.
Negligible beneficial	Results in positive effect on attribute, but of insufficient magnitude to affect the use or integrity	<p>The proposed scheme is unlikely to affect the integrity of the water environment.</p> <p>No measurable impact upon an aquifer.</p> <p>Negligible change in peak flood level (1% ape) > 10 mm</p>
Minor beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	<p>Potential for slight reduction in pollution to a surface water or groundwater body, but insufficient to cause noticeable benefit in quality, fishery productivity or biodiversity.</p> <p>Changes to site resulting in a decrease in discharge/runoff > 25%.</p> <p>Reduction in peak flood level (1% ape) > 10 mm.</p>

Importance	Criteria	Example
Moderate beneficial	Results in moderate improvement of attribute quality	<p>Moderate improvement to a fishery / designated nature conservation site. Potential increase in the productivity of a fishery.</p> <p>Reduced pollution of a receiving water body, but insufficient to change the environmental status/classification, including water quality classification.</p> <p>Changes to site resulting in a decrease in discharge/runoff > 50%.</p> <p>Reduction in peak flood level (1% ape) > 50 mm.</p>
Major beneficial	Results in major improvement of attribute quality	<p>Significant improvement to a fishery / designated nature conservation site.</p> <p>Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring.</p> <p>Change to the environmental status/classification of a water feature, including water quality classification.</p> <p>Changes to site resulting in a decrease in discharge/runoff of > 75%.</p> <p>Reduction in peak flood level (1% ape) > 100 mm.</p>

Limitations

9.2.10 The main limitations of the preliminary assessment are as follows:

- More detailed information required to confirm hydrogeological pathways and potential for pollutant transport. This preliminary assessment assumes a worst case scenario with potential for transport of pollutants through hydrogeological pathways. A ground investigation will be required to fully confirm hydrogeological pathways, which is unlikely to be completed for the ES. However, the assessment can be refined when more detailed information is available on the Project layout and location of potential pollutant sources;
- More detailed information required to assess the sensitivity of ecological receptors to changes in water quality. This preliminary assessment assumes ecological receptors may be sensitive to changes in water quality except where the designation indicates this is clearly not the case; and
- More detailed information required to assess specific impacts on flood risk and channel morphology where the Project may encroach on existing watercourses. This will be addressed in the ES when there is greater detail available for the Project.

Consultation and Consultation Responses

- 9.2.11 Appendix 4.1 provides a summary of scoping responses and set out the actions that have been undertaken, or will be undertaken to address them.

9.3 Baseline Conditions and Receptors

Topography and Land Use

- 9.3.2 The Project Site is reasonably elevated and steeply sloping. Ground levels at the Project Site vary from approximately 146 m AOD in the north-west corner to 80 m AOD along the southern perimeter with ground levels generally falling in a southerly and south easterly direction towards the Afon Llan and its tributaries.

Ground conditions and hydrogeology

- 9.3.3 A full description of ground conditions and hydrogeology is provided in Chapter 10. A summary is provided here to understand the possible linkages with surface water features.
- 9.3.4 Review of British Geological Survey (BGS) online mapping data indicates that the Project Site is mostly underlain by bedrock of the Grovesend Formation, comprising mudstone, siltstone and sandstone although to the north and east of the Project Site, this may change to sandstone (Swansea Member formation). Superficial deposits across the Project Site are quite variable, however they largely comprise Till and Glaciofluvial deposits (sands and gravels) with a smaller area of Peat. The depth of superficial deposit is currently unknown.
- 9.3.5 Bedrock geology within the Project Site and study area is designated as Secondary A aquifer with superficial deposits including a mixture of Secondary A aquifer and unproductive strata. Secondary A aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale and, in some cases, can form an important source of base flow to rivers. Unproductive strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow. Soils in the study area are variable, designated to have high, intermediate and low leachate potential.
- 9.3.6 Groundwater movement within the underlying geology is likely to be limited considering the aquifer destinations as discussed above. Although the Project Site is elevated, shallow or perched groundwater within the superficial deposits is expected to be reasonably close to the surface and in hydraulic connectivity with the land drainage system located in this area.

9.3.7 Groundwater quality in the study area has been assessed against the objectives of the WFD. According to the EA website the current quantitative quality is good and is predicted to remain so in 2015. The current chemical quality is poor and expected to remain so in 2015. Monitoring points are located in the vicinity of the study area (closest at Felindre) however records have not been obtained for this preliminary assessment. There are no identified designated groundwater Source Protection Zones or drinking water Safeguard Zones with regards to agricultural activities within 1 km of the Project Site.

9.3.8 Seven licensed groundwater abstractions (bedrock aquifer) have been identified within 1 km of the Project Site for general farming and domestic uses.

Contaminated land

9.3.9 A detailed assessment of contaminated land is included in Chapter 10. No desk-based study or intrusive site investigation has been completed to inform this assessment. However, as the majority of the Project Site is undeveloped it is unlikely to have experienced significant contamination. Current or historic land uses that have a higher potential for ground contamination include the disused (inert) landfill and coal mine north of Abergelli Farm and the National Grid site towards the south west of the Project Site.

Surface water features

9.3.10 Figure 9.1 shows the main surface water features in the vicinity of the Project Site considered in the preliminary assessment. The Loughor Estuary, alongside other ecological statutory designated sites, are shown on Figure 8.1.

9.3.11 The main watercourse that traverses the area is Afon Llan which flows in a south-westerly direction to the west and south of the Project Site, eventually discharging to the Loughor Estuary. This is a designated Main River, under the jurisdiction of NRW. The watercourse has been assessed under the WFD and Table 9.3 shows the current and 2015 predicted status. There are a number of smaller watercourses within the vicinity of the Project Site that drain to the Afon Llan, along with a number of springs and small ponds.

Table 9.3: WFD status of Afon Llan

Parameter	Current Status	2015 Predicted Status
Ecological quality	Moderate	Good
Chemical quality	Does not require assessment	Does not require assessment

Hydromorphological quality	-	-
Overall risk	At risk	-

- 9.3.12 The Afon Lliw is located approximately 1.3 km north of the Project Site and has been assessed under the WFD as shown in Table 9.4.

Table 9.4: WFD status of Afon Lliw

Parameter	Current Status	2015 Predicted Status
Ecological quality	Moderate Potential	Moderate Potential
Chemical quality	Fail	Fail
Hydromorphological quality	Heavily Modified	-
Overall risk	At risk	-

- 9.3.13 With the possible exception of the northern boundary, the Project Site is outside of the Afon Lliw topographic catchment and therefore it is expected that any direct hydraulic connectivity will be limited. The Afon Llan does however join with the Afon Lliw approximately 9 km downstream of the Project Site. There may also be some potential for cross transfer of shallow groundwater flows between the two catchments.

- 9.3.14 Both the Afon Llan and Afon Lliw discharge to the Loughor Estuary west of Swansea, approximately 7 km from the Project Site. This has been assessed under the WFD as shown in Table 9.5. NRW has identified that the Loughor Estuary contains designated Shellfisheries.

Table 9.5: WFD status of Loughor Estuary

Parameter	Current Status	2015 Predicted Status
Ecological quality	Moderate	Moderate
Chemical quality	Good	Good
Hydromorphological quality	Not designated	-
Overall risk	Probably At Risk	-

- 9.3.15 No surface water abstraction points have been identified within the Project Site boundary. The closest surface water abstractions, assumed to be from a tributary of the Afon Llan, have been identified approximately 1.6 km from the Project Site boundary, which serve the ponds/lakes close to Llwyncelyn.

Artificial water features (identified to date)

- 9.3.16 The Felindre water treatment works with covered reservoir is situated immediately north of the Project Site. A 48" diameter water main flows through the Power Generation Plant Site, in a south-easterly direction generally following the line of the existing access track. It is assumed that this is part of the water supply route serving Morriston to the south-east.
- 9.3.17 The Lower Lliw reservoir is situated approximately 1.1 km north of the Project Site. The on-line reservoir is located in the adjacent Lliw catchment and is part of the water supply infrastructure in the area.

Ecological designations

- 9.3.18 A detailed description of ecological designations within the study area is provided within Chapter 8. A summary of features relevant to the assessment of impacts on the water environment is provided below.
- 9.3.19 The Loughor Estuary is located approximately 7 km west of the Project Site and receives water from the Afon Llan and Afon Lliw. It is designated as a SSSI with the Burry Inlet further downstream also a designated Ramsar site. Both form part of the Carmarthen Bay SAC.
- 9.3.20 Two SSSI sites are located closer to and potentially in hydraulic connectivity with the Project Site: the Nant y Crimp, approximately 2.2 km west, designated for its wet pastures, grassland/woodland habitat and Marsh fritillary butterfly; and the Penllergaer railway cutting, approximately 3.5 km to the south-west designated for geological interest. The Project Site is not located within the catchment of the Nant y Crimp, and therefore hydraulic connectivity with the Project Site is limited to groundwater flows. An unnamed tributary of the Afon Llan flows through the Penllergaer SSSI however it is not considered that the Project will impact on its geological designation. Impacts to the SSSI are addressed in Chapter 8.
- 9.3.21 There are a number of SINCs situated within and surrounding the Project Site. It is understood that the main ecological value of these sites relates to marshy grassland/purple moor-grass and rush pastures, ponds and lowland mixed deciduous woodland. The SINCs may therefore have some sensitivity to changes in surface water runoff, flood risk or water quality but this is likely to be variable and will be assessed in greater detail for the ES.

Flood risk

- 9.3.22 Review of the Welsh Assembly Development Advice Map (DAM) indicates that a small area of the Project Site towards the Afon Llan lies within Flood Zone B (areas known to have flooded in the past evidenced by sedimentary deposits). Similarly land alongside the un-named drain east of the Project Site is situated within Flood Zone B and adjacent to Flood Zone C2 (see Figure 9.2). Comparison with the EA Flood Map for Planning (Rivers and Sea) indicates that the land within Flood Zone C2 is located within the high risk Flood Zone 3. Land within Flood Zone 3 is defined as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%).

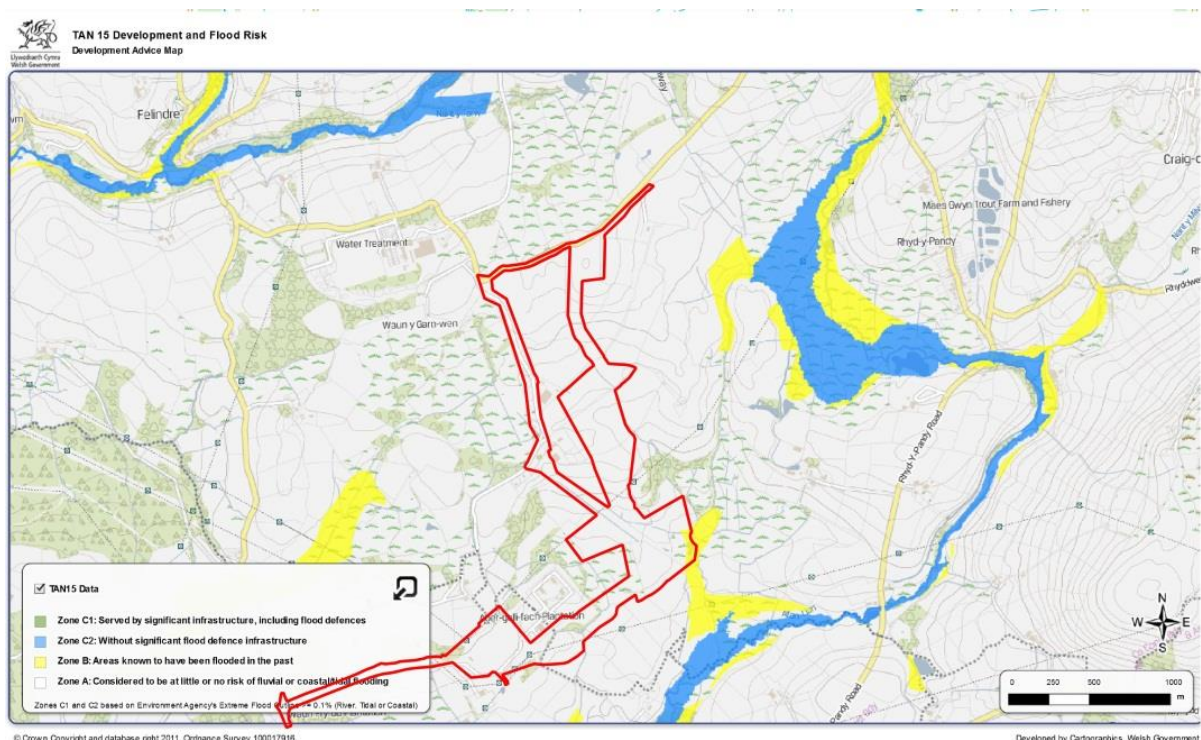


Figure 9.2: Extract from Development Advice Map showing Flood Zone B (Yellow) and C2 (Blue)

- 9.3.23 Many of the drains flowing through the Project Site are not included in the DAM or EA Flood Map for Planning. However, review of the EA Risk of Flooding from Surface Water map indicates that land adjacent to these watercourses is at risk from pluvial and/or flooding from local watercourses. The mapping indicates two main flow routes through the Project Site, heading north to south towards the Afon Llan.
- 9.3.24 The lower lying parts of the Project Site may be susceptible to groundwater flooding from the shallow aquifers and natural springs in the area. BGS groundwater flooding susceptibility areas are located within

50 m of the Project Site and site observations confirmed the potential for groundwater emergence. It is likely that shallow groundwaters are in hydraulic connectivity with surface water features.

- 9.3.25 NRW undertook an assessment of areas at risk from a reservoir breach. The online risk map shows flooding extending the length of the Afon Lliw valley does not affect the Project Site. It is assumed this map covers scenarios of embankment breaches in the Upper and Lower Lliw Reservoirs, including breaches happening in cascade if applicable. This will be confirmed with NRW for the ES.
- 9.3.26 A burst of the watermain flowing through the Project Site is a potential source of flooding. Flow rates in the watermain will be confirmed with Welsh Water (Dwr Cymru) to further quantify the risks for the ES.
- 9.3.27 The flood risk maps included in the Swansea SFCA⁶⁹ (2010) do not provide additional information to that described previously. No historic flood incidents are mapped within close proximity to the Project Site although as the study area is rural this does not necessarily imply no flooding has occurred.
- 9.3.28 The SFCA recommends that the LPA encourages the application of SUDS. The SFCA reports that infiltration measures are considered feasible to the north of Swansea based on underlying geology, however the SFCA acknowledges possible constraints on infiltration for example contamination risks and high groundwater table.

Drainage

- 9.3.29 Detailed drainage plans have not been reviewed for this preliminary assessment. Conclusions have therefore been drawn from OS mapping and site observations.
- 9.3.30 The majority of the Project Site is undeveloped and it is reasonable to assume that surface runoff flows overland and through a network of field drains, eventually discharging to the Afon Llan. There may be some piped networks and treatment of runoff (e.g. interceptors) associated with the existing farm operations. This will be confirmed, through a site survey, in the ES.
- 9.3.31 It is unlikely there are any existing foul sewers on the Project Site. Therefore, it is assumed that foul effluent from the farm and residential properties is discharged to local cess pits or septic tanks for subsequent removal.

⁶⁹ City & Council of Swansea, Stage 1 Strategic Flood Consequence Assessment, September 2010

Summary of Receptors

9.3.32 Based on the information reviewed for this PEIR the important receptors have been identified as shown in Table 9.6.

Table 9.6: Summary of receptors

Name	Key Attributes Defining Importance	Importance
Afon Llan tributaries (drains within the site)	Equivalent to WFD Class Moderate Water body of low amenity value	Medium
Ponds within the site	Low sensitivity aquatic ecosystem Water body of no amenity value	Low
Afon Llan	WFD Class Moderate	Medium
Groundwater aquifers	Secondary A aquifer providing water for agricultural use	Medium
Lower Lliw reservoir	Storage reservoir for potable water supply	Very High
Afon Lliw	WFD Class Moderate	Medium
Loughor Estuary/Burry Inlet	SAC, SSSI designations	Very High
Nant y Crimp SSSI	SSSI designations	Very High
Local SINCs	SINC designations	Medium
Construction workers/site occupants/plant	Highly vulnerable development (power stations)	High
3 rd party people & property	Less vulnerable development	Medium

9.4 Power Generation Plant Assessment

Construction/Decommissioning

9.4.1 Table 9.7 summarises the assessment of effects associated with the construction/decommissioning works for the Power Generation Plant Site. Additional site-specific mitigation, above that embedded within the CEMP is highlighted in the table

9.4.2 Impacts from decommissioning are considered to mirror construction impacts and therefore they are assessed collectively.

Table 9.7: Findings of Preliminary Assessment of Effects of Power Generation Plant during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment and Laydown Area				
Un-named tributaries of the Afon Llan flowing through the site	Increased pollutant & sediment loads	Settlement ponds as required to minimise sediment loading due to steep topography & "flashy" nature	Effects are anticipated to be slight adverse.	Establish detail of mitigation measures. Establish availability of any specific data to assess importance of receptors (e.g. ecology surveys, testing).
	Dust & debris	No additional measures beyond those included in CEMP		
	Loss of habitat or water quality treatment	Watercourse diversions in place prior to filling in existing watercourses where possible		
Ponds within and in close proximity to the site	Increased pollutant and sediment loads	No additional measures beyond those included in CEMP	Effects are anticipated to be slight adverse.	Establish detail of mitigation measures. Establish availability of any specific data to assess importance of receptors (e.g. ecology surveys, testing).
Afon Llan	Increased pollutant and sediment loads	Settlement ponds as required to minimise sediment loading due to steep topography & "flashy" nature	Effects are anticipated to be slight adverse.	Establish detail of mitigation measures. Establish availability of any specific data to assess importance of receptors (e.g. ecology surveys, water quality results).
Groundwater aquifers	Increased pollutants	No additional measures beyond those included in CEMP	Effects are anticipated to be slight adverse.	Establish details of mitigation measures. Confirm local abstractions and hydrogeological pathways.

Lower Lliw Reservoir	Increased pollutants	No additional measures beyond those included in CEMP	Effects are anticipated to be slight adverse.	Establish details of mitigation measures. Confirm local abstractions and hydrogeological pathways.
Afon Lliw	Increased pollutants	No additional measures beyond those included in CEMP	Effects are anticipated to be slight adverse.	Confirm hydrogeological pathways
Loughor Estuary	Increased pollutant and sediment load	Settlement ponds as required to minimise sediment loading due to steep topography & "flashy" nature	Effects are anticipated to be slight adverse due to sensitivity of receptor.	Establish detail of mitigation measures. Establish availability of any specific data to assess importance of receptors (eg ecology data, water quality results).
Nant y Crimp SSSI	Increased pollutants	No additional measures beyond those included in CEMP	Effects are anticipated to be slight adverse due to sensitivity of receptor.	Establish details of mitigation measures. Confirm hydrogeological pathways.
Local SINC	Increased pollutants	No additional measures beyond those included in CEMP	Effects are anticipated to be slight adverse.	Establish details of mitigation measures. Confirm hydrogeological & overland pathways. Confirm attributes and sensitivity of SINC.
	Increased flooding	Watercourse diversions / programming sequence	Effects are anticipated to be slight adverse.	Establish details of watercourse diversions and sensitivity of local SINC to small changes in flood risk
Existing water main	Damage to the water main	Method statements to include specific measures to protect the main during construction.	No effects expected	Establish position of water main with respect to proposed works and detailed protection measures.
Construction workers / site occupants / plant	Flood Risk	Method statements & sequencing of works. Main risk	Effects are considered low risk but large adverse if they do occur	Establish position of water main and detail of mitigation / protection

		is from a burst of the water main		measures. Establish details of watercourse diversions
3 rd party people & property	Flood Risk	Watercourse diversions /programming sequence	Effects are anticipated to be slight adverse.	Establish details of watercourse diversions and planned mitigation
Access Road – Option 1				
Preliminary assessment indicates effects are very similar to the Generating Equipment/Laydown Area.				
Access Road – Option 2				
Preliminary assessment indicates effects are very similar to the Generating Equipment/Laydown Area.				

Operation

9.4.3 Table 9.8 summarises the assessment of impacts associated with the operation of the Plant Generation Site. Additional site-specific mitigation, above that embedded within the design of the Project is highlighted in the table.

Table 9.8: Findings of Preliminary Assessment of Effects of Power Generation Plant during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment				
Un-named tributaries of the Afon Llan flowing through the Project Site	Increased pollutant & sediment loads	SUDS scheme including water quality treatment in line with current guidance	Effects are anticipated to be slight adverse.	Establish detail of SUDS mitigation measures & process water discharges. Establish availability of any specific data to assess importance of receptors (e.g. ecology surveys, testing).
	Surface water abstractions	Careful siting of abstractions & management through licensing, seek to balance abstractions	Effects are anticipated to be slight adverse	Establish water requirements for the Project. Assessment of existing flows &

		and discharges within reaches as far as possible		sensitivity of receptors to changes in flows.
Ponds within and in close proximity to the Project Site	Increased pollutant & sediment loads	SUDS scheme including water quality treatment in line with current guidance	Effects are anticipated to be slight adverse.	Establish detail of SUDS mitigation measures and process water discharges. Establish availability of any specific data to assess importance of receptors (eg ecology surveys, testing).
Afon Llan	Increased pollutant & sediment loads	SUDS scheme including water quality treatment in line with current guidance	Effects are anticipated to be slight adverse.	Establish detail of SUDS mitigation measures and process water discharges. Establish availability of any specific data to assess importance of receptors (e.g. ecology surveys, testing).
Groundwater aquifers	Increased pollutants	SUDS scheme including water quality treatment in line with current guidance	Effects are anticipated to be slight adverse.	Establish details of SUDS mitigation measures and process water discharges. Confirm local abstractions and hydrogeological pathways.
Lower Lliw Reservoir	No change	No additional measures beyond those included in the scheme design	No change is anticipated (neutral)	Establish details of SUDS mitigation measures. Confirm local abstractions and hydrogeological pathways.
Afon Lliw	No change	No additional measures beyond those included in the design of the Project	No change is anticipated (neutral)	Confirm hydrogeological pathways
Loughor Estuary	No change	No additional measures beyond those included in the design of the Project	No change is anticipated (neutral)	Establish detail of SUDS mitigation measures. Establish availability of any

				specific data to assess importance of receptors (e.g. ecology data, water quality results).
Nant y Crimp SSSI	No change	No additional measures beyond those included in the design of the Project	No change is anticipated (neutral)	Establish details of SUDS mitigation measures. Confirm hydrogeological pathways.
Local SINCs	Increased pollutants	SUDS scheme including water quality treatment in line with current guidance	Effects are anticipated to be neutral/slight adverse.	Establish details of SUDS mitigation measures. Confirm hydrogeological & overland pathways. Confirm attributes and sensitivity of SINCs.
Existing water main	No impact	No additional measures beyond those included in the design of the Project	No effects expected (neutral)	None identified
Site occupants / plant	Flood Risks	Emergency Flood Plan, appropriate siting of equipment, designated flood flow routes and safe access routes	Effects are considered low risk but large adverse if they do occur	Establish position of water main and detail of mitigation / protection measures. Establish details of watercourse diversions
3 rd party people & property	Flood Risks	Design of watercourse diversions, compensatory storage, SUDS scheme and flow attenuation	Effects are anticipated neutral/slight adverse	Establish details of watercourse diversions and planned mitigation
Access Road – Option 1				
Preliminary assessment indicates effects are very similar to the Generating Equipment with the exception of any effects associated with surface water or groundwater abstractions and process water discharges which apply only to the Generating Equipment.				
Access Road – Option 2				
Preliminary assessment indicates effects are very similar to the Generating Equipment with the exception of any effects associated with surface water or groundwater abstractions and process water discharges which apply only to the Generating Equipment.				

9.5 Gas Connection Assessment

Construction/Decommissioning

9.5.1 Table 9.9 summarises the assessment of impacts associated with the construction works for the Gas Connection. Additional site-specific mitigation, above that embedded within the CEMP is highlighted in the table.

9.5.2 Effects during decommissioning are unlikely to occur or be significant and therefore have been scoped out.

Table 9.9: Findings of Preliminary Assessment of Effects of Gas Connection during Construction

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Un-named tributaries of the Afon Llan	Increased pollutant & sediment loads	Settlement ponds as required to minimise sediment loading due to steep topography & “flashy” nature	Effects are anticipated to be slight adverse.	Establish detail of mitigation measures. Establish availability of any specific data to assess importance of receptors (e.g. ecology surveys, testing).
	Dust & debris	No additional measures beyond those included in the CEMP		
	Loss of habitat or water quality treatment	Directional drilling or similar techniques where possible		
Ponds within and in close proximity to the Project Site	Increased pollutant & sediment loads	No additional measures beyond those included in the CEMP	Effects are anticipated to be slight adverse.	Establish detail of mitigation measures. Establish availability of any specific data to assess importance of receptors (e.g. ecology surveys, testing).
Afon Llan	Increased pollutant & sediment loads	Settlement ponds as required to minimise	Effects are anticipated to be slight adverse.	Establish detail of mitigation measures. Establish availability of any

		sediment loading due to steep topography & “flashy” nature		specific data to assess importance of receptors (e.g. ecology surveys, water quality results).
Groundwater aquifers	Increased pollutants	No additional measures beyond those included in the CEMP	Effects are anticipated to be slight adverse.	Establish details of mitigation measures. Confirm local abstractions and hydrogeological pathways.
Lower Lliw Reservoir	Increased pollutants	No additional measures beyond those included in the CEMP	Effects are anticipated to be slight adverse.	Establish details of mitigation measures. Confirm hydrogeological pathways.
Afon Lliw – increased pollutants	Increased pollutants	No additional measures beyond those included in the CEMP	Effects are anticipated to be neutral/slight adverse	Confirm hydrogeological pathways
Loughor Estuary	Increased pollutant & sediment load	Settlement ponds as required to minimise sediment loading due to steep topography & “flashy” nature	Effects are anticipated to be slight adverse.	Establish detail of mitigation measures. Establish availability of any specific data to assess importance of receptors (e.g. ecology data, water quality results).
Nant y Crimp SSSI	Increased pollutants	No additional measures beyond those included in the CEMP	Effects are anticipated to be slight adverse.	Establish details of mitigation measures. Confirm hydrogeological pathways.
Local SINC	Increased pollutants	No additional measures beyond those included in the CEMP	Effects are anticipated to be slight adverse.	Establish details of mitigation measures. Confirm hydrogeological & overland pathways. Confirm attributes and sensitivity of SINC.
	Increased flooding	Avoid watercourse crossings where possible; selection of techniques for crossings and	Effects are anticipated to be neutral/slight adverse	Establish details of watercourse diversions and sensitivity of local SINC to small changes in flood risk

		siting of stockpiles		
Existing water main – damage	Damage to water main	Method statements to include specific measures to protect the main during construction.	No effects expected (neutral)	Establish position of water main with respect to proposed works and detailed protection measures.
Construction workers / site occupants / plant	Flood Risk	Method statements & sequencing of works. Main risk is from a burst to water main. Assumes gas connection avoids water main flow route & Afon Llan floodplain	Effects are considered moderate adverse due to potential impact of a burst of the water main even though it is low risk	Establish position of water main and detail of mitigation / protection measures. Establish details of watercourse diversions
3 rd party people & property	Flood risk	Careful siting of stockpiles and methods for watercourse crossings to avoid blockage of flow	Effects are anticipated to be slight adverse.	Establish details of watercourse diversions and planned mitigation

Operation

- 9.5.3 It is assumed that ground levels along the route corridor of the Gas Connection will be very similar to existing and that any ongoing maintenance of the Gas Connection will be negligible. The impact of the Gas Connection during the operation phase is therefore considered to be limited to the presence of the trench if it has different hydraulic properties to the surrounding natural ground. This can be mitigated through careful selection and placing of bedding and backfill material to try and match the natural ground as far as possible. Transport of pollutants associated with previous land uses is addressed in Chapter 10.
- 9.5.4 It is expected that offtake from the existing NTS will have a small footprint (two areas of approximately 90 m²) and the design will include appropriate SUDS measures for control and treatment of surface water runoff. No effluent discharges are expected for the Gas Connection. It is likely that the Gas Connection will be made from the north of the Generating Equipment Site, in which case the flood risks are considered

low, and can be mitigated through raised ground levels where necessary. This will be assessed in full in the FCA.

- 9.5.5 Effects during operation are unlikely to occur or be significant and therefore have been scoped out.

9.6 Electrical Connection Assessment

Construction/Decommissioning

- 9.6.1 Table 9.10 summarises the assessment of impacts associated with the construction works for the Electrical Connection. Additional site-specific mitigation, above that embedded within the CEMP is highlighted in the table.

- 9.6.2 Effects during decommissioning are unlikely to occur or be significant and therefore have been scoped out.

Table 9.10: Findings of Preliminary Assessment of Effects of Electrical Connection during Construction

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Un-named tributaries of the Afon Llan flowing through the site	Increased pollutant and sediment loads	Settlement ponds as required to minimise sediment loading due to steep topography & "flashy" nature	Effects are anticipated to be slight adverse.	Establish detail of mitigation measures. Establish availability of any specific data to assess importance of receptors (eg ecology surveys, testing).
	Dust & debris	No additional measures beyond those included in the CEMP		
	Loss of habitat or water quality treatment	Directional drilling or similar techniques where possible		
Afon Llan	Increased pollutant and sediment loads	Settlement ponds as required to minimise sediment loading due to steep	Effects are anticipated to be slight adverse.	Establish detail of mitigation measures. Establish availability of any specific data to assess importance of receptors (eg

		topography & "flashy" nature		ecology surveys, water quality results).
Groundwater aquifers	Increased pollutants	No additional measures beyond those included in the CEMP	Effects are anticipated to be slight adverse.	Establish details of mitigation measures. Confirm local abstractions and hydrogeological pathways.
Loughor Estuary	Increased pollutant & sediment load	Settlement ponds as required to minimise sediment loading due to steep topography & "flashy" nature	Effects are anticipated to be slight adverse	Establish detail of mitigation measures. Establish availability of any specific data to assess importance of receptors (eg ecology data, water quality results).
Nant y Crimp SSSI	Increased pollutants	No additional measures beyond those included in the CEMP	Effects are anticipated to be slight adverse.	Establish details of mitigation measures. Confirm hydrogeological pathways.
Local SINC	Increased pollutants	No additional measures beyond those included in the CEMP	Effects are anticipated to be slight adverse.	Establish details of mitigation measures. Confirm hydrogeological & overland pathways. Confirm attributes and sensitivity of SINC.
Local SINC – increased flooding through watercourse blockage / stockpiling	Flood Risk	Avoid watercourse crossings where possible; selection of techniques for crossings and siting of stockpiles to avoid increased risk to National Grid site	Effects are anticipated to be slight adverse	Establish details of watercourse diversions and sensitivity of local SINC to small changes in flood risk
Construction workers / site occupants / plant	Flood Risk	Method statements & sequencing of works. Main risk is from a burst to water main.	Effects are considered moderate adverse due to potential impact of a burst of the water main	Establish position of water main and detail of mitigation / protection measures. Establish details of watercourse diversions

3 rd party people & property	Flood risk	Careful siting of stockpiles and methods for watercourse crossings to avoid blockage of flow	Effects are anticipated to be moderate adverse due to potential impact of any increased flooding to National Grid site	Establish details of watercourse diversions and planned mitigation. Establish vulnerability of National Grid site
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Operation

9.6.3 This section considers the potential impacts that the Electrical Connection may have during its operation. It is assumed that ground levels along the route of the Electrical Connection will be very similar to existing and that any ongoing maintenance of the connection will be negligible. The impact of the Electrical Connection during the operation phase is therefore considered to be limited to the presence of the trench if it has different hydraulic properties to the surrounding natural ground. This can be mitigated through careful selection and placing of bedding and backfill material to try and match the natural ground as far as possible. Transport of pollutants associated with previous land uses is addressed in Chapter 10.

9.6.4 Effects during operation are unlikely to occur or be significant and therefore have been scoped out.

9.7 Project (as a whole)

9.7.1 The potential receptors are very similar for the Power Generation Plant, Gas and Electrical Connections as they cover very similar geographic areas. It is not expected that the presence of the other parts of the Project will reduce the effectiveness of measures to mitigate the impacts during construction. The impacts of the Gas and Electrical Connections during operation are expected to be negligible and therefore impacts relate only to the Plant Generation Site. The cumulative effects of the proposals for the Power Generation Plant, Gas and Electrical Connections, therefore, are not expected to be significantly different from those identified for the individual parts of the Project detailed previously.

9.8 Cumulative Effects

9.8.1 Other developments to be considered for cumulative effects within the ES are outlined in Chapter 4. At this stage there are no expected significant cumulative effects on the water environment during construction or operation.

9.9 Summary and Conclusions

- 9.9.1 The potential significant impacts of the Project on water resources and flood risk have been identified and mitigation measures to reduce the effect identified where appropriate.
- 9.9.2 For the most part the Project is not anticipated to have any significant residual effects. In some instances the effect is currently assessed as moderate, and therefore potentially significant, due to the sensitivity of the receptor. However it is anticipated that the scale of impact may be reduced in the detailed assessment once more detailed information is available on the Project, mitigation measures and hydrogeological pathways.
- 9.9.3 A summary of the potential effects and mitigation is provided in Table 9.11.

Table 9.11: Summary of Effects

	Receptor name and description	Potential Mitigation	Preliminary Assessment of Residual Effects
Power Generation Plant			
Construction/ Decommissioning	Afon Llan tributaries & local ponds – water quality	Settlement ponds See Section 2.13.	Effects are anticipated to be slight adverse.
	Afon Llan – water quality	Settlement ponds See Section 2.13.	Effects are anticipated to be slight adverse.
	Groundwater aquifers - quality & quantity of resource	See Section 2.13.	Effects are anticipated to be slight adverse.
	Lower Lliw reservoir – water quality	See Section 2.13.	Effects are anticipated to be slight adverse.
	Afon Lliw – water quality	See Section 2.13.	Effects are anticipated to be neutral/slight adverse
	Loughor Estuary – water quality	Settlement ponds See Section 2.13.	Effects are anticipated to be slight adverse.
	Nant y Crimp SSSI – water quality	See Section 2.13.	Effects are anticipated to be slight adverse.
	Local SINCs water quality	See Section 2.13.	Effects are anticipated to be slight adverse.
	No impact	Method statements to include specific measures to protect the main during construction.	No effects expected (neutral)

	Construction workers/ site occupants/plant – Flood Risk	Method statements & sequencing of works. Main risk is from damage and burst to watermain	Effects are considered low risk but large adverse if they do occur
	3 rd party people & property - Flood Risk	Watercourse diversions/ programming sequence	Effects are anticipated to be slight adverse.
Operation	Afon Llan tributaries & local ponds – water quality	Detailed SUDS scheme	Effects are anticipated to be slight adverse.
	Afon Llan tributaries - abstractions	Siting of abstractions & discharges to minimise impacts	Effects are anticipated to be slight adverse.
	Afon Llan – water quality	Detailed SUDS scheme	Effects are anticipated to be slight adverse.
	Groundwater aquifers – water quality	Detailed SUDS scheme	Effects are anticipated to be slight adverse.
	Groundwater aquifers - abstractions	Siting of abstractions & discharges to minimise impacts	Effects are anticipated to be slight adverse.
	Lower Lliw Reservoir	None identified	No change is anticipated (neutral)
	Afon Lliw	None identified	No change is anticipated (neutral)
	Loughor Estuary	None identified	No change is anticipated (neutral)
	Nant y Crimp SSSI	None identified	No change is anticipated (neutral)
	Local SINCs – water quality	Detailed SUDS scheme	Effects are anticipated to be neutral/slight adverse.
	Existing watermain	None identified	No effects expected (neutral)
	Site occupants / plant – Flood Risk	Emergency Flood Plan, appropriate siting of equipment, designated flood flow routes and safe access routes	Effects are considered low risk but large adverse if they do occur
	3 rd party people & property – Flood Risk	Design of watercourse diversions, compensatory storage, SUDS scheme and flow attenuation	Effects are anticipated to be neutral/slight adverse

Electrical Connection			
Construction / Decommissioning	Afon Llan tributaries – water quality	Settlement ponds See Section 2.13.	Effects are anticipated to be slight adverse.
	Afon Llan – water quality	Settlement ponds See Section 2.13.	Effects are anticipated to be slight adverse.
	Groundwater aquifers - quality & quantity of resource	See Section 2.13.	Effects are anticipated to be slight adverse.
	Loughor Estuary – water quality	Settlement ponds See Section 2.13.	Effects are anticipated to be moderate adverse due to sensitivity of receptor.
	Nant y Crimp SSSI – water quality	See Section 2.13.	Effects are anticipated to be moderate adverse due to sensitivity of receptor
	Local SINC's – water quality	See Section 2.13.	Effects are anticipated to be slight adverse.
	Construction workers/ site occupants/ plant - Flood Risk	Method statements & sequencing of works. Main risk is from damage and burst to water main.	Effects are considered moderate adverse due to potential impact of a burst of the water main
	3 rd party people & property - Moderate adverse	Avoid watercourse crossings where possible; selection of techniques for crossings and siting of stockpiles to avoid increased risk to	Effects are anticipated to be moderate adverse due to potential impact of any increased flooding to National Grid site
Operation	No effects expected		
Gas Connection			
Construction/ Decommissioning	Afon Llan tributaries & local ponds – water quality	Settlement ponds See Section 2.13.	Effects are anticipated to be slight adverse.
	Afon Llan – water quality	Settlement ponds See Section 2.13.	Effects are anticipated to be slight adverse.
	Groundwater aquifers - quality & quantity of resource	See Section 2.13.	Effects are anticipated to be slight adverse.
	Lower Lliw reservoir – water quality	See Section 2.13.	Effects are anticipated to be slight adverse
	Afon Lliw – water quality	See Section 2.13.	Effects are anticipated to be neutral/slight adverse
	Loughor Estuary – water	Settlement ponds	Effects are anticipated to

	quality	See Section 2.13.	be slight adverse
	Nant y Crimp SSSI – water quality	See Section 2.13.	Effects are anticipated to be slight adverse
	Local SINCs – water quality	See Section 2.13.	Effects are anticipated to be slight adverse.
	Watermain - No impact	Method statements to include specific measures to protect the main during construction.	No impacts expected (neutral)
	Construction workers/ site occupants/plant - Flood Risk	Method statements & sequencing of works. Main risk is from damage and burst to water main. Assumes gas connection avoids water main flow route	Effects are considered moderate adverse due to potential impact of a burst of the water main
	3 rd party people & property - Flood Risk	Careful siting of stockpiles and methods for watercourse crossings to avoid blockage of flow	Effects are anticipated to be slight adverse.
Operation	No effects expected		
Project (as a whole)			
Construction/ Decommissioning	As per Power Generation Plant		
Operation	As per Power Generation Plant		
Cumulative Effects			
Construction/ Decommissioning	At this stage there are no expected significant cumulative effects on the water environment.		
Operation	At this stage there are no expected significant cumulative effects on the water environment.		

10 GEOLOGY, GROUND CONDITIONS AND HYDROGEOLOGY**10.1 Introduction**

10.1.1 This chapter provides the geology, ground conditions and hydrogeology preliminary environmental assessment of the proposed Abergelli Power Project based upon assessment carried out up to September 2014. The Project is described in Chapter 2 which forms the primary basis for the assessment carried out to date. The following factors have specifically been taken account of in this preliminary assessment

10.1.2 In respect of geology, ground conditions and hydrogeology, the Project Scenario that is considered the realistic worst case from within the Power Generation Plant is described in Chapter 2.

10.1.3 Embedded mitigation will be included from the outset. Further details on embedded mitigation are detailed in Section 2.13.

10.2 ApproachRelevant Policy and Guidance

10.2.1 The ground conditions assessment in the PEIR has taken account of planning policy and guidance set out in Section 3, as well as the Environmental Protection Act 1990.

Assessment Methodology

10.2.2 Guidance contained within R&D Publication 66, EA/NHBC 2008⁷⁰, states that off-site features within an area of up to 250 m from the Project Site boundary should typically be considered within the hazard identification stage of the site assessment. However, it is considered necessary (using professional judgement) to assess an area of up to 1 km from the Project Site boundary in which the development of the Project may impact on the highly sensitive receptors such as groundwater abstractions and source protection zones.

10.2.3 The baseline conditions (including the identification of previous land uses) described in this PEIR were determined with reference to the following:

- The GroundSure GeoInsight Report (geological conditions, hazards and mining hazards) (GS-1587648 29th July 2014), Appendix 10.1;
- The GroundSure EnviroInsight Report (groundwater vulnerability, landfills and pollution incident records, and sensitive land uses

⁷⁰ R&D Publication 66, 'Guidance for the Safe Development of Housing on Land Affected by Contamination', EA/NHBC 2008

within the vicinity of the Project) (GS-158647, 29th July 2014), Appendix 10.1;

- The GroundSure MapInsight Report (historical maps) (GS-1587646 30th July 2014), Appendix 10.1;
- Soilscape Website (Cranfield University) via <http://www.landis.org.uk/soilscales> (viewed 30th July 2014);
- Review of available BGS information via <http://mapapps2.bgs.ac.uk/geoindex/home.html> (viewed 30th July 2014);
- Review of Geological Survey Maps, scale 1:10,560 Glamorgan Sheet SN60SE, 1964, 1971, and provisional addition Sheet SN60SW 1961;
- Review of EA, 'What's in your backyard?' Website: <http://maps.environment-agency.gov.uk/wiyby/> (viewed 30th July 2014); and
- Coal Authority Mining Report, 1st August 2014, Appendix 10.2.

10.2.4 In the specific case of assessing impacts from land contamination, a conceptual site model approach is used to assess the risks posed by contaminants to sensitive receptors using a "Source-Pathway-Receptor" model as outlined in CLR11 (EA & Defra, 2004)⁷¹; based on the following:

- Source – potential source of contamination;
- Pathway – means by which contamination can reach and impact upon a receptor; and
- Receptor – that aspect which may be adversely affected by the presence of contamination.

10.2.5 The assessment of risk is a three stage process commencing with a Preliminary Risk Assessment (usually completed after a Desk Study and Site Walkover) which comprises a qualitative assessment of the risk. This is typically followed by a ground investigation whereby the nature of the source is quantified and this can be used in a conservative Generic Quantitative Risk Assessment (GQRA). Where potentially unacceptable risks are identified, further investigation is typically required and the assessment becomes a Detailed Quantitative Risk Assessment (DQRA) requiring site specific modelling.

⁷¹ Department for Environment Food and Rural Affairs and EA (2004) Contaminated Land Report 11, 2004, Model Procedures for the Management of Land Contamination

Site Walkover

- 10.2.6 A site walkover was undertaken on 18th July 2014. This was undertaken in order to identify potential sources of contamination, and potential receptors which may be adversely affected by the presence of contamination.

Significance Criteria

- 10.2.7 The assessment of potential effects to geology and hydrogeology was undertaken using criteria set out in Tables 10.1 and 10.2 to define the importance/sensitivity of the receptor and the magnitude of change respectively.
- 10.2.8 Importance and magnitude are combined to determine the significance of each effect as presented in Table 4.3 in Chapter 4.

Table 10.1: Defining the Importance/Sensitivity of the Receptor

Receptor Importance/ Sensitivity	Type of Resource	Type of Receptor				
	Geology and Soils	End Users	Construction Workers	Surrounding Land Users	Controlled Waters	Ecological Systems
High	Designated SSSI or SPZ for geology or soils / Grade 1 Agricultural Land / Land supports nationally rare plant species	Residents (Home owners / allotment gardeners / play areas)	Extensive earthworks.	Residential area	Principal aquifer or surface water in close proximity to Project Site Private groundwater abstraction licence for farming and domestic use on site.	Nationally or internationally designated sites
Medium	Grade 2 / 3a Agricultural Land / Currently used for important crops / Land supports regionally or locally rare plant species	General Public (Amenity: landscaping or public open space)	Limited earthworks	Open space / Greenfield Site / Commercial area	Secondary aquifer	Locally designated ecological sites
Low	Brownfield or industrial site / Site of little or no agricultural value (Grades 3b to 5)	'Hard' end use (e.g. industrial, car parking)	Minimal ground disturbance	Industrial area	No surface water bodies or aquifers close to the Project Site	No sites of ecological importance close by

Receptor Importance/ Sensitivity	Type of Resource	Type of Receptor				
	Geology and Soils	End Users	Construction Workers	Surrounding Land Users	Controlled Waters	Ecological Systems
Negligible	Brownfield or industrial site / Site of little or no agricultural value (Grades 3b to 5)	'Hard' end use (e.g. industrial, car parking)	No ground disturbance	Industrial area	No surface water bodies or aquifers close to the Project Site	No sites of ecological importance within the vicinity of the Project Site.

Table 10.2: Defining the Magnitude of Change

Magnitude		Description
Major	Adverse	A permanent or long term adverse impact on the integrity and value of an environmental attribute or receptor, or exposure to acutely toxic contaminants. For example, harm to human health, designated habitats or pollution to controlled waters.
	Beneficial	Large scale or major improvement of resource quality. Extensive restoration or enhancement. Major improvement of attribute quality.
Moderate	Adverse	An adverse impact on the integrity and / or value of an environmental attribute or receptor, but recovery is possible in the medium term and no permanent impacts are predicted
	Beneficial	Benefit to, or addition of, key characteristics, features, or elements or improvement of attribute quality.
Minor	Adverse	An adverse impact on the value of an environmental attribute or receptor, but recovery is expected in the short-term and there will be no impact on its integrity. For example, temporary effects on receptors not designated under environmental legislation
	Beneficial	Minor benefit to or addition of, key characteristics, features or elements or improvement of attribute quality. Some beneficial impact on attribute or a reduction in the risk of a negative impact occurring.
Negligible		No impact will be detectable, either positive or negative

Limitations

- 10.2.9 This preliminary assessment has been limited to the currently available desk-top information and site walkover. No intrusive ground investigation has been undertaken in order to establish the ground conditions and thereby help quantify the significance of effects at this stage.
- 10.2.10 An intrusive investigation will not be required prior to submission of the ES. An investigation of the ground conditions will be required for detailed design purposes and will be a Requirement within the Development

Consent Order. This is considered a robust approach and suitable for the management of the likely impacts.

- 10.2.11 Impacts to ecological and water quality receptors have been addressed within their respective chapters and have not been included within the ground conditions chapter.

Consultation and Consultation Responses

- 10.2.12 Appendix 4.1 provides a summary of scoping responses and set out the actions that have been undertaken, or will be undertaken to address them.

10.3 Baseline Conditions and Receptors

Current Land Use

- 10.3.2 The Project Site is predominately agricultural land, used for the grazing of horses and sheep with associated farm buildings and residential properties. No arable farming is understood to take place and as such it is anticipated that the agricultural land class is relatively low.
- 10.3.3 Industrial infrastructure across the Project Site includes a number of electricity pylons, Swansea North substation, gas compressor station and stack.
- 10.3.4 The GroundSure EnviroInsight Report indicates National Grid Gas Plc currently operates a gas compressor station on the Project Site. The associated integrated pollution prevention and control (IPPC) permit covers the process of combustion of any fuel of greater than or equal to 50 MW.

Historic Land Use

- 10.3.5 Historical maps have been provided in the GroundSure MapInsight Report, presented in Appendix 10.1. The historical development of the Project Site is summarised in Table 10.3.
- 10.3.6 **Table 10.3: Historical Development**

Dates/Sources	On Project Site	Off Project Site
1876-1878 1:10,560 1:2,500	The Project Site is predominantly agricultural fields and tracks, with areas of woodland and marshland. There are a number of buildings associated with Abergelli Fach and Abergelli Fawr in the central region of the Project Site, and Bryn Mawr along the north western corner of the Project Site.	The land is predominantly agricultural. A lime kiln is identified to the south east of the Project Site, west of the Maes-eglwyys development.
1896 – 1897 1:10,560 1898 – 1899 1:2,500	A gravel pit is identified to the west of Abergelli Fach. The woodland in the south of the Project Site has now been identified as Abergelli Fach Plantation and Lletty Morfil Plantation.	An old gravel pit is identified to the south of the Project Site that was not previously identified. An old tramway is identified to the north of the Project Site, which was not previously identified on the older map.
1913-1914 1:10,560 1913-1918 1:2,500	The gravel pit is now identified as old. Rises and streams are now indicated on the map.	Two old quarries have been identified. One approximately 500 m west and one approximately 750 m north west of the Project Site. A tank is identified next to a spring just off Project Site, north of Abergelli Fach Plantation. The limekiln previously identified is now labelled as old limekiln.
1921 1:10,560	No significant changes.	No significant changes.
1935-1938 1:10,560 1935 1:2,500	Abergelli Colliery, associated buildings, engine houses, railway sidings, slant (loading bay) and tank are identified on the map, north of Abergelli Fach.	No significant changes.
1948 1:10,560	The buildings associated with Abergelli Colliery have changed slightly but are still operational.	No significant changes.

Dates/Sources	On Project Site	Off Project Site
1964 1:10,560 1960 1:2,500 1958 1:2,500	The colliery is now identified as disused. A spoil heap/tip adjacent to the colliery is identified to the north west of the mine with a routeway into the centre of the tip. Railway sidings tracks run through the colliery and ends at the edge of the spoil heap/tip.	The tank next to Abergelli Plantation and a spring are no longer identified. The old tramway is now labelled as dismantled.
1975 1:10,000 1974 1:2,500	The railway sidings and one building associated with the Abergelli Colliery are no longer identified. Electricity pylons are identified across the site, towards the central section of the Project Site, running in a north east to south west direction.	A tip is labelled approximately 300 m to the south of the Project Site.
1991 1:10,000 1989-1:2,500 1989-1992 1992-1993 1:2,500	An electrical substation is present in the south western corner of the Project Site, adjacent to Lletty-morfil Plantation. A large warehouse building is now present in this area. Abergelli Fach is now labelled as Abergelli Farm and looks to have been redeveloped. Abergelli Fawr is now labelled as ruins.	A gas valve compound is shown adjacent to the north western Project Site boundary. Beyond the gas valve compound are covered reservoirs and associated water treatment works. The tip to the south of the Project Site is no longer identified.
2002 1:10,000	An embankment previously identified as a spoil heap or similar is present to the north west of the former mine. Two buildings associated with the colliery remain.	No significant changes.
2010 1:10,000	The previous track across the site to Abergelli Farm is now developed into a roadway.	No significant changes.

Bedrock Geology

10.3.7 The bedrock geology underlying the Project Site consists of the Grovesend Formation from the Westphalian stage of the Carboniferous

period, comprising argillaceous mudstones and siltstones, with well-developed coals, and minor lithic sandstones⁷².

10.3.8 The north eastern corner of the Project Site consists of the Swansea Member, also from the Westphalian stage, comprising green-grey pennant sandstone, with thin mudstone / siltstone and seat earth interbeds and mainly thin coals. This geological formation is overlain conformably by the Grovesend Formation.

10.3.9 The permeability of the bedrock geology ranges from low to high, depending on the degree of fracturing. There are nine faults across the Project Site, two of which have been observed, according to BGS records, and the others inferred either as a normal fault or along a coal seam.

Superficial Geology

10.3.10 The superficial deposits located across the Project Site comprise predominantly glacial till (a diamicton; predominantly clay), and glaciofluvial deposits of sand and gravel. There are also pockets of alluvium and peat present locally within the Project Site boundary. The peat is located north west of Abergelli Farm, and within the likely area for the Generating Equipment Site and Laydown Area. The permeability of the superficial deposits range from very low (within the clays) to very high (within the sand and gravel) across the Project Site.

10.3.11 There are records of three boreholes formed within the Project Site boundary held by the British Geological Survey (BGS); only one of these is currently available for viewing online⁷³. The record has a reference of SN60SE24 and is located east of Abergelli Farm (NGR 265200, 201600), in an area mapped as being underlain by Devensian glaciofluvial deposits of sand and gravel.

10.3.12 The superficial deposits recorded on the log comprise yellow brown gravelly clay to 6 metres below ground level (m bgl), overlying a grey brown clayey gravelly sand, clayey sand and sandy clay to 15.8 m bgl of likely glaciofluvial deposits that is underlain by firm yellow clay becoming stiff grey gravelly clay that is likely to be glacial till; proven to a maximum depth of 16.8 m bgl. Traces of coal were identified at 10.7 m bgl within the clayey sand.

⁷² <http://mapapps2.bgs.ac.uk/geoindex/home.html>

⁷³ http://scans.bgs.ac.uk/sobi_scans/boreholes/256136/images/10509848.html

Soils and Agriculture

- 10.3.13 There are two different soil classification areas within the Project Site⁷⁴. The predominant soil classification is described as slowly permeable, wet, very acidic upland soils with a peaty surface, of low fertility and moorland rough grazing and forestry land cover that drains to the stream network. Overgrazing could lead to accelerated run-off and soil erosion.
- 10.3.14 Through the centre and north eastern section of the Project Site, the soils are described as freely draining, slightly acid loamy soils, of low fertility, with arable and grassland land cover that drains to local groundwater and rivers. There is potential for groundwater contamination associated with these soils, comprising nitrate, siltation and nutrient enrichment of streams from soil erosion.
- 10.3.15 The agricultural land classification for the land within and surrounding the Project Site is grade 4 (poor quality agricultural land)⁷⁵ with severe limitations which significantly restricts the range of crops and / or level of yields, mainly suited to grass with occasional arable crops⁷⁶. The Project Site is known to be utilised as improved grazing for sheep and horses, with small areas of marshy grassland and woodland copses interspersing the improved grassland to the north and east. The importance of this receptor is considered low.

Ground Workings and Mineral Resources

- 10.3.16 According to the GroundSure GeoInsight Report, based on historical mapping there have been a number of historical surface ground working features on the Project Site. These comprise refuse heaps, a colliery, old gravel pits and unspecified pits and a pond.
- 10.3.17 The GroundSure GeoInsight Report has identified a gravel pit at Abergelli Fach that produced sand and gravel. There are also a number of surface mineral workings, including sand and gravel, sand, sandstone and one underground deep coal working within 1km of the Project Site. All operations now have the “ceased” status.
- 10.3.18 The Project Site is not within an area of tin or clay mining, or brine or gypsum extraction.

⁷⁴ <http://www.landis.org.uk/soilscapes/index.cfm>

⁷⁵ Ministry of Agriculture, Fisheries and Food Welsh Office Agricultural Department (1975) Agricultural Land Classification of England and Wales Map, Scale 1:2,000,000.

⁷⁶ Ministry of Agriculture, Fisheries and Food Welsh Office Agricultural Department (October 1988) Agricultural Land Classification of England and Wales, Revised guidelines and criteria for grading the quality of agricultural land.

Underground Coal Mining

- 10.3.19 A review of the GroundSure GeoInsight Report identified Abergelli Colliery located on the Project Site approximately 500 m north of Abergelli Farm operating between 1936 and 1948 that was subsequently indicated as disused on 1964 and 1975 historical mapping. However, the Coal Mining Report indicates the coal was last worked on the Project Site in 1986. A coal pit, shaft, colliery and tunnels have all been identified on historical mapping at locations between 480 m and 1 km from the Project Site boundary (i.e. off-site),
- 10.3.20 Further details on Abergelli Colliery are presented in the Coal Authority Mining Report (Appendix 10.2) and are summarised below.
- 10.3.21 The Project Site is in the likely zone of influence from workings in three seams of coal, at shallow depth to a depth of 380 m. The seams were last worked in 1986⁷⁷.
- 10.3.22 There are two mine entries on the Project Site, one of which is located in the vicinity of Abergelli Colliery (north of Abergelli Fach Farm). The other is located south of the National Grid site at (NGR 26498, 20078). There is no record of any treatment to the mine entries.
- 10.3.23 The Project Site is currently not in an area for which the Coal Authority is determining to grant a licence to remove coal using underground methods, where a licence has been granted, or in an area that is likely to be affected at the surface from any planned future workings. However, reserves of coal exist and could be worked in the future.

Opencast Coal Mining

- 10.3.24 The Coal Authority report states that the Project Site is not within the boundary of an opencast site from which coal has been removed by opencast methods, and does not lie within 200 m of a boundary of an opencast site. It also states that the Project Site is not within 800 m of the boundary of an opencast site for which the Coal Authority are determining whether to grant a licence to remove coal by opencast methods, or for which a licence to remove coal has been granted.

Ground Stability/Subsidence

- 10.3.25 The Coal Authority Mining Report indicates that no notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

⁷⁷ Non-Residential Coal Authority Report, 01/08/14

- 10.3.26 Abergelli Farm has been subject to remedial works, by or on behalf of the Coal Authority under its emergency surface hazard call out procedures. No further information was provided, however two damage notices or claims for alleged subsidence damage were made in June 1995 and November 1996.
- 10.3.27 Geological hazards across the Project Site have been identified in the GroundSure GeoInsight Report; these are detailed in Table 10.4.

Table 10.4: Geological Hazards

Stability	Collapsible Ground	Negligible to very low
	Compressible Ground	Negligible to <u>high</u>
	Ground Dissolution	Null to negligible
	Landslides	Very low to low
	Running Sand	Negligible to low
	Shrinking or Swelling Clay	Negligible to very low
Radon Hazard		The Project Site is in a Radon Affected Area, as between 3-5% of properties are above the Action Level. Radon protective measures may be necessary in the Project.

- 10.3.28 The high hazard associated with compressible ground is mapped and presented within the GroundSure GeoInsight Report and presumably associated with the peat. One of the high hazard areas is situated in the location of the Generating Equipment, along the eastern boundary, and the other to the west and north west of Abergelli Farm.
- 10.3.29 Consideration of this hazard will be made in the design of any ground works including site investigation, earthworks, de-watering and foundation design.

Hydrogeology

- 10.3.30 The aquifer associated with the superficial geology comprises unproductive strata associated with the glacial till, and a Secondary A aquifer associated with the glaciofluvial deposits across the Project Site. The importance of this receptor is considered medium.
- 10.3.31 The bedrock geology aquifer has been classified as a Secondary A aquifer. The importance of this receptor is considered medium.
- 10.3.32 Unproductive strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

- 10.3.33 Secondary A aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
- 10.3.34 The GroundSure EnviroInsight Report has identified one groundwater abstraction licence on the Project Site, associated with Abergelli Farm. The licence number is 22/59/4/0027 and is used for general farming and domestic purposes. The version start date was 01/02/1993, as there is no end date, it has been assumed to be still active. The importance of this receptor is considered high.
- 10.3.35 There are an additional 16 No. groundwater abstraction licences within 2 km of the Project Site all used for general farming and domestic purposes.
- 10.3.36 The Project Site does not lie within a groundwater Source Protection Zone (SPZ). Groundwater quality in the study area has been assessed against the objectives of the Water Framework Directive (WFD). According to the EA website the current quantitative quality is good and is predicted to remain so in 2015. The current chemical quality is poor and expected to remain so in 2015.
- 10.3.37 The closest potable water supply is from the Lower Lliw Reservoir approximately 1 km north west of the Project Site. The original start date of abstraction was 09/08/1989. The importance of this receptor is considered high, however it is unlikely to be influenced by this Project.
- 10.3.38 Groundwater vulnerability has been identified from the GroundSure EnviroInsight Report with a varying classification across the Project Site, from low to high leaching potential. Low soil vulnerability is described as soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants. High soil vulnerability is described as coarse or moderately shallow soils which readily transmit non-adsorbed pollutants and liquid discharges but have some ability to attenuate adsorbed pollutants because of their clay or organic matter content⁷⁸.
- 10.3.39 The GroundSure EnviroInsight Report has identified there are areas susceptible to groundwater flooding within 50 m of the Project Site. This is associated with superficial deposits, where shallow unconsolidated sedimentary aquifers overlie unproductive strata. The susceptibility to groundwater flooding is potentially at the surface, which means that given the geological conditions in the area, groundwater flooding hazard

⁷⁸ GroundSure EnviroInsight Report Reference GS-1587647 29th July 2014.

should be considered in all land-use planning decisions. The BGS confidence rating of this groundwater flooding is classified as 'high'⁶⁷.

Soil and Groundwater Quality

- 10.3.40 The GroundSure GeoInsight Report has identified the estimated background soil chemistry across the Project Site. Estimated concentrations where identified are follows:
- Arsenic: 25 - 35mg/kg,
 - Cadmium: <1.8mg/kg,
 - Chromium: 60 - 90mg/kg
 - Nickel: 15 - 30mg/kg; and
 - Lead: <150mg/kg.
- 10.3.41 The GroundSure EnviroInsight Report details historical landfill sites, and other waste management sites within 500 m of the Project Site.
- 10.3.42 Two historical landfills have been identified at Abergelli Fach Farm, the original landfill and the landfill extension, taking non-biodegradable, inert waste. The size of the landfills was greater than or equal to 75,000 tonnes. The original landfill has a closed status, and the landfill extension now has an expired status. The issue date for the licences was September 1999. There is no information regarding the closing date of the landfills.
- 10.3.43 There are also an additional three historical landfills within 400 m of the Project Site. Further details are provided in the GroundSure EnviroInsight Report.
- 10.3.44 There have been three discharge consents on the Project Site, all now expired or revoked:
- Discharging to land associated with Abergelli Farm in 1987;
 - The National Grid site, discharging sewage to an unnamed land drain, effective between 2007 and 2010; and
 - Trade discharges (site drainage) to the Afon Llan, revoked in 2011.
- 10.3.45 Further details of other discharge consents within 500 m of the Project Site boundary is presented in the GroundSure EnviroInsight Report.
- 10.3.46 There are five recorded pollution incidents within 500 m of the Project Site, three of which were on the Project Site. Two are associated with atmospheric pollutants and effects (smoke) in 2002. The third incident concerned polluted soils and clay associated with inert materials and

wastes that occurred on 10/05/2007 in the north western corner of the Project Site, potentially associated with the construction works of the NTS. This was classified as category 2, significant impact to the water environment, and category 3, minor impact to the land environment.

Receptors

- 10.3.47 Receptors that have the potential to be impacted by the Project have been identified and are discussed above. The importance of receptors was classified in accordance with the criteria in Table 10.1 and are summarised below.
- 10.3.48 The geology and soils within the Project Site are preliminary assessed as being of medium sensitivity given the peat on the Project Site, unknown potential of sand, gravel and coal resources, however the agricultural land is classified as grade 4 (low sensitivity).
- 10.3.49 The groundwater is assessed as being of high importance, given that there is a groundwater abstraction licence on the Project Site used for general farming and domestic use. The bedrock aquifer and the glaciofluvial deposits are classified as a Secondary A aquifer. The glacial till deposits are classified as unproductive strata. This aquifer is assessed as having low importance.
- 10.3.50 There are four residential properties on the Project Site. These residents are of high sensitivity. Construction workers are classified as medium sensitivity as are only on site temporarily.

10.4 Power Generation Plant Assessment

Construction/Decommissioning

- 10.4.1 The main effects on geology, soils and hydrogeology anticipated to occur during the construction and decommissioning phases of the Power Generation Plant, are presented in the table below. Effects during the decommissioning works will be temporary and therefore considered similar to those for the construction phase. For detail of the significance of impacts please refer to paragraph 4.6.3.

Table 10.5: Findings of Preliminary Assessment of Effects of Power Generation Plant during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment and Laydown Area				
Controlled Water. Disturbance of existing contamination and the creation of pathways to receptors i.e. through piling or earthworks.	Localised pollution of groundwater and potential impacts to licensed groundwater abstraction wells.	See Section 2.13.	Slight Adverse	Ground investigation to confirm ground conditions beneath the Project. Will be a Requirement in the DCO.
Construction workers, Plant and Structures. Ground instability from previous mining activities, ground workings and compressible ground leading to harm to workers or damage to plant and structures.	Direct, localised impacts relating to potential injuries / fatalities, and loss or damage to Plant or Structures.	See Section 2.13. Development specific control/mitigation measures to be defined on further information.	Moderate Adverse	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO.
Sand, Gravel and Coal Resources. Disturbance to or loss of valuable mineral deposits	Temporary (long term) loss of valuable mineral deposits.	Undertake surveys to establish the value of the reserves.	If not currently economically viable, likely to sterilise resource if it becomes viable in future. Slight Adverse	Ground investigation to confirm ground conditions beneath the Project Site, in order to determine the loss of mineral resources. Will be a Requirement in the DCO.
Loss of peat habitat	Loss of carbon storage area.	A Peat Management Plan will need to be undertaken to	Neutral	Ground investigation to confirm ground conditions

		minimise the loss/disturbance of peat.		beneath the Project Site, in order to determine the potential loss of peat. Will be a Requirement in the DCO.
Grade 4 Agricultural Land. Permanent loss in area of above ground installations.	Direct, localised reduction in grazing land.	See Section 2.13.	Neutral	N/A
Land or groundwater: Accidental pollution incidents impacting on the land and groundwater quality i.e. release of fuels, oils or chemicals	Direct, localised impact on land or groundwater from pollution incidents from construction works.	See Section 2.13.	Neutral	N/A
On-site Residents. Disturbance and mobilisation of potentially contaminated soils, groundwater, ground/mine gas, mine water during earthworks.	Localised impact on human health, from polluted air borne dust from soils, use of groundwater from abstraction wells by on-site residents, disturbance of mine workings, releasing mine gas and mine water.	See Section 2.13.	Neutral	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO.
Construction Workers. Contact with potentially contaminated soils or groundwater from potential burial grounds, sheep dips, use of fertilisers,	Localised and temporary impact on human health from disturbance of polluted soils, groundwater.	See Section 2.13	Neutral	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO.

ground/mine gas, mine water				
Access Road - Option 1				
Construction Workers. Contact with potentially contaminated material, soil, leachate or groundwater if access road is extended into landfill.	Localised and temporary impact on human health from disturbance of polluted soils, groundwater	See Section 2.13. Phase 2 Ground Investigation to delineate edge of landfill and establish the risk if access road is to be widened to the west.	Neutral	Ground investigation to confirm ground conditions beneath the Project Site if access road is to be widened. Will be a Requirement in the DCO.
Controlled Water. Disturbance and remobilisation of existing contamination pathways to receptors i.e. through earthworks.	Localised polluting of groundwater and licensed groundwater abstraction wells	See Section 2.13. Phase 2 Ground Investigation to delineate edge of landfill and establish the risk if access road is to be widened to the west.	Slight Adverse	Ground investigation to confirm ground conditions beneath the Project. Will be a Requirement in the DCO.
Access Road – Option 2				
Grade 4 Agricultural Land. Permanent loss in area of access road.	Direct, localised reduction in grazing land.	See Section 2.13.	Neutral	N/A
Land or groundwater: Accidental pollution incidents impacting on the land and groundwater quality i.e. release of fuels, oils or chemicals	Direct, localised impact on land or groundwater from pollution incidents from construction works.	See Section 2.13.	Neutral	N/A

Operation

10.4.2 Potential effects during the operational phase of the Power Generation Plant are detailed below.

Table 10.6: Findings of Preliminary Assessment of Effects of Power Generation Plant during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment Site and Laydown Area				
Land and Groundwater. Accidental release of stored fuels and chemicals impacting on groundwater quality.	Direct, localised impact on land or groundwater from pollution incidents from spills / leaks of fuels and chemicals on the Project Site.	See Section 2.13.	Neutral	N/A
Structures. Ground instability i.e. from previous mining activities.	Direct, localised impact from potential loss or damage to Project Structures/Plant.	Detailed mining assessment to be undertaken to establish the risk of untreated shallow workings to be present beneath the Project Site. Appropriate mitigation measures to be designed upon the information developed.	Moderate Adverse	Intrusive ground investigation to confirm ground conditions beneath the Project Site. Potential for mine workings grouting and treatment of mine entries as required.
Structures. Potential long-term chemical attack on foundations.	Natural ground or polluted ground causing damage to foundations and other sub-surface structures/	Foundations of plant to be designed based on ground investigation results.	Neutral	N/A
On-site Residents and Site Users. Exposure potential to contaminants	Localised impact on human health, from pollution incidents, and mine gas if disturbed.	During operational phase, the Power Generation Plant Site is covered	Neutral	Ground investigation to confirm ground gas/mine gas beneath the Project Site.

and mine gas		with hardstanding, therefore the linkage associated with contaminants is not anticipated to remain. Design of the Generating Equipment will need to take into consideration potential mine gas.		
Access Road – Option 1				
Land and Groundwater. Accidental spillages/leaks of fuel from vehicles	Direct, localised impact on land or groundwater from pollution incidents from operation works.	See Section 2.13	Neutral	N/A
Access Road – Option 2				
Land and Groundwater. Accidental spillages/leaks of fuel from vehicles	Direct, localised impact on land or groundwater from pollution incidents from operation works.	See Section 2.13	Neutral	N/A

10.5 Gas Connection Assessment

Construction/Decommissioning

- 10.5.1 The construction and decommissioning works associated with the Gas Connection will be a relatively narrow corridor and result in the temporary sterilisation of agricultural land, and other potential mineral resources. Where the AGI is situated, there will be a permanent sterilisation of agricultural land and potential mineral resources.

Table 10.7: Findings of Preliminary Assessment of Effects of Gas Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Controlled Waters. Disturbances of potentially existing contamination and the creation of pathways to receptors i.e. through earthworks.	Localised polluting of groundwater and licensed groundwater abstraction wells.	See Section 2.13.	Slight Adverse	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO.
Construction workers, Plant and Structures Ground instability from previous mining activities, ground workings, compressible ground leading to hard to workers and damage to plant and structures.	Direct, localised impacts relating to potential injuries / fatalities, and loss or damage to plant or structures.	See Section 2.13. Specific control/mitigation measures to be defined on further information.	Slight Adverse	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO.
Sand, Gravel and Coal Resource: Disturbance to or loss of valuable mineral deposits	Permanent (until Project decommissioned) loss of valuable mineral deposits	Undertake surveys to establish the value of the reserves.	If not economically viable, likely to sterilise resource if it becomes viable in future. Slight Adverse	Ground investigation to confirm ground conditions beneath the Project Site, in order to determine the loss of mineral resources. Will be a Requirement in the DCO.
Grade 4 Agricultural Land Temporary loss and potential damage to soil resources along the connection routes.	Direct, localised reduction in grazing land.	See Section 2.13.	Neutral	N/A
Land or groundwater:	Direct, localised impact on land or	See Section 2.13.	Neutral	N/A

Accidental pollution incidents impacting on the land and groundwater quality i.e. release of fuels, oils or chemicals	groundwater from pollution incidents from construction works.			
On-site Residents Disturbance and mobilisation of potentially contaminated soils, groundwater, ground/mine gas, and mine water during earthworks.	Localised impact on human health, from polluted air borne dust from soils, use of groundwater from abstraction wells by on-site residents, disturbance of mine workings, releasing mine gas and mine water.	See Section 2.13.	Neutral	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO.
Construction Workers Contact with potentially contaminated soils or groundwater from potential burial grounds, sheep dips, use of fertilisers, ground/mine gas, and mine water	Localised and temporary impact on human health from disturbance of polluted soils, groundwater.	See Section 2.13.	Neutral	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO.

Operation

- 10.5.2 No adverse impacts to geology, soils and hydrogeology are anticipated during the operational phase of the Gas Connection. A potential impact on the Gas Connection is considered below.

Table 10.8: Findings of Preliminary Assessment of Effects of Gas Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Structures: Ground instability i.e. from previous mining activities.	Natural ground or polluted ground causing damage to foundations and other sub-surface structures	Detailed mining assessment to be undertaken to establish the risk of untreated shallow working to be present beneath the Project Site. Appropriate mitigation measures to be designed upon the information developed.	Neutral	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO. Potential for mine workings grouting and treatment of mine entries as required.

10.6 Electrical Connection Assessment

Construction/Decommissioning

- 10.6.1 The Electrical Connection will involve the excavation of a trench along the proposed route prior to laying the cable connection. The baseline conditions and receptors are similar to that of the Power Generation Plant and Gas Connection (described above).
- 10.6.2 The construction and decommissioning works associated with the Electrical Connection will result in the temporary sterilisation of agricultural land, and other potential mineral resources. However the route will be a narrow corridor and temporary in nature.

Table 10.9: Findings of Preliminary Assessment of Effects of Electrical Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Controlled Waters. Disturbances of potentially existing contamination and the creation	Localised polluting of groundwater and licensed groundwater abstraction wells.	See Section 2.13.	Minor Adverse	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement

of pathways to receptors i.e. through earthworks.				in the DCO.
Construction workers, Plant and Structures Ground instability from previous mining activities, ground workings, compressible ground leading to hard to workers and damage to plant and structures.	Direct, localised impacts relating to potential injuries / fatalities, and loss or damage to plant or structures.	See Section 2.13. Development specific control/mitigation measures to be defined on further information.	Minor Adverse	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO.
Sand, Gravel and Coal Resource: Disturbance to or loss of valuable mineral deposits	Permanent (until Project decommissioned) loss of valuable mineral deposits	Undertake surveys to establish the value of the reserves.	If not economically viable, likely to sterilise resource if it becomes viable in future. Minor Adverse	Ground investigation to confirm ground conditions beneath the Project, in order to determine the loss of mineral resources. Will be a Requirement in the DCO.
Grade 4 Agricultural Land Temporary loss and potential damage to soil resources along the connection routes.	Direct, localised reduction in grazing land.	See Section 2.13.	Neutral	N/A
Land or groundwater: Accidental pollution incidents impacting on the land and groundwater quality i.e. release of fuels, oils or chemicals	Direct, localised impact on land or groundwater from pollution incidents from construction works.	See Section 2.13.	Neutral	N/A
On-site Residents Disturbance and	Localised impact on human health, from polluted air	See Section 2.13.	Neutral	Ground investigation to confirm ground

mobilisation of potentially contaminated soils, groundwater, ground/mine gas and mine water during earthworks.	borne dust from soils, use of groundwater from abstraction wells by on-site residents, disturbance of mine workings, releasing mine gas and mine water.			conditions beneath the Project Site. Will be a Requirement in the DCO.
Construction Workers Contact with potentially contaminated soils or groundwater from potential burial grounds, sheep dips, use of fertilisers, ground/mine gas, and mine water.	Localised and temporary impact on human health from disturbance of polluted soils, groundwater.	See Section 2.13.	Neutral	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO.

Operation

- 10.6.3 No adverse impacts to geology, soils and hydrogeology are anticipated during the operational phase of the Electrical Connection. A potential impact on the Electrical Connection is considered below.

Table 10.10: Findings of Preliminary Assessment of Effects of Electrical Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Structures Potential degradation of electrical cable.	Natural ground or polluted ground causing damage to sub-surface structures	See Section 2.13.	Neutral	N/A

10.7 Public Health

- 10.7.1 Human health has been considered within the preliminary assessment of effects. Residents at Abergelli Farm have been considered to be of high sensitivity, and construction workers medium sensitivity. It is anticipated that residents and construction workers could potentially be

impacted from the construction/decommissioning phase through the disturbance of potentially contaminated ground and groundwater and also, if mine gas or mine water is disturbed through earthworks. However, it is considered through working in accordance with best practises this potential impact can be minimised. The risks to human health will be refined by developing a conceptual site model within the Phase 1 desk study which will be appended to the ES.

10.8 Project (as a whole)

- 10.8.1 The summary of effects for the Project as a whole (including the Power Generation Plant, Gas Connection and Electrical Connection) is detailed in Table 10.11. In summary, when considering the effects of the Project as a whole, on the geology, ground conditions and hydrogeology, the effects of the Gas Connection and Electrical Connection are comparatively minor. Therefore, the effects of the Power Generation Plant are similar to that for the Project as a whole.

10.9 Cumulative Effects

Construction/Decommissioning

- 10.9.1 The planning application for the installation of ground mounted array of solar panels, inverter substations and 2.4 m high fencing around Abergelli Farm is located within the Project Site, within the Gas Connection area. It is not anticipated that this development will impact significantly on the geology and hydrogeology of the Project Site as it is understood there will be limited excavation works. The identified potential impacts on the geology and hydrogeology of the Project will comprise accidental pollution incidents during the construction phase.
- 10.9.2 It is not anticipated that the other planning applications for the Rhyd-y-Pandy solar park, and Myle Coch Mawr wind turbines will have an impact on geology and hydrogeology such that a cumulative effect will occur alongside the Projects effects.
- 10.9.3 The development of the Project or other planned developments within the area are not anticipated to have any cumulative effects as they will not likely create a larger contamination or ground instability effect than the individual projects taken in isolation. In addition, none of the planned developments will remove large amounts of good quality graded agricultural land or sites of important geology.

Operation

10.9.4 There are not anticipated to be any cumulative effects resulting from the operation of the Project or operation of other planned developments within the vicinity of the Project Site.

10.10 Summary and Conclusions

10.10.1 The table below summarises the potential receptor, potential mitigation measures, best practices, and residual effects of the Project identified during the PEIR process.

Table 10.11: Summary of Effects

	Receptor name and description	Potential Mitigation	Preliminary Assessment of Residual Effects
Power Generation Plant			
Construction / Decommissioning	Impacts on Soil / Geology (Sand, Gravel and Coal Resources) and Agricultural Land Sterilisation of potential sand and gravel and coal resources under the Project. Accidental pollution incidents impacting land and groundwater quality. Loss of grade 4 agricultural land and peat habitat.	Undertake surveys to establish the value of the reserves. A Peat Management Plan will outline minimising the loss / disturbance of peat. See Section 2.13.	Slight Adverse/ Neutral
	Impacts on human health (construction workers and on-site residents) Disturbance to existing potential contamination, ground/mine gas and mine water during earthworks.	Ground investigation to confirm ground conditions beneath the Project Site. Will be a Requirement in the DCO. See Section 2.13.	Neutral
	Impacts on construction workers, plant, structures from ground instability	Ground investigation in key areas of concern to establish risk. Will be a Requirement in the DCO. Specific control/mitigation measures to be defined on further information.	Moderate Adverse

	Impacts on controlled waters including groundwater abstraction well. Disturbance to existing potential contamination through piling / earthworks.	Ground investigation to confirm ground conditions and hydrogeological conditions beneath the Project Site. Will be a Requirement in the DCO. See Section 2.13.	Slight Adverse
Operation	Impacts on soil / geology and groundwater	See Section 2.13.	Neutral
	Impacts on Structures Ground instability i.e. from previous mining activities. Potential long term chemical attack on foundations.	Detailed mining assessment to be undertaken to establish the risk of untreated shallow workings present beneath the Project Site. Appropriate mitigation measures to be designed upon the information developed. Foundations of plant to be designed based on ground investigation results.	Moderate adverse
Power Generation Plant Access Road (Options 1 and 2)			
Construction / Decommissioning	Impacts on Soil / Geology and Groundwater. Disturbance and remobilisation of existing contamination pathways to receptors Loss of Grade 4 Agricultural Land.	Ground investigation to delineate edge of landfill if road to be extended (Option 1). Will be a Requirement in the DCO. See Section 2.13.	Neutral
	Impacts on human health (construction workers) Contact with potentially contaminated material	Ground investigation to delineate edge of landfill if widened (Option 1). Will be a Requirement in the DCO. See Section 2.13.	Neutral
Operation	Impacts on Soils / Geology and Groundwater.	See Section 2.13.	Neutral

	Accidental spillages/leaks of fuel from vehicles		
Electrical Connection			
Construction / Decommissioning	Impacts on Soil/Geology Temporary loss of grade 4 agricultural land.	See Section 2.13.	Neutral
Operation	Structures Potential degradation of cable	See Section 2.13.	Neutral
Gas Connection			
Construction / Decommissioning	Impacts on Soil / Geology Temporary disturbance of grade 4 agricultural land	See Section 2.13.	Neutral
Operation	Structures Impacts on operation due to mining and ground stability	Development specific control/mitigation measures to be defined on further information.	Neutral
Project (as a whole)			
Construction / Decommissioning	Impacts on geology, soil and hydrogeology Temporary or minimal permanent grade 4 agricultural land. Minor sterilisation of potential future mineral resources.	Undertake surveys to establish the value of the reserves. Detailed mining risk assessment to establish the risks from untreated mine workings, etc. See Section 2.13.	Moderate Adverse
Operation	Structures Impacts on operation due to mining and ground instability.	Complete a ground investigation to inform foundation and gas pipeline design	Moderate Adverse
Cumulative Effects			
Construction / Decommissioning	Negligible	N/A	Neutral
Operation	Negligible	N/A	Neutral

11 LANDSCAPE AND VISUAL IMPACTS

11.1 Introduction

11.1.1 This Chapter sets out the findings of preliminary the Landscape and Visual Impact Assessment (LVIA). It considers the likely significant effects arising during the construction, operation and decommissioning stages on landscape character and resources, designated landscapes, registered parks and gardens, and recreational interests; and visual amenity.

11.1.2 The assessment considers the Power Generation Plant, the Gas Connection and the Electrical Connections except for the Access Road Options, which have not been assessed further as there are no identified landscape and visual impacts arising as a result of utilising the existing trackways.

11.2 Approach

Relevant Policy and Guidance

11.2.1 The LVIA has taken account of planning policy and guidance set out in Section 3, as well as the following documents:

- European Landscape Convention (ELC) 2007; and
- Countryside and Rights of Way (CROW) Act 2000.

11.2.2 The ELC recognises the importance of landscape and need for proper consideration of landscape and visual amenity within the planning system. The CROW Act designated large areas of countryside as Open Access areas, where the freedom to roam was enshrined in legislation. This has resulted in the need to consider views from these areas of open access within landscape and visual impact assessments on a similar basis to PROW.

11.2.3 The preliminary assessment has been carried out using current best practice and the methodology/guidance from the following sources:

- Guidelines for Landscape and Visual Impact Assessment (GLVIA), 3rd Edition, 2013, published by the Landscape Institute/Institute of Environmental Management and Assessment;
- LANDMAP Information Guidance Series, May 2013, Natural Resources Wales; and
- Advice Note 01/11: Photography and Photomontage in Landscape and Visual Impact Assessment, 2011, Landscape Institute.

Assessment Methodology

Illustrative Tools

- 11.2.4 The following graphic information has been used to illustrate the visual aspects of the Project and will be provided with the ES.

Visibility Maps

- 11.2.5 A computer generated Zone of Theoretical Visibility (ZTV) map has been produced for a stack height of 40 m (maximum height) to assist in viewpoint selection and to appreciate the extent to which the stacks will be seen from neighbouring areas (intervisibility).
- 11.2.6 The ZTV indicates areas from which it might be possible to secure views to part or parts of the Project.
- 11.2.7 The ZTV has been compiled using Ordnance Survey Landform Profile data comprising spot heights and of contours (within a 10 m resolution) to produce a Digital Terrain Model (DTM). The DTM has been overlaid on a 1:250,000 Ordnance Survey base map to provide details of locations and landmark features, which may affect the extent of visibility or screening in the landscape. The model takes into account of the height of the stacks (worst case scenario of a 40 m stack height) and a radius of 15 km from the centre of the Project Site. A 15km radius has been selected as appropriate given the height of the proposed stacks and location within a valley with restricted visibility.

Photographs

- 11.2.8 Panorama photograph and photomontage images will be produced to illustrate an observer's view of the existing Project Site and Project during operation respectively, from each of the viewpoint locations. Discussions with CCS have identified potential photomontage viewpoints from key receptors. Photomontages will be created for a representative sample of the viewpoints assessed in the LVIA, sufficient to gain an appreciation of the likely visual effects and will be presented in the ES. NRW will also be consulted on the photomontages.
- 11.2.9 All photographs will be taken with a digital equivalent of a 35 mm SLR camera, with 50 mm focal length lens, mounted on a level panoramic head tripod. They will record a 90 degree angle of view to illustrate the full extent of the Project within the local landscape that will be experienced at each viewpoint.

Wireframes

- 11.2.10 The Project will be shown from the selected viewpoints in wireframe format. Ordnance Survey Landform Profile data with a 50 m resolution will be used to construct the landform seen in the wireframe view. Proposed structures associated with the Project, other nearby built development or structures and viewpoint location coordinates will be added to the DTM as necessary. The wireframes will be constructed to show up to five stacks, each up to a height of 40 m. The wireframe views will be taken from a set viewer height of 2 m above the terrain model (the terrain model has an accuracy of 3 m at grid points).

Photomontages

- 11.2.11 Once the pre-prepared images have been imported and the wireframe views overlaid onto the photographs, photomontages of the proposed structures associated with the Project will be rendered (white) and blended using Adobe Photoshop software to produce a realistic view. Other large scale development not directly associated with the Project, such as the existing pylons, will be added to the DTM and the horizontal spacing and vertical dimensions of these structures matched when visible in the panorama. The images will be correctly scaled to the correct angle for the final output image size and transferred into CAD software to produce the images.

Gathering Baseline Data

- 11.2.12 Baseline studies for assessing landscape and visual effects require a mix of desk study and field work to identify and record the character of the landscape and the elements, features and aesthetic and perceptual factors, which contribute to it.
- 11.2.13 The visual baseline establishes the area in which the Project may be visible, the different groups of people who may experience views of the Project, the places where they will be affected and the nature of the views and visual amenity at those points. Visual receptors are individuals and/or defined groups of people who have the potential to be affected by a proposal such as the Project.
- 11.2.14 The use of Landscape Character Assessments is an important element of establishing the current baseline and potential forces for change. LANDMAP has been used for this assessment as it covers the necessary local area and evaluates each area in terms of its five key aspects, geological landscape, landscape habitats, historic landscape, cultural landscape, and visual and sensory landscape.
- 11.2.15 LANDMAP is the national information system for Wales, devised and managed by the NRW (as successor body to Countryside Council for Wales), for taking landscape into account in decision making. Landscape

characteristics within the vicinity of the Project Site are described with reference to what are termed, 'Aspect' data. The following five constituent Aspect data sets in LANDMAP are relevant for landscape and visual impact assessments:

- *Visual & Sensory*: identifies perceptual landscape qualities as well as including information on individual physical attributes of landform and land cover, and the relationships between them;
- *Geological Landscape*: identifies those landscape qualities which are linked to the control or influence exerted by bedrock, surface processes, landforms and hydrology;
- *Landscape Habitats*: Identifies the characteristics and spatial relationships of habitats and vegetation;
- *Historic landscape*: Identifies those qualities that depend on key historic land uses, patterns and features; and
- *Cultural Landscape*: includes information on the relationship between people and places, meaning of places to people, how landscape has shaped people's actions and how people's actions have shaped the landscape.

11.2.16 LANDMAP also includes evaluation scores, which are defined as follows:

Table 11.1 LANDMAP Evaluation

Overall evaluation score	Corresponding definition of importance
Outstanding	International or national
High	Regional or county
Moderate	Local
Low	Little or no importance

11.2.17 The comparative landscape evaluations assigned to each Aspect area within the five data sets provides additional information to aid the assessment of the sensitivity of the landscape. Value does not necessarily equate with suitability or lack of suitability for a particular development and forms part of the underlying information from which the evaluation can be derived.

11.2.18 The greatest magnitude of change is likely to occur within Aspect areas that cover the Project Site. However, more distant Aspect areas where views form part of the area's key characteristics, or to which the landscape of the Project Site serves as an important backdrop, may also be affected. Although this may normally be an issue for the Visual and Sensory layer, other qualities such as those in historical and cultural

landscapes may also be affected at some distance. These effects will be examined in the LVIA.

Spatial Scope

- 11.2.19 The Study Area for visual effects has been set at 15 km for the ZTV and landscape character. Beyond 15 km it is considered that the nature of the location of the Project Site in a valley and the 40 m high stacks mean that effects are unlikely to be significant.

Temporal Scope

- 11.2.20 More detailed Project Site studies will be undertaken to establish the landscape and visual baseline in the ES. These will include site visits as well as desk based studies. Landscape and visual impacts will be assessed for the construction phase, at operation, and at decommissioning. Visual impacts will be assessed for the winter (i.e. worst case) situation when the screening effects of vegetation are least effective.

Significance Criteria

Sensitivity

- 11.2.21 Sensitivity is a term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value related to that receptor. The overall sensitivity of the landscape can be defined as embracing a combination of the sensitivity of the landscape resource (in terms of both its character as a whole and the individual elements contributing to character) and the visual sensitivity of the landscape.
- 11.2.22 Visual sensitivity is assessed in terms of a combination of factors such as views, visibility, the number and nature of people perceiving the landscape and the scope to mitigate visual impact. Sensitivity is not absolute; it will vary according to the character of the existing landscape and the extent and nature of the Project.
- 11.2.23 Visual receptors, such as users of buildings, recreational spaces, footpaths and transport routes, have differing sensitivities to their visual environment. Generally, this is subjective and dependent upon their interest in the visual environment, their viewing opportunity and duration, and the context of the views. These factors may be expressed in terms of:
- The value of the view/viewpoint - reflects the intrinsic character and scenic qualities of its location and context. Where recognised through

the designation of an area, such as a National Park or National Scenic Area, value is increased, while the presence of detracting features in a view will generally reduce value. Higher value views/viewpoints are likely to be more sensitive to change.

- The importance of the viewpoint – as indicated by some form of recognition, e.g. as noted in a guidebook, marked on the ground by a sign or other visible feature. The provision of facilities e.g. seating, parking, footpath may also indicate a location of higher importance. Views gained from locations where people gather outdoors may also be of higher importance.

11.2.24 Table 11.2 Landscape Sensitivity and Table 11.3 Visual Sensitivity (below) describe differing degrees of sensitivity ranging between low to high. LANDMAP provides information on landscape value for an area, which is one element of sensitivity. The determination of the sensitivity of the landscape resource is based upon an evaluation of each key element or characteristic of the landscape. The evaluation will reflect such factors as its quality, value, contribution to landscape character, and the degree to which the particular element or characteristic can be replaced or substituted. The tables are then used to identify sensitivity for a specific receptor within the LANDMAP Area. Each of the bullet points in Table 11.2 and 11.3 must be fulfilled under each category of sensitivity.

Table 11.2: Landscape Sensitivity

Sensitivity (see Table 11.1)	Description
Very High/ Outstanding	<ul style="list-style-type: none"> • Internationally recognised designation; and • Very highly recognised/ very high importance or very rare example of landscape character.
High	<ul style="list-style-type: none"> • Important and valued landscape recognised by national or regional designation; • Sense of tranquillity or remoteness noted in Landscape Character Assessment (LCA); • High sensitivity to disturbance specifically noted in LCA; and • The qualities for which the landscape is valued are in good condition, with a clearly apparent and distinctive character. This distinctive character is susceptible to relatively small changes.
Medium	<ul style="list-style-type: none"> • Regionally designated landscape; • Landscape of moderately valued characteristics;; • The landscape is relatively intact, with a distinctive character; and • The landscape is reasonably tolerant of change.
Low	<ul style="list-style-type: none"> • Landscape is not recognised by designation;

Sensitivity (see Table 11.1)	Description
	<ul style="list-style-type: none"> Relatively degraded or low value landscape; Landscape integrity is low, with a landscape in poor condition and a degraded character; and The landscape has potential capacity to accommodate significant change.
Negligible	<ul style="list-style-type: none"> No sensitivity to change.

Table 11.3: Visual Sensitivity

Sensitivity	Description
Very High	<ul style="list-style-type: none"> A very special landscape or view that is of great importance at the international or national level; and Viewers are drawn to the location specifically to take in the view – international reputation.
High	<ul style="list-style-type: none"> Viewers' attention likely to be focused on the landscape or have proprietary/high interest in their everyday visual environment and/or with prolonged and regular viewing opportunities. Such receptors will include: <ul style="list-style-type: none"> Residents experiencing views from dwellings; Users of public rights of way and access land; Strategic recreational footpath and cycleways; People experiencing views from important landscape features of physical, cultural or historic interest, beauty spots and picnic areas; and Large number of viewers and/or location in highly valued landscape could elevate viewer sensitivity to highest level.
Medium	<ul style="list-style-type: none"> Viewers with moderate interest in their environment, and discontinuous and/or irregular viewing periods. Such receptors will include: <ul style="list-style-type: none"> Road or rail users; Users engaged in outdoor sport or recreation other than appreciation of the landscape (i.e., hunting, shooting, golf, water-based activities); and Users of secondary footpaths or footpaths that may be already impacted by intrusive features.
Low	<ul style="list-style-type: none"> Small number or low sensitivity of viewers assumed. Viewers with a passing interest in their surroundings and momentary viewing periods. Such receptors include: <ul style="list-style-type: none"> Drivers/travellers and/or passengers of moving vehicles including trains; and People at their place of work, including agricultural workers and other non-motorised users on most roads or those already impacted by intrusive features.

Sensitivity	Description
Negligible	<ul style="list-style-type: none"> No sensitivity

Magnitude

- 11.2.25 Each effect on a receptor needs to be assessed in terms of its size or scale, the geographical extent of the area influenced, and its duration and reversibility. The assessment will consider the magnitude of change the Project will exert on the receptor because of:
- The proximity of the Project to the receptor – generally the magnitude of effect reduces with increasing distance as it progressively exerts less influence;
 - The extent to which the Project can be seen, and the extent to which landform, woodland, buildings etc. intervene; and
 - The visibility of the Project and its resulting effects on character.
- 11.2.26 The assessment of the magnitude of potential visual impacts is an assessment of the extent of change upon visual amenity as a direct result of the Project, and depends upon several factors including:
- The scale of change in the view with respect to the loss and/or addition of new features;
 - The degree of contrast, or integration of/compatibility with any new features with existing features in the view;
 - The duration of the effect (temporary or permanent, intermittent or continuous). Temporary effects are considered to be less significant than longer term or permanent effects;
 - The distance of the receptor from the source of the effect;
 - The angle of view and presence of intervening vegetation or features;
 - The dominance of the impact feature in the view, and
 - Seasonal variation.
- 11.2.27 It is assumed that the visual effects of the Project will reduce as viewing distance increases. The magnitude of visual effects at any given distance will vary according to a range of factors. They include:
- The extent of the new buildings and structures that will be visible;
 - Their position in the view;

- The presence of other conspicuous features;
- The extent to which views of the Project will be screened or filtered by intervening landform or by landscape elements such as trees, woodlands, hedgerows, or built structures; and
- The extent of mitigation planting.

11.2.28 The assessment will assume that the change will be seen in clear visibility and under appropriate lighting conditions and considers:

- The attributes of the landscape where the Project will be sited (i.e. the scale and character of the landscape in which it will be viewed; the presence or absence of landscape features; and the scale/enclosure of the landscape within the field of view);
- The design and siting of the Project itself; and
- The atmospheric conditions prevalent at the time of viewing.

11.2.29 Criteria used to assess the magnitude of predicted landscape and visual amenity effects range from no change/negligible to major and are set out below in Table 11.4.

Table 11.4: Magnitude of Effects

Magnitude	Landscape Effect	Visual Effect
Major	Total permanent/ long term loss or major change to key landscape features or elements of the baseline that is important to character.	Total permanent/long term loss or major change in the existing view, change very apparent involving high level of change in character and composition of baseline, i.e. pre-development view
Moderate	Notable partial/ long term loss or alteration to one or more key landscape features or elements of the baseline that is important to character.	Notable partial/long term loss or alteration to the existing view, change apparent involving change in character and composition of baseline, i.e. pre-development view
Minor	Minor permanent/ long term loss or alteration to one or more key landscape features or elements of the baseline that is important to character.	Minor permanent/long term loss or alteration in baseline, i.e. pre-development view, change will be distinguishable from the surroundings whilst composition and character of view, although altered will be broadly similar to pre-change circumstances
Negligible	Very minor permanent/ long term loss or change to one or more key landscape features or	Very minor permanent/long term loss or change in the existing view, change barely

	elements of the baseline that are important to character.	distinguishable from surroundings. Character and composition of view substantially unaltered
No Change	No Change will be perceptible	No Change will be perceptible

Significance of Effect

- 11.2.30 The two principal criteria determining significance are the sensitivity of the receptor to change as a result of the Project, and the magnitude of the effect. In order to come to an overall conclusion on the significance of landscape and visual effects, the separate judgements about the sensitivity of the landscape receptors and the magnitude of the landscape impacts are combined as shown in Table 4.3.
- 11.2.31 Judgements on the overall significance of effect need to be determined using informed and well-reasoned professional judgement. To help guide the judgements the scale of significance and associated descriptions provided in Table 11.5 will be used in the assessment.

Table 11.5: Significance of Effects

Significance	Landscape Effects	Visual Effects
Very Major	<p>The Project will result in effects that:</p> <ul style="list-style-type: none"> Are at a complete variance with the landform, scale and pattern of the landscape; Will permanently degrade, diminish or destroy the integrity of valued characteristic features, elements and/or their setting; Will cause a very high quality landscape to be permanently changed and its quality diminished; and Will be substantially damaging to a high quality landscape. 	<p>The Project will cause a very significant deterioration in the existing view.</p> <p>The view will be completely lost on a permanent/ very long term basis.</p> <p>The visual, aesthetic and perceptual qualities will be very substantial altered in detriment to the special qualities/ key characteristics of the landscape and its amenity.</p>

Significance	Landscape Effects	Visual Effects
Major	The Project will: Be out of scale with the landscape or at odds with the local pattern and landform; and Will leave an adverse impact on a landscape of nationally recognised quality.	The Project will cause a significant deterioration in the existing view. The view will be partially lost on a permanent/ very long term basis. The visual, aesthetic and perceptual qualities will be significantly altered in detriment to the special qualities/ key characteristics of the landscape and its amenity.
Moderate	The Project will: Not fit into the landform and scale of the landscape; and Affect an area of recognised landscape character.	The Project will cause a noticeable deterioration in the existing view. The view will be partially impacted upon. The visual, aesthetic and perceptual qualities will be changed/ altered affecting the special qualities/ key characteristics of the landscape and its amenity.
Minor	Minor change affecting the character of the landscape or the elements therein.	The Project will cause a barely perceptible deterioration in the existing view.
Neutral	No perceptible change affecting the character of the landscape or the elements therein. Includes, 'no effect'.	No discernible deterioration or change in the existing view. Includes, 'no effect'.

Limitations

- 11.2.32 The use of ZTV mapping needs to be qualified on the following basis:
- There are a number of areas within the ZTV maps from where there is potential to view parts of the Project, but which comprise land to which the general public do not have access;
 - A ZTV map does not account for the effects of screening and filtering of views as a result of intervening features, such as buildings, trees and hedgerows; and
 - A ZTV map does not account for the likely orientation of a viewer – for example when travelling in a vehicle.
- 11.2.33 The combined effect of these limitations means that ZTV mapping tends to over-estimate the extent of visibility – both in terms of the land area

from which the Project is visible and the extent of visibility of the Project's structures from a particular viewpoint.

- 11.2.34 This is consistent with the overall approach taken to assess the realistic worst case scenario and, although the use of this type of ZTV map is considered good practice, a ZTV map does not present an absolute measure of visibility or the 'visual impact' of the Project.

Consultation and Consultation Responses

- 11.2.35 Appendix 4.1 provides a summary of scoping responses and set out the actions that have been undertaken, or will be undertaken to address them.

11.3 Baseline Conditions and Receptors

Site Context

- 11.3.2 The Project Site is located within a patchwork of woodland and pasture with visually prominent utility-based infrastructure in the area. Gas and water pipelines cross the Project Site and there is also a network of electricity pylons southwest of Abergelli Farm. Furthermore, there is a Gas Compressor Station and Water Treatment Works located immediately to the northwest, and Cefn Betingau Solar Park to the east of the Project Site.

- 11.3.3 The nearest Area of Outstanding Natural Beauty (AONB) is the Gower AONB which is physically remote from the Project Site being 10 km away and visually separated from the Project Site by intervening topography. The Brecon Beacons National Park lies over 15 km to the north of the Project Site and due to the intervening distance is both physically and visually separate. Both protected landscapes have been scoped out of the assessment due to the physical and visual separation. However, both are noted within the baseline and two viewpoints have been located within the Gower AONB in order to support the overall assessment.

Land Use and Vegetation

- 11.3.4 Pastoral land use is predominant within the wider valley, combined with forestry to the south west featuring Penllergaer Forest and other smaller scattered broadleaved woodlands, typically scattered throughout the valley.
- 11.3.5 A block of broadleaved woodland is located to the east and is classified as Ancient Woodland and a SINCE. There are also further large blocks of woodland to the west, which are also SINCEs.

- 11.3.6 Fields are medium to small and irregularly shaped, divided by combinations of hedge banks, low walls, and ditches. With the exception of the road side; hedgerows are generally unmanaged, overgrown and contain frequent hedgerow trees.
- 11.3.7 Land within the valley is of poor agricultural value (see Chapter 10) and is, poorly draining (see Chapter 9).
- 11.3.8 Other significant land uses within the study area include the following:
- National Grid Site at Waun Ffyrdd to the west of the Project Site and its associated overhead power lines and pylons are frequent and dominant features within the valley;
 - Large water treatment works at Waun y Garn-wen, 1 km north of the Project Site;
 - Park & Ride at Brynwhilhach, just north of Junction 46 to the south west of the Project Site;
 - Morriston Hospital complex at Pant lasau to the south of the Project Site;
 - M4 and rail transport corridor to the north of Junction 46 to the south of the Project Site; and
 - Northern edges of Swansea, forming dominant features in the southern and south eastern parts of the study area.
- 11.3.9 The combination of undulating land form, woodlands, plantations, hedgerows and hedgerow trees combine to give the valley a well vegetated character. This character of woodland, rolling topography and visual containment helps integrate developments into the rural fabric.

Landform

- 11.3.10 The Project Site lies centrally within the Afon Llan Valley; that forms a wide lowland basin situated at the base of higher ground and steep valleys to the north and east. The valley floor is wide and undulating; backed to the north by upland moorland areas rising to over 250 m AOD and divided by numerous steep narrow valleys.

Settlement

- 11.3.11 North of the M4 and Swansea, settlements are typically small, dispersed villages and scattered farmsteads. Felindre is the largest village, situated 1km north-west of the Project Site and nestling within the Upper Lliw Valley.

- 11.3.12 Properties are a mixture of styles with older properties circa 17-18th Century typically stone and white washed walls with slate roofs.

Public Rights of Way & Recreation

- 11.3.13 The study area is well served by PRow (see Figure 12.4), though not all are easily accessible or regularly used. PRow leading to outlying properties often combine as local farm tracks, notably PRow LC35 and to the north, a diverted section of LC35.
- 11.3.14 The Gower Way long distance footpath passes approximately 2-3 km to the north of the Project Site along the Afon Llŵ valley and reservoirs.
- 11.3.15 St Illtyd's Walk long distance footpath passes approximately 7-8 km to the north along the ridge line that takes in Craig Fawr, Pentwyn Mawr, and Penlle'r Castell.

Landscape Character

- 11.3.16 The baseline study includes an appraisal of the landscape within 15 km. Information has been gathered through a combination of desk studies and field survey.
- 11.3.17 The Project Site is situated in the low lying parts of the Afon Llan Valley and consists of very gently sloping land, falling south-south-east. The land consists of grazing fields divided in parts by hedgerows with occasional trees or fencing. The Project Site has a sense of visual enclosure provided by rising ground to the north and north west and from existing hedgerows and vegetation associated with the eastern boundary stream, woodland to the immediate south of the Project Site and wetland vegetation within the valley to the north east.
- 11.3.18 Borrowed distant views out towards upland areas at Mynydd Gelliwastad in the east and Banc Maestir-mawr in the north, also adds to the sense of place. However, the wide tarmaced track leading to Abergelli Farm (previously used as access to former land fill site north west of Abergelli Farm) and wide farm tracks surrounding the eastern Project Site, and the close presence of overhead power lines and pylons within the valley, creates detractors within the landscape and partly reduces the sense of remoteness.
- 11.3.19 The Project Site lies within two LANDMAP landscape character areas, *Rhyd-y-Pandy* and *Penllergaer Forest*. Descriptions of these and other adjacent character areas are summarised below (Refer to Figure 11.3 – Landscape Character Areas).

Rhyd-y-Pandy

- 11.3.20 This area (to the east of the Project Site) is described as rolling farmland mosaic on land ranging between 60 m and 200 m AOD, with slight upland character at these higher elevations generated by the adjacent uplands, essentially rural landscape, although criss-crossed by a network of minor roads and greater detractor of overhead wires on steel pylons. The southern part of this area is also influenced by road noise from the busy M4.
- 11.3.21 The sensitivity of this character area to change is considered to be medium. This reflects the rural nature of the landscape and the open, medium to long distance views that are possible over the surrounding landscape, but also acknowledges the presence of numerous detractors in the landscape. The high voltage towers associated with electricity transmission form a prominent element, as does the M4 motorway and developments on the northern edge of Swansea.
- 11.3.22 LANDMAP overall evaluation of landscape character for this area is moderate value.

Penllergaer Forest

- 11.3.23 This landscape character area (to the west of the Project Site) is relatively low lying and is described as rolling farmland dominated by conifer woodland. Land cover is dominated by conifer plantation and where woodland is interrupted, agriculture is present, with fields set to pasture and small to medium sized field compartments. The woodland, together with the nature of the landform, provides a strong degree of enclosure and shelter.
- 11.3.24 The sensitivity of this character area to change is considered to be low, increasing to medium where the landcover opens up. This is primarily a result of the degree of visual enclosure provided by the woodland and the limited contribution made by views out from the character area.
- 11.3.25 LANDMAP overall evaluation of landscape character for this area is moderate value.

Other Landscape Character Areas

Pentwyn Mawr

- 11.3.26 This landscape character area (to the north east of the Project Site) is described as having strongly rolling hills of between 250 m and 400 m AOD. Land cover is predominantly rough grazing moorland with a distinctive upland feel generated by exposure, elevated views, a lack of human presence and detractors. Attractive long views of the Gower add to a sense of place.

11.3.27 The sensitivity of this character area to change is considered to be high given its generally intact upland character and sense of place and accessible picturesque and borrowed views.

11.3.28 The LANDMAP overall evaluation of landscape character for this area is high value.

Mynydd Gelliwastad

11.3.29 This landscape character area (to the east of the Project Site) is described as upland grazing land. The area is open with views out to Clydach and is distinct from surrounding areas, which have a more pasture/hedgebank characteristic.

11.3.30 The sensitivity of the landscape character area to change is considered to be high. This reflects the open nature of land and long distance views available from this area.

11.3.31 The LANDMAP overall evaluation of landscape character for this area is moderate value.

West of Clas

11.3.32 This landscape character area (to the south of the Project Site) is described as rolling farmland on relatively low lying land, with mosaic pattern derived from hedges and scattered woodland, mainly broadleaf. Urban influence is strong in the southern and eastern sides, where the area is encircled by the urban edge. The northern edge borders the M4 motorway.

11.3.33 The sensitivity of this character area to change is considered to be medium; reflected by the urban/built influences on the area.

11.3.34 The LANDMAP overall evaluation of landscape character for this area is moderate value.

Settlement

11.3.35 Several areas of settlement lie within the study area (see Figure 1.1). Within these areas there is a high degree of enclosure provided by built development and vegetation which restricts the views over the surrounding landscape. However, it is possible that the elevation of the land in certain places affords long distance views, particularly in Llangyfelach. Land cover is dominated by residential uses, but there are industrial, commercial and office premises in some areas. The Driver and Vehicle Licensing Agency (DVLA) is the tallest building in the vicinity and forms a dominant presence, both within the built up area and when viewed from the surrounding rural landscape.

11.3.36 The sensitivity of this character area to change is considered to be low, reflected by the urban/built influences on the area.

11.3.37 The LANDMAP overall evaluation of landscape character for this area is low value.

Wider Study Area

11.3.38 A number of other *LANDMAP* landscape character areas have been identified that lie within the wider study area. These areas are as follows:

- Penbwl Valley, Graig-neddfwch Woods;
- Cwm Clydach;
- North of Clydach;
- Afon Tawe;
- Afon Lliw and surrounds; and
- Surrounding Cwm Dulais.

11.3.39 These have not been considered due to the distance from and/or lack of intervisibility with the Project Site.

11.3.40 *LANDMAP* also identifies the M4 Corridor as a landscape character area, comprising a large road corridor with associated signage, lighting, embankments, cuttings and overbridges. Noise and movement are major detractors. [The area is considered to have minimal landscape value. The *LANDMAP* overall evaluation of landscape character for this area is Low value.]

Visual Receptors

11.3.41 Residential receptors within 1 km of the Project Site include those within the nearby settlements of Morriston, Pant-lasau and Llwyncelyn and Felindre. The closest residential dwellings to the Project Site are Abergelli Farm, Cefn-betingau to the west and Maes-eglwys to the southwest. In addition there are also isolated dwellings and farmsteads outside of the settlements including but not exclusive to:

- | | |
|-----------------------|-------------------|
| • Abergelli Farm; | • Brynheulog; |
| • Cefn-betingau; | • Taironen; |
| • Maes-eglwys; | • Penfeddi Uchaf; |
| • Lletty Morfil Farm; | • Penidy Isaf; |
| • Felin-wen; | • Gellyfedden; |

- Pont Felin-wen;
- Pontbren Llwyd;
- Gors-wen;
- Llety'r Bugall;
- Rhos fawr;
- Brynawel;
- Brynwhilhach; and
- Lletty'r-scil.

11.3.42 The potential visual amenity effects arising from the Project have been considered throughout the study area. A preliminary survey was carried out to identify useful viewpoints to propose for the impact assessment. A wide variety of locations were initially selected as they offered a potential range of appropriate receptors, provided good coverage of the local area and seemed likely to provide views of the Project Site. However, once out on site it was clear that much of the Project Site is not visible or only partially visible from many of the potential receptors. In particular, views from nearby properties in the valley are obscured by topography and/or vegetation.

11.3.43 Although properties on the edge of Morriston (northern suburbs of Swansea) are on the rising ground overlooking the Project Site, there are few public vantage points from where views can be confirmed and/ or assessed.

Summary Table 11.6: Preliminary Viewpoint Locations

[Refer to Figure 11.1 & 11.4]

Receptors: R = Residential; T = Tourist/ Recreational; U = Road User

Viewpoint	Receptor	Location	Grid Ref.
pVP1	U/R	North side of J46 of M4	SS 649 994
pVP2	R	Fforest-newydd	SN 639 015
pVP3	R/T	Felindre/ Gower Trail	SN 642 029
pVP4	R	Llwyngwenno	SN 637 035
pVP5	T/U	Mynydd Pysgodlyn	SN 635 043
pVP6	T/U	Penlle'r castell	SN 665 091
pVP7	U	Tor Clawdd	SN 671 049
pVP8	R	Cynghordy	SN 662 031
pVP9	T	PRoW north of Aber-gelli fach	SN 655 025
pVP10	U	Pen y Fedw	SN 665 013
pVP11	R/T	Mynydd-Bach	SS 645 981
pVP12	R/T	Carnglas	SS 617 941
pVP13	R/T	Three Crosses	SS 575 948
pVP14	R/T	PRoW near Maes-eglwys farm	SN 653 007

Viewpoint	Receptor	Location	Grid Ref.
pVP15	R/T/U	Rhyd-y-pandy Rd/ PRoW/ farm access road	SN 659 001
pVP16	R/W	South side of Long View Rd near the DVLA	SN 655 985

11.4 Power Generation Plant Assessment

11.4.1 The construction and commissioning of the Power Generation Plant will include all areas required for the permanent works as well as temporary construction areas. During this time potential adverse temporary landscape and visual effects will arise from the following activities:

- Site clearance, removal of vegetation and topsoil stripping from the Project Site;
- Earthworks to construct platforms and excavate foundations;
- Construction of an internal road for access to the buildings and storage area;
- Movement of construction related traffic including delivery and removal of materials to and from site, off-site road traffic including workers travelling to and from site;
- General construction activities including the movement of large scale construction equipment, i.e. tower cranes, smaller cranes, batching plants drilling rigs; site compounds and temporary buildings required for construction and parking on site materials stockpiles; presence of temporary hoardings and protective fencing; temporary hoardings and protective fencing; and signage;
- Construction site lighting, in particular during the winter months;
- Construction of the buildings within the Power Generation Plant Site; and
- Construction of the permanent perimeter security fence.

11.4.2 Decommissioning will comprise the removal of all Power Generation Plant items and restoration of the Project Site.

Construction/Decommissioning

11.4.3 The following table sets out the initial assessment of effects of the Power Generation Plant during the construction and decommissioning phases. Effects from decommissioning are considered to be the same as

construction impacts and therefore they both are assessed in Table 11.7 below.

- 11.4.4 Please refer to paragraph 4.6.3 which provides guidance on which effects are significant.

Table 11.7: Findings of Preliminary Assessment of Effects of Power Generation Plant during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Landscape Characteristics				
Rhyd-y-Pandy Character Area	Although a rural landscape, area currently affected by overhead wires and pylons. Construction activities will bring some temporary adverse effects through the introduction of construction infrastructure and activity.	See Section 12.3.	Some temporary adverse effects expected to remain.	To be assessed in LVIA
Penllergaer Forest Character Area	Woodland, together with the nature of the landform, provides a strong degree of enclosure and shelter. This characteristic will remain largely unaffected. Construction activity unlikely to affect the forest character.	See Section 12.3.	None	To be assessed in LVIA
Visual Amenity				
Residential – within the valley	Generally, unlikely to be able to view the Power Generation Plant Site directly and therefore not able to see the construction activities. However, Maes-eglwys lies directly south of the Power Generation Plant Site and may see construction activity.	Advance screen planting. See Section 12.3.	Advanced planting should reduce any likely effects that do arise, to Neutral. Some residual effects may remain for Maes-eglwys.	Viewpoints to be agreed with LPA and assessed in LVIA. Maes-eglwys to be included in viewpoint selection.
Residential – valley sides	Some properties might be able to view the Power Generation Plant Site directly and will therefore view some construction activities, but unlikely to see all.	See Section 12.3	Some temporary adverse effects expected to remain.	Viewpoints to be agreed with LPA and assessed in LVIA

Tourist/ Recreational	PRoW in immediate vicinity may have partial views. However, generally unlikely to be able to view the Generating Equipment Site at ground level and therefore unlikely to be able to see the construction activities.	See Section 12.3	Some temporary adverse effects for PRoW in immediate vicinity expected to remain.	Viewpoints to be agreed with LPA and assessed in LVIA
Road User	Generally, not able to view the Power Generation Plant Site directly due to high hedge banks and therefore not able to see the construction activities. Exception to this will be the view north at Junction 46 [pVP1].	See Section 12.3	Some temporary adverse effects for views north from J46 expected to remain.	Viewpoints to be agreed with LPA and assessed in LVIA

Operation

- 11.4.5 For visual amenity considerations a maximum stack height of 40 m has been used for each of a maximum of five stacks. This is considered the worst case scenario. Table 11.8 provides the initial assessment of the impacts of the Power Generation Plant during operation with and without mitigation. Where potential residual effects are stated, this sets out what might be the effect once the site is operational and any landscape scheme has had 15 years to mature.

Table 11.8: Findings of Preliminary Assessment of Effects of Power Generation Plant during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Landscape Characteristics				
Rhyd-y-Pandy Character Area	Although a rural landscape, area currently affected by overhead wires and pylons. The Generating Equipment and Access Road will be set in context with existing – but will reinforce the industrial landscape aspects.	Planting with native species of trees and shrubs similar to those present nearby, using local provenance stock wherever possible, in order to enhance biodiversity and connect habitats to	Some remaining residual effects	To be assessed in LVIA

Penllergaer Forest Character Area	Woodland, together with the nature of the landform, provides a strong degree of enclosure and shelter. This characteristic will remain largely unaffected.	form an ecological network	None	
Visual Amenity				
Residential – within the valley	Generally unlikely to be able to view the Power Generation Plant Site directly, with views being constrained by intervening local topography and vegetation. In places there maybe partial views of upper parts of stacks. However, Maes-eglwys lies directly south of the Generating Equipment Site may have views of the Generating Equipment.	Structure/hedgerow planting on the perimeter of the site to reduce views of ground level operational activities; The design of external lighting to reduce trespass, glare and spillage and by restricting usage to the minimum periods required	Where views of the stacks are possible these are unlikely to be mitigated by planting and adverse effects are likely to remain. Lighting strategy should reduce potential effects at night.	Viewpoints to be agreed with LPA and assessed in LVIA. Maes-eglwys to be included in viewpoint selection.
Residential – valley sides	Some properties might be able to view the Power Generation Plant Site directly and will therefore see the stacks, but unlikely to see the Gas Turbine Generators, site buildings and other infrastructure. A few medium to long distance views from northern edge of Swansea.			
Tourist/ Recreational	PRoW in immediate vicinity may have partial views stacks and upper parts of generators. Paths and accessible areas on higher ground will have views of the Generating Equipment within its wooded landscape context.			
Road User	Generally, not able to view the Power Generation Plant directly due to high hedge banks and therefore only able to see the occasional stack. Exception to this will be the view north at Junction			

	46 [pVP1], which provides a broad panorama showing the Generating Equipment set against rising ground to the north and within a wooded valley.			
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11.5 Gas Connection Assessment

Construction/Decommissioning

- 11.5.1 Further technical advice will be sought from National Grid to establish planting restrictions in the vicinity of all above and below ground structures prior to developing the landscape strategy. However, hedge planting could be undertaken directly across the Pipeline with shallow rooting species where visual screening is required and where it is necessary to gap up a field boundary hedge.

Table 11.9: Findings of Preliminary Assessment of Effects of Gas Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Landscape Characteristics				
Rhyd-y-Pandy Character Area	Will depend on technique chosen, open trenching will result in trenching and earthmoving machinery and associated activity. Similar activities will occur for the sections that maybe bored. Construction activities will therefore bring some temporary adverse effects, through the introduction of construction infrastructure and activity	See Section 2.13.	Mitigation should reduce effects to Neutral	Will be assessed in the LVIA
Penllergaer Forest Character Area	Gas Connection not directly affecting this area.	None	None	Will remain part of baseline in LVIA
Visual Amenities				
Residential – within the valley	Generally, unlikely to be able to view the gas	See Section 2.13.	Mitigation should reduce	Viewpoints to be agreed with

	connection site directly and therefore not able to see the construction activities. Abergelli Farm will be in close proximity to the construction activity and may experience some effects.	Reinstatement of ground above the pipeline.	effects to Neutral where a view is possible. However, there may be some Minor residual effects on Abergelli Farm	LPA and assessed in LVIA
Residential – valley sides	Some properties to the E/SE might be able to view the Gas Connection directly, but unlikely to see full extent of construction activity.		Mitigation should reduce effects to Neutral	
Tourist/ Recreational	Generally unlikely to be able to view the Gas Connection directly and therefore will not see the route of pipeline and construction activity. Two PRoW in immediate vicinity will have full/partial views and will therefore be directly affected (possible diversion). Significant effect expected.		Should reduce effects to Neutral however, there may be some Minor residual effects on PRoW	
Road User	Unlikely to be able to view the Gas Connection directly due to high hedge banks and therefore not able to see the route of pipeline and construction activity.		None	

Operation

- 11.5.2 During operation the reinstated route of the pipeline will settle in and with time be invisible. However, the connection of the Pipeline to the NTS will require two AGIs to be installed. These structures will be visible.

Table 11.10: Findings of Preliminary Assessment of Effects of Gas Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Landscape Characteristics				
Rhyd-y-Pandy	The Gas Connection route is not expected to affect the	Reinstatement of ground	Should reduce effects to	Will be assessed in

Character Area	key characteristics.	above the pipeline, careful placing and screening of AGI such as GRF.	Neutral	the LVIA
Penllergaer Forest Character Area	Gas Connection not directly affecting this area.	None	None	Will remain part of baseline in LVIA
Visual Amenity				
Residential – within the valley	Generally unlikely to be able to view the Gas Connection directly and therefore not able to see the Gas Receiving Facility (GRF). Abergelli Farm in close proximity to the route. However, pipeline will be buried so no above ground visibility.	Reinstatement of ground above the pipeline, careful placing and screening of AGI such as GRF.	None	Viewpoints to be agreed with LPA and assessed in LVIA
Residential – valley sides	Some properties might be able to view the Gas Connection directly, but unlikely to be able to see the GRF due to local topography and vegetation. Pipeline will be buried so no above ground visibility.		None	
Tourist/ Recreational	Visitors unlikely to be able to see the GRF due to local topography and vegetation. PRoW in immediate vicinity may have partial views. Pipeline will be buried so no above ground visibility.		Should reduce effects to Neutral	
Road User	Unlikely to be able to view the Gas Connection directly due to high hedge banks and therefore not able to see the GRF. Pipeline will be buried so no above ground visibility.		None	

11.6 Electrical Connection Assessment

Construction/Decommissioning

11.6.1 Table 11.11 below sets out the predicted impacts of the Electrical Connection during the construction or decommissioning phases.

Table 11.11: Findings of Preliminary Assessment of Effects of Electrical Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Landscape Characteristics				
Rhyd-y-Pandy Character Area	The Electrical Connection will be on the boundary of this character area. The area is currently affected by overhead wires and pylons. Construction activities will bring some temporary adverse effects, through the introduction of construction infrastructure and activity.	See Section 2.13.	Some remaining residual effects	Will remain part of baseline in LVIA
Penllergaer Forest Character Area	Woodland is the key characteristic of this area. Route selection will determine the amount of woodland affected through vegetation clearance. Construction infrastructure and activities will have a temporary effect on the character of the area.	Identify route that has least effect on the woodland and minimise the loss of trees during clearance work. See Section 2.13.	Likely to be some residual effects – the significance of these will depend on route and potential effect on vegetation.	Viewpoints to be agreed with LPA and assessed in LVIA
Visual Amenity				
Residential – within the valley	Generally unlikely to be able to view the Electrical Connection directly and therefore not able to see the construction activities. However, Maes-eglwys lies directly south of the PGP site and may see construction activity.	Advance planting. See Section 2.13 Reinstatement of ground	Advance planting should reduce any likely effects that do arise, to Neutral. Some residual effects may remain for Maes-eglwys.	Viewpoints to be agreed with LPA and assessed in LVIA. Maes-eglwys to be included in viewpoint selection.

Residential – valley sides	Some properties might be able to view the Electrical Connection directly and will therefore view some construction activities, but unlikely to see all.	above the underground connection	Where views do exist, the construction of some above ground infrastructure may remain within view, but underground section will have no effects	
Tourist/ Recreational	Generally unlikely to be able to view the Electrical Connection directly and therefore not able to see the construction activities. PRow in immediate vicinity may have full/ partial views as it crosses the Electrical Connection route.		Should reduce effects to Neutral however, there may be some Minor residual effects on PRow	
Road User	Generally, not able to view the Electrical Connection directly due to high hedge banks. Exception to this will be the view north at Junction 46 [pVP1], which provides a broad panorama showing the power station set against rising ground to the north and within a wooded valley.		Where views do exist, the construction of some above ground infrastructure may remain within view, but underground section will have no effects	

Operation

11.6.2 Table 11.12 below sets out the predicted impacts of the Electrical Connection during the operation phase.

Table 11.12: Findings of Preliminary Assessment of Effects of Electrical Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Landscape Characteristics				
Rhyd-y-Pandy Character Area	The Electrical Connection will be on the boundary of	None required	None	Will be further considered in

	this character area. The area is currently affected by overhead wires and pylons. No direct or indirect effects expected .			the LVIA
Penllergaer Forest Character Area	Woodland is the key characteristic of this area. The significance of effect will depend on the degree of woodland/ tree loss along the proposed route. The underground Electrical Connection could affect the characteristics of this area as a consequence.	Dependent on route and potential loss of woodland – replanting options maybe limited due to electrical clearance requirements	Likely to be some residual effects – the significance of these will depend on route and potential effect on vegetation.	
Visual Amenity				
Residential – within the valley	Generally unlikely to be able to view the Electrical Connection directly as Connection underground.	The reinstatement of ground above the underground connection will settle in.	None - Underground section will have no residual effects.	Viewpoints to be agreed with LPA and assessed in LVIA. To include Maes-eglwys
Residential – valley sides	Some properties might be able to view the Electrical Connection route directly, however, Connection will be underground, so no effect.		None - Underground section will have no residual effects.	
Tourist/ Recreational	Generally unlikely to be able to view the Electrical Connection directly – underground sections not visible.		None - Underground section will have no residual effects.	
Road User	Generally, not able to view the Electrical Connection directly due to high hedge banks. Exception to this will be the view north at Junction 46 [pVP1], which provides a broad panorama showing the power station set against rising ground to the north and within a wooded valley.		Where views do exist, some above ground infrastructure may remain within view, but underground section will have no residual effects	

11.7 Project (as a whole)

11.7.1 It is unlikely that there would be significant landscape and visual effects during the construction/ decommissioning period. Successful reinstatement of the ground above underground infrastructure will be

important. There maybe some remaining residual effects arising from vegetation loss as a result of clearance work prior to construction.

- 11.7.2 During operation there will be some significant effects where the Project is visible, in particular from southern receptor points. Route identification, reinstatement of underground infrastructure, screening of above ground infrastructure will be important in mitigating these effects, reducing the potential for residual effects.

11.8 Cumulative Effects

Construction/Decommissioning

- 11.8.1 Construction and decommissioning effects will be determined by the proposed site works programmes. Construction of the Mynydd y Gwair Wind Farm will be 3km north of the Project Site and although a proposed access route to the wind turbine site is along the Craig y Bedw ridge, it is unlikely to be noticeable in and around or in combination with the Project Site.
- 11.8.2 The Felindre Business Park is currently under construction and is therefore likely to be complete before the construction of the Project commences (other than minor works).
- 11.8.3 The solar park is at planning application stage and it is feasible that it maybe be underway on site at the same time as the Project. Although some cumulative effects can be expected, for most receptors there will be no effect as intervisibility with the Project Site at ground level (where most of the construction activities will be taking place) is limited.

Operation

- 11.8.4 The area identified for the Mynydd y Gwair Wind Farm is not within the Zone of Visual Influence for the Project. Preliminary viewpoint pVP6 is located on the northern side of the wind farm and as it is expected that the Project Site will be out of view from this location, there will be no cumulative effects from viewpoints in the north. Views from the south looking northwards to the Project Site will have the wind farm as a backdrop. The addition of the stacks associated with the Project will increase the amount of utility infrastructure in the view. However, these are different types of vertical structures (stacks/wind turbine) and will be perceived as different types of development in the landscape. It is expected that there will be some cumulative visual effects on viewpoints south of the Project Site.
- 11.8.5 Felindre Business Park is currently under construction with the main infrastructure works being implemented on the ground in order to

facilitate development of the individual plots. The Felindre sustainable urban village is also planned to link in with the business park. The Project will be located to the north east of these sites and is visually contained within its woodland context. It sits within an existing landscape of pylons, wires and substations. Views from pVP1 and pVP11 will afford broad views north of the Business Park and the proposed urban village. The Project will be seen as an addition to the existing substations and electrical infrastructure in the area, rather than an integral part of the Business Park & Village. Any cumulative visual effects are not likely to be significant due to the differing nature of the developments and the existing character of the area.

- 11.8.6 The Solar Park at Brynwhilach Farm is adjacent to the southern boundary of the Project. The area is wooded and contained visually and therefore, despite the size of the proposed solar park, it is unlikely that it will be visible from the majority of receptors to the north, east and west. For receptors to the south, notably pVP1 and pVP11 it is likely that the solar panels will be fully or partially visible and seen in combination with the Project. Although the characteristics of the two developments are different, any cumulative visual effects are likely to be significant from the south.

11.9 Summary and Conclusions

- 11.9.1 The expectation is that the main visually prominent element of the Project will be the up to 40 m high stacks. These vertical elements are expected to have adverse effects on some medium distance receptors. However, much of the Project Site itself will be screened by existing vegetation and local topography and this will reduce the visual effects of the main generators. This could be strengthened with planting as part of a landscape mitigation strategy. The Gas and Electrical Connections are predominantly underground and are not expected to have significant effects other than where there is above ground infrastructure.

Table 11.13: Summary of Effects

	Receptor name and description	Potential Mitigation	Preliminary Assessment of Residual Effects
Power Generation Plant			
Construction / Decommissioning	Some temporary landscape effects on existing vegetation.	See Section 2.13.	Not all landscape effects able to be mitigated.
	Site activities generally visual contained. Generally, unlikely to	See Section 2.13.	Where site remains visible, activities are unlikely to be significantly

	view the Project Site directly, although some receptors to the south (Maes-eglwys) and PRow may have some adverse effects.		reduced.
Operation	Existing landscape characteristics of the area mainly unaffected.	Planting of native plants/ shrubs to mitigate effects on woodland and trees.	Some remaining residual effects likely.
	Views from higher ground, especially of stacks. Some receptors to the south (Maes-eglwys) and PRow may have some adverse effects.	Screen planting Lighting strategy to reduce light pollution.	Some remaining residual effects likely.
Electrical Connection			
Construction / Decommissioning	Construction activities could affect the landscape depending on the degree of vegetation removal required.	See Section 2.13.	Some remaining landscape effects expected
	Generally unlikely to view the site directly, although some receptors to the south (Maes-eglwys) and PRow may have some adverse effects.	Screen planting See Section 2.13.	Some remaining visual effects expected
Operation	Significance of landscape effect will depend on the degree of woodland loss along the proposed route	Route selection and replanting and reinstatement proposals	Likely to be some residual effects
	Underground section will have no effects	None	None
Gas Connection			
Construction / Decommissioning	Construction activities not expected to affect key characteristics – some effects expected with loss of vegetation.	See Section 2.13. Reinstatement of route of pipeline.	No significant residual effects expected.
	Few opportunities to view the construction activities, but where these are visible, effects are not	See Section 2.13. Reinstatement of route of pipeline.	No significant residual effects expected.

	expected to be significant		
Operation	Restored pipeline and location of AGI is not expected to raise significant landscape effects.	Reinstatement of route of pipeline and careful placing and screening of AGI such as GRS.	No significant residual effects expected
	Restored pipeline and location of AGI is not expected to raise significant visual effects	Reinstatement of route of pipeline and careful placing and screening of AGI such as GRS.	No significant residual effects expected
Project (as a whole)			
Construction / Decommissioning	Unlikely to be any significant landscape and visual effects during the construction period	See Section 2.13. Reinstatement of underground infrastructure.	Some remaining residual effects expected
Operation	There will be some significant effects where the Project is visible, in particular from southern receptor points.	Route identification, reinstatement of underground infrastructure, screening of above ground infrastructure.	Some remaining significant effects expected
Cumulative Effects			
Construction / Decommissioning	No significant cumulative effects identified during construction in addition to those resulting from the Project.	None	None
Operation	Significant effects expected for landscape and visual receptors to the south of the site.	Route identification, reinstatement of underground infrastructure, screening of above ground infrastructure.	Some remaining significant effects expected

12 TRAFFIC, TRANSPORT AND ACCESS

12.1 Introduction

12.1.1 This chapter provides the traffic, transport and access preliminary environmental assessment of the proposed Abergelli Power Project based upon assessment carried out up to September 2014. The proposed development is set out in Chapter 2 which forms the primary basis for the assessment carried out to date.

12.1.2 The following factors have specifically been taken account of in this preliminary assessment: a Power Generation Plant capable of generating ~299MW, a Gas Connection, and an Electrical Connection. The worst case considers a plant with up to 5 generators and stacks as this is likely to generate the greatest level of traffic during construction.

12.1.3 Embedded mitigation included within the assessment of traffic, transport and access consists of a Construction Traffic Management Plan, and Travel Plan for construction and operational workers (see Chapter 2). These documents aim to mitigate the impact of vehicular trips on the local road network.

12.2 Approach

Relevant Policy and Guidance

12.2.1 The traffic assessment in the PEIR has taken account of planning policy and guidance set out in Section 3, as well as the following documents:

- Wales Transport Strategy (2008);
- Wales Infrastructure Investment Plan (May 2012); and
- Regional Transport Plan for South West Wales (2010-2015).

12.2.2 The likely significant effects of the Project in environmental terms will be evaluated in accordance with the Institute of Environmental Assessment's (IEA) 'Guidelines for the Environmental Assessment of Road Traffic' (1993).

Assessment Methodology

12.2.3 A meeting was held with the CCS and the South Wales Trunk Road Agent in Swansea on 7th August 2014 in order to discuss the Project with these Authorities and the potential impacts of the Project and the available data sources to assist with the assessment.

12.2.4 The preliminary assessment has established the existing capacity conditions around the Project Site and assessed network and corridor

performance in relation to a number of receptors. This is based on data collected on site and existing data.

- 12.2.5 In addition, the ES Chapter will present the findings of trip estimates from the Project, the mode split of all trips, and the likely distribution across the transport network. Forecasting of baseline traffic data will be carried out to establish a 'do minimum' scenario for a future year.
- 12.2.6 The impact of the Project will be established by adding trips associated with the Project to the 'do minimum' scenario to create a 'do something' scenario and the effects will be presented in the ES Chapter. The cumulative effects of all other development will also be assessed. If necessary, mitigation measures will be proposed to reduce the number of trips, or provide capacity to cater for these additional trips.
- 12.2.7 A Travel Plan will be created and adopted in which sustainable transport will be promoted throughout the life cycle of the Project.
- 12.2.8 Additionally, an outline Construction Traffic Management Plan will be produced as a basis to manage the traffic associated with the construction phase of the Project.
- 12.2.9 Potential environmental effects are likely to be most significant for receptors within the local community, and employees at the Project, although any user of the highway network or of the local public rights of way around the Project could be affected.
- 12.2.10 The Project may cause potential effects to both motorised and non-motorised users and it will be ensured that effects for all modes of transport are considered and kept to a minimum.
- 12.2.11 As further work is progressed, the transport related environmental effects (as defined by IEA guidelines) are being assessed for the following factors:
- Traffic flows;
 - Delay;
 - Road safety;
 - Intimidation and fear;
 - Severance; and
 - Pedestrian amenity.
- 12.2.12 The effects of traffic in relation to noise and vibration, and air quality are considered in the relevant sections of the PEIR.

Traffic Flows

- 12.2.13 The changes in traffic flow will be assessed in terms of impacts on key junctions and links surrounding the project site. These locations are awaiting agreement from SCC but are likely to include:
- M4 Junction 46 northern dumbbell;
 - M4 Junction 46 southern dumbbell;
 - A48 / Pant Lasau Road mini roundabout;
 - Pant-Lasau Road / Mynydd Gelli Wastad Road / Heol Maes Eglwys mini roundabout;
 - B4489 to Felindre;
 - Rhyd-Y-Pandy Road; and
 - Unnamed Road north of Abergelli Fach Farm.
- 12.2.14 The impact of flow changes at these locations will be assessed for the traffic related to the construction/decommissioning phase or the operational phase, whichever is greater.
- 12.2.15 It is estimated that the construction and decommissioning phases will result in approximately 200 car or van trips per day and around 150 HGV deliveries per day during the peak construction/decommissioning period. This assumes a 22 month construction period, as per similar peaking plants, with the peak of HGV deliveries occurring during the first quarter of construction (months 1 to 3) and the peak of car and van trips occurring during the fifth quarter of construction (months 13 to 15). The car or van trips would be limited to the start and end of the working day whilst HGV trips would be spread across the day.
- 12.2.16 During the operational period, it is anticipated that approximately 3 people would be present on site during each shift. With three shifts per day, this would equate to 18 two-way car trips.
- 12.2.17 The construction/decommissioning phase has the largest impact in terms of traffic generation and the impacts of this scenario on the surrounding road network will be assessed in the ES.
- 12.2.18 The junctions will be assessed for:
- a base year (2014);
 - a do minimum scenario to represent baseline levels of traffic during the peak construction period (year dependent on construction timetable); and
 - a do something scenario to represent the impact of the construction traffic over and above the do minimum.

12.2.19 The do something scenario will assess the construction worker traffic and HGV deliveries arriving at and departing from the site for each of the components of the project; the Electrical Connection, the Gas Connection, and the Power Generation Plant.

12.2.20 Traffic surveys are in the process of being commissioned to determine the peak hours for assessment. From initial investigations, traffic generated by the Project is likely to have a greater impact on Access Option 1, as this route, from the M4 Junction 46 to Pant-Lasau, is an important route enabling access to Morriston Hospital and is used by emergency service vehicles.

Delay

12.2.21 The change in delay resulting from the change in traffic flow will be presented in the ES and the percentage increase reported. The change in delay will be assessed through the assessment of delay at key junctions in the vicinity of the Project Site.

Road Safety

12.2.22 An analysis of collisions over a five-year period will be undertaken in the ES to identify any significant patterns or clusters in the vicinity of the project site. The collision history at each of the junctions identified for traffic assessment will be reported in the ES.

Intimidation and Fear

12.2.23 Intimidation and fear can be caused by location, highway layout, level of crime, and driver stress. As discussed in the IEA guidelines, there are no commonly agreed thresholds for estimating these from other measurable factors.

12.2.24 Therefore a qualitative judgement, based on content of the ES Chapter including a site audit and non-motorised user assessment will be used to determine the intimidation and fear effect of the Project.

Severance

12.2.25 Severance will be assessed in the ES in relation to the increase in traffic flow. A qualitative assessment will be provided based on traffic volumes, and impacts on footways and PRow.

Pedestrian Amenity

12.2.26 Pedestrian Amenity is defined within the IEA guidelines as the “relative pleasantness of a journey”. This is affected by traffic flow, traffic composition, pavement width and separation from traffic.

- 12.2.27 There are no commonly agreed thresholds for quantifying the significance of changes in pedestrian amenity, although in this case the traffic flow will be assessed for the increase in the proportion of HGVs. If the proportion of HGVs double, a significant effect is likely to arise. A qualitative assessment of the effect of the Project on pedestrian amenity will then be given using the Site Audit and Non-Motorised User Assessment.
- 12.2.28 A preliminary assessment of the likely impacts listed above for each of the elements of the Project and each Project phase is presented in Section 12.4 to 12.6 below.

Significance Criteria

- 12.2.29 IEA provides guidance on how the magnitude of changes in traffic flow should be determined, as shown in Table 12.1

Table 12.1: Criteria Defining Magnitude of Change in Traffic Flow

Magnitude	Criteria
High	Considerable change in condition (90+%)
Medium	Readily apparent change in conditions (60-90%)
Low	Perceptible change in conditions (30-60%)
Very Low	No discernible change in conditions (0-30%)

- 12.2.30 The overall significance of change is categorised based on the sensitivity of the receptor as shown in Table 4.3. For many effects, there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on part of the assessor, backed-up by data or quantified information wherever possible. Consultation with stakeholders will enable determination of the sensitivity of each receptor.
- 12.2.31 The positive or negative effect of changes may therefore vary across receptors, with some road links experiencing a beneficial effect or being of low sensitivity, whereas others may have high sensitivity and high magnitude of impact and these will be identified accordingly.
- 12.2.32 Effects of moderate significance or above are considered to be significant for the purposes of the assessment.

Limitations

- 12.2.33 The limitations are split into the following two categories:

- Assessments not yet complete in the PEIR; and
- Limitations in assessments which will remain in the ES.

12.2.34 The assessments not yet complete in the PEIR are as follows:

- The calculation of trips generated by construction vehicles and construction workers;
- No detailed analysis of routes for abnormal loads has been undertaken;
- Surveys to determine the existing traffic flows on the surrounding network had not been undertaken in time for the PEIR assessment; and
- The theoretical capacity of existing junctions was not assessed or modelled.

12.2.35 The limitation in the assessment which will remain in the ES is that the usage of the local road and PRow networks by non-motorised users was not known.

Consultation and Consultation Responses

12.2.36 A summary of the consultation responses received to date from the scoping response document in relation to traffic, transport and access, and how these will be considered is provided in Appendix 4.1.

12.3 Baseline Conditions and Receptors

Highway Network

12.3.1 The B4489 lies west of the Project Site and runs north-south linking Felindre to Llangyfelach and is marked with a 40mph speed limit. North of the access to the Swansea North electrical substation and Felindre Gas Compressor Station, the B4489 is a narrow rural road. It then widens to a single carriageway road for the rest of its length, with the stretch leading to the junction with the A48 having two lanes south-bound.

12.3.2 The Rhyd-Y-Pandy Road is an unclassified road which runs east and north of the Project Site, from Pant-lasau to Rhyd-Y-Pandy in an almost directly north-south direction. It is of varying width, alternating along its length between narrow rural road and single carriageway. The road has a 30mph speed limit in proximity to both Pant-lasau and Rhyd-Y-Pandy, but increases to national speed limit in between the two settlements.

12.3.3 There are several other private roads in proximity to the Project Site, all of which are rural in nature. The local highway network is shown in Figure 12.1.

Junctions

12.3.4 Consideration will be given to the assessment of junctions within the area and will be identified in collaboration with CCS and South Wales Trunk Road Agent (SWTRA) at a later stage. An initial scoping assessment of junctions has identified the following three junctions as a preliminary focus for investigation (see Figure 12.2):

- M4 Roundabout Junction 46;
- A48/Pant-lasau Road; and
- Pant-lasau Road/Heol Maes Eglwys/Rhyd-Y-Pandy Road.

Road Safety and Collisions

12.3.5 An initial review of accident data shows that between 2009 and 2012, there was 1 accident on the Rhyd-Y-Pandy Road. This was a slight accident involving two vehicles and with one casualty. There were also four more slight accidents along the Pant-lasau Road within the same time period. One of these involved two vehicles, whilst the other three all had only one vehicle involved. All of them had one casualty.

12.3.6 There were also several accidents along the B4489 within this time period, however, none within close proximity to the Project Site or potential access routes.

12.3.7 There is a cluster of slight accidents at the M4 Junction 46 roundabout which will be expected at a junction of this type.

12.3.8 Figure 12.3 provides a summary of the accidents in the study area.

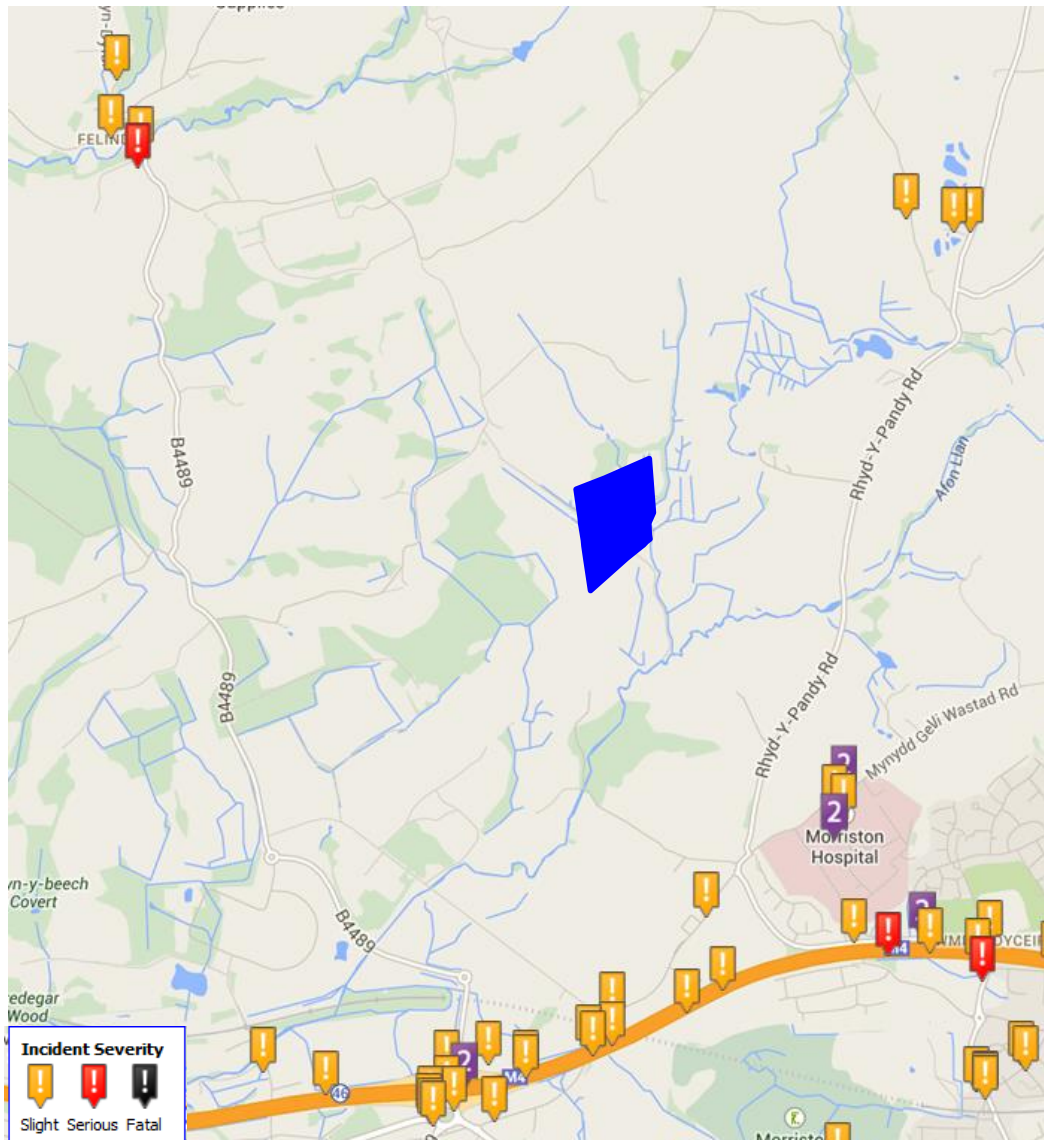


Figure 12.3: Road accidents in vicinity of Generating Equipment Site

- 12.3.9 The initial analysis of the accident records does not identify any abnormal results or clusters that are of concern. A further, more detailed collision assessment will be undertaken as part of the ES.

Pedestrian and Cycle Facilities

- 12.3.10 There is no pedestrian footway provision in close proximity to the Project Site. However, there is a footway provided on one side of the B4489, for approximately 1.2 km north of the M4 Junction 46 (see Figure 12.4).

- 12.3.11 There is no cycling infrastructure in place within the vicinity of the Project Site, except a short, local route which runs from the B4489 for approximately 1.5 km to the Pant-lasau Road (see Figure 12.5).

Bus Services

- 12.3.12 There is one bus route in the vicinity of the Project Site, although there are several other bus routes that pass through nearby villages (see Figure 12.6). The nearest bus stop is Lliw Reservoirs, approximately 0.25 km from the entrance of the Access Option 1. The next nearest bus stop is Taironen, which is approximately 1.5 km east of Access Option 1. Both are served by the 142 service provided by South Wales Transport, the route of which links Garnswllt to Swansea, Kingsway. The 141 service runs between Swansea and Garnswllt and passes south of the Project Site through Pant-lasau to Morriston Hospital.

Table 12.2: Bus Services

Service	Operator	Route	Frequency	First Service	Last Service
141	South Wales Transport	Morriston - Gorseinon	Irregular	0753	1650
		Gorseinon - Morriston		0728	1732
142	South Wales Transport	Swansea - Garnswllt	Irregular	1015	1750
		Garnswllt - Swansea		0909	1559

Rail Services

- 12.3.13 There are no train stations in close proximity to the Project Site. Llansamlet is the nearest railway station, approximately 5.5 km south east of the Project Site, and is accessible by private car from Junction 44 of the M4. However, Swansea station, whilst being an extra 2 km away, is an important local transport hub and is more easily accessible by public transport.
- 12.3.14 Rail services at Swansea station are managed by Arriva Trains Wales. There are four services daily from Swansea to Shrewsbury; an hourly service from Swansea to Manchester Piccadilly, which calls at Cardiff Central, and two/three services hourly from Swansea to Cardiff Central. First Great Western also provides services from Swansea to London Paddington, calling at Bristol.

12.4 Power Generation Plant Assessment

Construction/Decommissioning

- 12.4.1 Table 12.3 provides a summary of the likely effects of the Construction of the Power Generation Plant split into two potential access roads identified above. Decommissioning is likely to cause the same effects as that of construction, but goods are taken away from site rather than to site, therefore the impacts have been assessed together in Table 12.3.
- 12.4.2 The assumptions in relation to the assessment of significance are set out in paragraph 4.6.3.

Table 12.3: Findings of Preliminary Assessment of Effects of Power Generation Plant during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Power Generation Plant (Access Road – Option 1)				
Access road construction (improvement of existing road)	Temporary restriction of unclassified road that runs between Salem and Felindre during road works at junction with the access track to Abergelli Fach Farm	Access road construction (improvement of existing road)	Access maintained.	Assessment of traffic management options required.
Access road construction (construction of new road)	<p>Track crosses utilities and watercourses in the following locations:</p> <ul style="list-style-type: none"> • NTS Pipeline (Feeder 28) 2no. Pipes • NTS Pipeline (Feeder 28) 3no. Pipes <p>In addition, the track runs parallel to a Welsh water pipeline but does not cross the pipe. Over-run may cause disruption or require diversion of utilities/road alignment if not</p>	Access road construction (construction of new road)	Neutral	Further design and liaison with National Grid and other Utility Companies required.

	designed according to standards			
Construction worker traffic, consisting of cars and LGVs travelling to and from Project Site.	Increased car and LGV traffic levels on the unclassified road (north of the Project Site), the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Travel Plan measures to reduce the number of vehicles on the road network.	Slight/moderate increases in traffic	Further trip estimate, junction and link capacity assessment work will be undertaken in the ES.
HGV construction delivery traffic	Increased HGV traffic levels on the unclassified road name above, the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads – Construction Traffic Management Plan to be adopted.	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in slight effects during peak times	Construction Traffic Management Plan to be produced. Assessment of HGV numbers to be undertaken.
Abnormal load deliveries	Obstruction for normal vehicles and potential impact on street furniture	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival.	Slight effects e.g. disruption to the road network during off peak times	Construction Traffic Management Plan to be produced and access routes to be appraised to all sections of the Project Site.
Cycling Access	Existing cyclists will share road with construction traffic.	N/A	N/A	No further assessment
Public Transport	Construction vehicles will travel along Rhyd-Y-Pandy Road, bus 142 also uses this route.	N/A	N/A	No further assessment
Power Generation Plant (Access Road – Option 2)				

Access road construction (construction of new road)	<p>Track crosses utilities and watercourses in the following locations:</p> <ul style="list-style-type: none"> • 400kv Cable • Watercourse • HP LTS Pipeline • Watercourse <p>Over-run of existing gas pipes and other utilities may cause disruption or require diversion of utilities / road alignment if not designed according to standards</p>	Liaison with National Grid and Other Utility Companies to design an appropriate standard access road.	Neutral	Further design and liaison with National Grid and other Utility Companies required.
Construction worker traffic travelling to and from Project Site.	Increased car and LGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4.	Travel Plan measures to reduce the number of vehicles on the road network.	Slight/moderate increases in traffic	Further trip estimate, junction and link capacity assessment work will be undertaken in the ES.
HGV construction delivery traffic	Increased HGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4.	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads – Construction Traffic Management Plan to be adopted.	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in slight effects during peak times.	Construction Traffic Management Plan to be produced. Assessment of HGV numbers to be undertaken.
Abnormal load deliveries	Obstruction for normal vehicles and potential impact on street furniture	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival	Slight effects e.g. disruption to the road network during off peak times.	Construction Traffic Management Plan to be produced and Access routes to be appraised to all sections of the Project Site.

Cycle Access	Existing cyclists will share road with construction traffic.	N/A	N/A	No further assessment
Public Transport	No impact.	N/A	N/A	N/A

Operation

- 12.4.3 There is likely to be minimal impacts during the operation of the Power Generation Plant as operational staff numbers will be low (of the order of 15 full time employees) and the delivery and removal of goods to the Project Site are also expected to be very low.

Table 12.4: Findings of Preliminary Assessment of Effects of Power Generation Plant during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Power Generation Plant (Access Road – Option 1)				
Operational worker traffic travelling to and from Project Site	Low numbers of workers expected so negligible impact on surrounding road network.	Travel Plan measures to ensure workers have choices for travel.	Neutral effect on surrounding road network.	Further trip estimate, junction and link capacity assessment work will be undertaken in the ES.
Power Generation Plant (Access Road – Option 2)				
Operational worker traffic travelling to and from Project Site	Low numbers of workers expected so negligible impact on surrounding road network.	Travel Plan measures to ensure workers have choices for travel.	Neutral effect on surrounding road network	Further trip estimate, junction and link capacity assessment work will be undertaken in the ES.

12.5 Gas Connection Assessment

Construction/Decommissioning

- 12.5.1 The number of construction workers required to construct the Gas Connection Route will be low in relation to the Power Generation Plant. As such, there is likely to be limited impacts associated with additional trips on the network. There will be some additional traffic caused by the arrival and departure of construction workers and HGV's

delivering and removing goods from the corridor, however, this is anticipated to be low.

- 12.5.2 The decommissioning stage will generate very few vehicle movements, as it is likely that the Gas Connection will be left in situ. Some elements of the AGI may be removed, although there are not anticipated to be any impacts on the traffic network.

Table 12.5: Findings of Preliminary Assessment of Effects of Gas Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Gas Connection (Access Road – Option 1)				
Construction worker traffic travelling to and from Project Site	Minor increased car and LGV traffic levels on the unclassified road (north of the Project Site), the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46.	Travel Plan measures to reduce the number of car and LGV vehicles on the road network.	Minor/moderate increases in traffic.	Further trip estimate, junction and link capacity assessment work will be undertaken in the ES.
HGV construction delivery traffic	Increased HGV traffic levels on the unclassified road name above, the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46.	Delivery timings to be monitored to reduce impacts at peak times.	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in reduced impact during peak times.	Further trip estimate, junction and link capacity assessment work will be undertaken in the ES.

Abnormal Loads	Obstruction for normal vehicles and potential impact on street furniture.	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival and replaced once complete.	Minor planned disruption to the road network during off peak times.	Construction Traffic Management Plan to be produced and access routes to be appraised to site.
Cycling Access	Existing cyclists will share road with construction traffic.	N/A	N/A	No further assessment
Public Transport	Construction vehicles will travel along Rhyd-Y-Pandy Road, bus 142 also uses this route.	N/A	N/A	No further assessment
Gas Connection (Access Road – Option 2)				
Construction worker traffic travelling to and from Project Site	Increased car and LGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4.	Travel Plan measures to reduce the number of vehicles on the road network.	Minor/moderate increases in traffic.	Further trip estimate, junction and link capacity assessment work will be undertaken in the ES.
HGV construction delivery traffic	Increased HGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4.	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads – Construction Traffic Management Plan to be adopted.	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in slight effects during peak times.	Construction Traffic Management Plan to be produced. Assessment of HGV numbers to be undertaken.
Abnormal Loads	Obstruction for normal vehicles and potential	Abnormal load routing will be agreed with CCS	Minor planned disruption to the	Construction Traffic Management

	impact on street furniture.	officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival and replaced once complete.	road network during off peak times.	Plan to be produced and Access routes to be appraised to site.
Cycling Access	Existing cyclists will share road with construction traffic.	N/A	N/A	No further assessment
Public Transport	No impact	N/A	N/A	No further assessment

Operation

- 12.5.3 Maintenance vehicles are expected to be very infrequent and are not anticipated to cause any detriment to the local transport network. Table 12.6 identifies likely impacts associated with the operation of the Gas Connection.

Table 12.6: Findings of Preliminary Assessment of Effects of Gas Connection Impact during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Maintenance vehicles expected to be infrequent	Very low additional traffic on the network	None required	Neutral effect on surrounding road network	Further work to identify frequency of maintenance

12.6 Electrical Connection Assessment

Construction/Decommissioning

- 12.6.1 The number of construction workers required in the construction and decommissioning of the Electrical Connection will be low in relation to the Power Generation Plant. As such, there is likely to be limited impacts associated with additional trips on the network. There will be

some additional traffic caused by the arrival and departure of construction workers and HGV's delivering and removing goods from the corridor. The impacted roads will be either the B4489 or the Rhyd-Y-Pandy Road, the Pant-lasau Road and several other unclassified roads, depending on the access route chosen.

Table 12.8: Findings of Preliminary Assessment of Effects of Electrical Connection during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Electrical Connection (Access Road – Option 1)				
Construction worker traffic travelling to and from Project Site	Minor increased car and LGV traffic levels on the unclassified road (north of the Project Site), the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46.	Travel Plan measures to reduce the number of vehicles on the road network.	Minor/moderate increases in traffic	Further trip estimate, junction and link capacity assessment work will be undertaken in the ES.
HGV construction delivery traffic	Increased HGV traffic levels on the unclassified road name above, the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46.	Delivery timings to be monitored to reduce impacts at peak times.	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in reduced impact during peak times.	Further trip estimate, junction and link capacity assessment work will be undertaken in the ES.
Abnormal Loads	Obstruction for normal vehicles and potential impact on street furniture.	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and	Minor planned disruption to the road network during off peak times.	Construction Traffic Management Plan to be produced and Access routes to be appraised to site.

		adhered to and any street furniture is removed prior to arrival and replaced once complete.		
Cycling Access	Existing cyclists will share road with construction traffic.	N/A	N/A	No further assessment
Public Transport	Construction vehicles will travel along Rhyd-Y-Pandy Road, bus 142 also uses this route.	N/A	N/A	No further assessment
Electrical Connection (Access Road – Option 2)				
Construction worker traffic travelling to and from Project Site	Increased car and LGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4.	Travel Plan measures to reduce the number of vehicles on the road network.	Minor/moderate increases in traffic	Further trip estimate, junction and link capacity assessment work will be undertaken in the ES.
HGV construction delivery traffic	Increased HGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4.	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads – Construction Traffic Management Plan to be adopted.	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in slight effects during peak times.	Construction Traffic Management Plan to be produced. Assessment of HGV numbers to be undertaken.
Abnormal Loads	Obstruction for normal vehicles and potential impact on street furniture.	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is	Minor planned disruption to the road network during off peak times.	Construction Traffic Management Plan to be produced and Access routes to be appraised to site.

		removed prior to arrival and replaced once complete.		
Pedestrian Access	The proposed electrical connection crosses an existing pedestrian footpath. This may lead to the temporary closure of the footpath.	Temporary diversion routes.	Minor disruption to PRow.	Details of the temporary closure and diversion of the footpath to be detailed in the CTMP.
Cycling Access	Existing cyclists will share road with construction traffic.	N/A	N/A	No further assessment
Public Transport	No impact	N/A	N/A	No further assessment

Operation

12.6.2 Maintenance vehicles are expected to be infrequent and are not anticipated to cause any detriment on the local transport network. Access to the Electrical Connection Compound will be via the B4489.

Table 12.9: Findings of Preliminary Assessment of Effects of Electrical Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Specific Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Operational worker traffic travelling to the Electrical Connection.	Very low number of vehicles anticipated – limited impact on road network	Gated access to substation required	Neutral effect on surrounding road network	Further work to identify frequency of maintenance

12.7 Project (as a whole)

12.7.1 The effects for the project as a whole will be considered in the ES for the following criteria:

- Traffic flows;

- Delay;
- Road safety;
- Intimidation and fear;
- Severance; and
- Pedestrian amenity.

- 12.7.2 The assessment to date has shown that traffic generated by the Project will impact upon the surrounding road network, including key junctions at the interchange with the M4. Two smaller junctions may also be impacted upon depending on the final decision on the access route option. The level of impact will be assessed in the ES.

Construction/Decommissioning

- 12.7.3 The effects of the whole project will be assessed, with the Power Generation Plant, Gas Connection, and Electrical Connection each generating construction worker trips or HGV deliveries.

Operation

- 12.7.4 The potential effects predicted to arise from the Electrical Connection and the Gas Connection are not material in the context of the Power Generation Plant so the overall assessment for the Project as a whole is considered to be the same as for the Power Generation Plant. In turn, the potential effects resulting from the Power Generation Plant during the Operational process are negligible in comparison to the construction/decommissioning period and therefore the overall assessment for the Project as a whole is not considered to be worse than as for the construction/decommissioning phase set out above

12.8 Cumulative Effects

Construction/Decommissioning

- 12.8.1 The cumulative effect in terms of number of construction workers and therefore trips created by the simultaneous development of the Power Generation Plant, Gas Connection and Electrical Connection on traffic will be considered.

- 12.8.2 There will be an assessment of other developments in proximity to the Project Site that have the potential to result in detrimental cumulative effects on the transport and traffic. This will include both planned developments identified in Section 4.8 and those already under construction and the list of those to be considered will be agreed upon with the relevant authorities at a later date.

Operation

- 12.8.3 The cumulative effect in terms of number of operational workers and other future developments will be undertaken in the ES to determine the cumulative effects of operational traffic.

12.9 Summary and Conclusions

Table 12.10: Summary of Effects

	Receptor name and description	Potential Mitigation	Preliminary Assessment of Residual Effects
Power Generation Plant with Access Road – Option 1			
Construction / Decommissioning	Temporary restriction of unclassified road that runs between Salem and Felindre during road works at junction with Private Means of Access	Temporary Traffic Management allowing for one way traffic or Alternative Diversion Route provided.	Access maintained.
	Over-run of existing gas pipes and other utilities may cause disruption or require diversion of utilities / road alignment if not designed according to standards	Liaison with National Grid and Other Utility Companies to design an appropriate standard access road.	Neutral
	Increased car and LGV traffic levels on the unclassified road (north of the Project Site), the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Travel Plan measures to reduce the number of vehicles on the road network (see Chapter 2).	Slight/moderate increases in traffic
	Increased HGV traffic levels on the unclassified road named above, the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads – Construction Traffic Management Plan to be adopted (see Chapter 2)	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in slight effects during peak times.
	Obstruction for normal vehicles and potential impact on street	Abnormal load routing will be agreed with CCS officers and the	Slight effects from disruption to the road

	furniture during abnormal load deliveries.	SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival (see Chapter 2)	network during off peak times.
Operation	Low numbers of workers expected so negligible impact on surrounding road network	Travel Plan measures to ensure workers have choices for travel (see Chapter 2).	Neutral effect on surrounding road network
Power Generation Plant with Access Road – Option 2			
Construction / Decommissioning	Over-run of existing gas pipes and other utilities may cause disruption or require diversion of utilities / road alignment if not designed according to standards	Liaison with National Grid and Other Utility Companies to design an appropriate standard access road.	Neutral
	Increased car and LGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4	Travel Plan measures to reduce the number of vehicles on the road network (see Chapter 2)	Slight/moderate increases in traffic
	Increased HGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads – Construction Traffic Management Plan to be adopted (see Chapter 2).	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in minor effects during peak times
	Obstruction for normal vehicles and potential impact on street furniture during abnormal load deliveries.	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival (see Chapter 2).	Slight effects from disruption to the road network during off peak times
Operation	Low numbers of workers expected so negligible impact on surrounding road	Travel Plan measures to ensure workers have choices for travel (see Chapter	Neutral effect on surrounding road network

	network	2).	
Gas Connection with Access Road – Option 1			
Construction / Decommissioning	Minor increased car and LGV traffic levels on the unclassified road (north of the Project Site), the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Travel Plan measures to reduce the number of vehicles on the road network (see Chapter 2).	Slight/moderate increases in traffic
	Increased HGV traffic levels on the unclassified road named above, the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Delivery timings to be monitored to reduce impacts at peak times.	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in reduced effect during peak times
	Obstruction for normal vehicles and potential impact on street furniture during delivery of abnormal loads.	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival and replaced once complete.	Slight planned disruption to the road network during off peak times
Operation	Very low additional traffic on the network	None required.	Neutral effect on surrounding road network
Gas Connection with Access Road – Option 2			
Construction / Decommissioning	Increased car and LGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4	Travel Plan measures to reduce the number of vehicles on the road network (see Chapter 2).	Slight/moderate increases in traffic
	Increased HGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak

		– Construction Traffic Management Plan to be adopted (see Chapter 2).	times resulting in reduced effect during peak times
	Obstruction for normal vehicles and potential impact on street furniture during abnormal load deliveries.	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival and replaced once complete (see Chapter 2).	Minor planned disruption to the road network during off peak times
Operation	Very low additional traffic on the network	None required	Neutral effect on surrounding road network
Electrical Connection with Access Road – Option 1			
Construction / Decommissioning	Minor increased car and LGV traffic levels on the unclassified road (north of the Project Site), the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Travel Plan measures to reduce the number of vehicles on the road network (see Chapter 2).	Slight/moderate increases in traffic
	Increased HGV traffic levels on the unclassified road named above, the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Delivery timings to be monitored to reduce impacts at peak times (see Chapter 2).	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in reduced effect during peak times
	Obstruction for normal vehicles and potential impact on street furniture during delivery of abnormal loads	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival and replaced	Minor planned disruption to the road network during off peak times

		once complete (see Chapter 2).	
Operation	Very low number of vehicles anticipated – limited impact on road network	Gated access to substation required	Neutral effect on surrounding road network
Electrical Connection with Access Road – Option 2			
Construction / Decommissioning	Increased car and LGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4	Travel Plan measures to reduce the number of vehicles on the road network (see Chapter 2).	Slight/moderate increases in traffic
	Increased HGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads – Construction Traffic Management Plan to be adopted (see Chapter 2).	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in reduced effect during peak times
	Obstruction for normal vehicles and potential impact on street furniture during delivery of abnormal loads.	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival and replaced once complete (see Chapter 2).	Minor planned disruption to the road network during off peak times
Operation	Very low number of vehicles anticipated – limited impact on road network.	Gated access to substation required.	Neutral effect on surrounding road network
Project (as a whole) with Access Road – Option 1			
Construction / Decommissioning	Temporary restriction of unclassified road that runs between Salem and Felindre during road works at junction with Private Means of Access.	Temporary Traffic Management allowing for one way traffic or Alternative Diversion Route provided.	Access maintained.
	Over-run of existing gas pipes and other	Liaison with National Grid and Other Utility	Neutral

	utilities may cause disruption or require diversion of utilities / road alignment if not designed according to standards.	Companies to design an appropriate standard access road.	
	Increased car and LGV traffic levels on the unclassified road (north of the Project Site), the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Travel Plan measures to reduce the number of vehicles on the road network (see Chapter 2).	Slight/moderate increases in traffic
	Increased HGV traffic levels on the unclassified road named above, the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads – Construction Traffic Management Plan to be adopted (see Chapter 2).	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in slight effects during peak times
	Obstruction for normal vehicles and potential impact on street furniture during abnormal load deliveries.	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival.	Slight effects from disruption to the road network during off peak times
Operation	<u>Operational worker traffic travelling to and from Project Site –</u> Low numbers of workers expected so negligible impact on surrounding road network	Travel Plan measures to ensure workers have choices for travel (see Chapter 2).	Neutral effect on surrounding road network
Project (as a whole) with Access Road – Option 2			
Construction / Decommissioning	Over-run of existing gas pipes and other utilities may cause disruption or require diversion of utilities / road alignment if not designed according to	Liaison with National Grid and Other Utility Companies to design an appropriate standard access road.	Neutral

	standards		
	Increased car and LGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4	Travel Plan measures to reduce the number of vehicles on the road network (see Chapter 2).	Slight/moderate increases in traffic
	Increased HGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads – Construction Traffic Management Plan to be adopted (see Chapter 2).	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in slight effects during peak times
	Obstruction for normal vehicles and potential impact on street furniture during abnormal load deliveries.	Abnormal load routing will be agreed with Swansea City and County Council officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival	Slight effects from disruption to the road network during off peak times
Operation	Low numbers of workers expected so negligible impact on surrounding road network	Travel Plan measures to ensure workers have choices for travel (see Chapter 2).	Neutral effect on surrounding road network
Cumulative Effects with Access Road – Option 1			
Construction / Decommissioning	Temporary restriction of unclassified road that runs between Salem and Felindre during road works at junction with Private Means of Access	Temporary Traffic Management allowing for one way traffic or Alternative Diversion Route provided (see Chapter 2).	Access maintained.
	Over-run of existing gas pipes and other utilities may cause disruption or require diversion of utilities / road alignment if not designed according to standards	Liaison with National Grid and Other Utility Companies to design an appropriate standard access road.	Neutral
	Increased car and LGV traffic levels on the unclassified road (north of the Project Site), the	Travel Plan measures to reduce the number of vehicles on the road network (see	Slight/moderate increases in traffic

	Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Chapter 2).	
	Increased HGV traffic levels on the unclassified road named above, the Rhyd-Y-Pandy road and the Pant-lasau road, as well as the associated junctions. Increased traffic at M4 Junction 46	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads – Construction Traffic Management Plan to be adopted (see Chapter 2).	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak times resulting in slight effects during peak times
	Obstruction for normal vehicles and potential impact on street furniture during abnormal road deliveries.	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival (see Chapter 2).	Slight effects from disruption to the road network during off peak times
Operation	Low numbers of workers expected so negligible impact on surrounding road network	Travel Plan measures to ensure workers have choices for travel (see Chapter 2).	Neutral effect on surrounding road network
Cumulative Effects with Access Road – Option 2			
Construction / Decommissioning	Over-run of existing gas pipes and other utilities may cause disruption or require diversion of utilities / road alignment if not designed according to standards	Liaison with National Grid and Other Utility Companies to design an appropriate standard access road.	Neutral
	Increased car and LGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4	Travel Plan measures to reduce the number of vehicles on the road network (see Chapter 2).	Slight/moderate increases in traffic
	Increased HGV traffic levels on the B4489 as well as the associated junctions, including Junction 46 of the M4	Delivery timings to be monitored to reduce impacts on congestion issues on the surrounding roads	Depending on the results of the monitoring, HGV traffic could arrive and depart during off peak

		– Construction Traffic Management Plan to be adopted (see Chapter 2).	times resulting in slight effects during peak times
	Obstruction for normal vehicles and potential impact on street furniture during abnormal load deliveries.	Abnormal load routing will be agreed with CCS officers and the SWTRA. This will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival (see Chapter 2).	Slight effects from disruption to the road network during off peak times
Operation	Low numbers of workers expected so negligible impact on surrounding road network	Travel Plan measures to ensure workers have choices for travel (see Chapter 2).	Neutral effect on surrounding road network

13 ARCHAEOLOGY AND CULTURAL HERITAGE

13.1 Introduction

13.1.1 This chapter provides the Archaeology and Cultural Heritage preliminary environmental assessment of the proposed Abergelli Power Project based upon assessment carried out up to September 2014. The Project is set out in Chapter 2 which forms the primary basis for the assessment carried out to date.

13.1.2 The following factors have specifically been taken account of in this preliminary assessment: the extent of the Power Generation Plant's footprint; the height of the stacks; the route and installation of the Gas Connection and Electrical Connection; and the route of the Access Road options.

13.1.3 There is no embedded mitigation identified in relation to archaeology and cultural heritage.

13.2 Approach

Relevant Policy and Guidance

13.2.1 The archaeology assessment in the PEIR has taken account of planning policy and guidance set out in Section 3 and in paragraph 13.3.2 below.

13.3 Assessment Methodology

13.3.1 A Desk Based Assessment (DBA) has been undertaken in consultation with Cadw who has made the following recommendations regards the methodology;

- Data searches should include aerial photographs as held by Central Register of Air Photography for Wales and also LiDAR information held by NRW;
- Photographs from each asset towards the development site should be produced;
- Where it is clear that an adverse effect will occur than a photomontage should be produced;
- The Setting Assessment should consider those designated assets within a 5 km Study Area;
- Tranquillity should be considered in the Setting Assessment.

13.3.2 The DBA included the following searches:

- The Royal Commission on Ancient and Historical Monuments Wales which is the investigative body and national archive for the historic environment of Wales and hosts an online search facility (Coflein);
- Swansea Historic Environment Record (HER) (which includes records of any previous archaeological interventions within the Scheme Area). The HER will also include details of Registered Parks and Gardens, Listed Buildings and Registered Battlefields;
- Aerial photographs as held by Central Register of Air Photography for Wales and LiDAR information held by National Resources Wales.
- Historic Mapping; and
- Conservation Areas and Historic Landscape Characterisation.

- 13.3.3 The DBA has been undertaken in accordance with Standard and Guidance for Historic Environment Desk-based Assessment⁷⁹. Furthermore, the assessment has been carried out in accordance with the relevant professional guidelines - Institute for Archaeologists (IfA)⁸⁰, English Heritage⁸¹ and Glamorgan-Gwent Archaeological Trust (GGAT⁸²). The assessment of setting has been undertaken in accordance with English Heritage guidelines⁸³ (see section 13.2.39).
- 13.3.4 The assessment has been undertaken by a Member of the Institute for Archaeologists (IfA).
- 13.3.5 Searches have been limited to 1 km (Inner Study Area) from the Project Site for HER entries for archaeology as the Project has the potential to impact on archaeological remains within the Project Site and the immediate surroundings.
- 13.3.6 As part of the DBA, a site inspection was undertaken of the Project Site to identify any previously unknown heritage assets or to assess the condition of known assets. During the site inspection a detailed photographic record was created and an assessment of the setting of the cultural heritage assets was undertaken.
- 13.3.7 In order to gather baseline cultural heritage setting data, and to undertake an assessment of the potential effects that the Project Site may have on the setting of any above ground remains, selected cultural

⁷⁹ Institute for Archaeologists, 2012, Standard and Guidance for Historic Environment Desk-based Assessment

⁸⁰ IfA, 2013 Code of Conduct, Reading

⁸¹ English Heritage, 2006 Management of Research Projects in the Historic Environment: The MoRPHE Project Managers' Guide, Swindon

⁸² GGAT 2007, Notes for archaeologists undertaking desk-based studies in south-east Wales

⁸³ English Heritage, 2011 'The Setting of Heritage Assets'

heritage assets were visited. This followed an initial study making reference to the results of desk-based research, and the ZTV including searches of the records listed above. Both the asset and its surrounding area was been visited to identify locations that might be relevant to the asset's setting.

13.3.8 In accordance with recommendations made by Cadw (see section 13.3.1), the Setting Assessment considers those designated Heritage Assets within a 5 km (Outer Study area) from the Project Site.

13.3.9 For the purposes of the setting assessment, the following cultural heritage assets (Heritage Assets) have been considered:

- Scheduled Monuments;
- Listed Buildings;
- Registered Parks and Gardens;
- World Heritage Sites; and
- Any other non-designated building [/structure] which is considered to be important in terms of cultural heritage and archaeological significance.

Visibility Maps

13.3.10 Archaeology and Cultural Heritage have used the same ZTV map as the LVIA as a tool in assessing the likely inter-visibility and line of sight between the Project and heritage assets.

13.3.11 Whilst this is consistent with the overall approach taken to assess the realistic worst case scenario and, the use of this type of ZTV map is considered good practice, a ZTV map does not present an absolute measure of visibility or the 'visual impact' of the Project. It is recognised best practice by approved public consultees to include those designated heritage assets that lie within and just outside the ZTV. The setting assessment considered the impact of the Project upon all designated cultural heritage assets that lie within a 5 km radius from the Project Site. This includes any such assets within the 1 km inner study area (see paragraph 13.3.5).

13.3.12 The following factors were also considered to be relevant when assessing impacts upon setting:

- Visual dominance;
- Scale;
- Intervisibility;

- Vistas and sight lines;
- Movement and light; and
- Unaltered settings.

13.3.13 At this stage, no intrusive investigations are proposed for cultural heritage or archaeological purposes, although this will be agreed with the CCS Planning Archaeologist and representative of GGAT or Cadw. Should intrusive investigations be necessary, the scope will be agreed with the Planning Archaeologist through a Written Scheme of Investigation (WSI).

Significance Criteria

13.3.14 The IfA⁸⁴ considers that an assessment of the significance of heritage assets should include archaeological, historic, architectural and artistic interests pertaining to the asset. It should identify the potential impact of proposed or predicted changes on the significance of the asset and the opportunities for reducing that impact. Additionally, this significance may derive not only from its physical presence but also from its setting and relies heavily upon English Heritage's 'The Setting of Heritage Assets'⁸⁵.

13.3.15 English Heritage presents a set of heritage values in their guidance document 'Conservation Principles, Policies and Guidance'⁸⁶: aesthetic, communal, historic and evidential, which is the approach adopted for analysing significance in this document. Additionally, and in order to consider the archaeological and historic significance in particular, an additional set of criteria are employed which relate to the Secretary of State's criteria for assessing the national importance of monuments, as contained in Annex 1 of the policy statement on scheduled monuments produced by the Department of Culture, Media, and Sport ⁸⁷. These criteria relate to period, rarity, documentation, group value, survival/condition, fragility/vulnerability, diversity, and potential.

13.3.16 In accordance with the Design Manual for Roads and Bridges⁸⁸, which is widely adopted by heritage professionals as a standard for the quantification of magnitude and impact assessment, the sensitivity, value or importance of the Heritage Asset is judged in a neighbourhood, local, regional, national and international context. It should be stressed that enhancements were made to the criteria more appropriate to archaeology and cultural heritage. Furthermore, professional judgement was applied throughout the assessment process which results in the

⁸⁴ Institute for Archaeologists, 2012 Standard and Guidance for Historic Environment Desk-based Assessment

⁸⁵ English Heritage, 2011 The Setting of Heritage Assets, London

⁸⁶ English Heritage, 2008 Conservation Principles, Policies and Guidance, Swindon

⁸⁷ DCMS, 2010 Annex 1: Scheduled Monuments, London

⁸⁸ DMRB, 2007 Cultural Heritage, Vol II, Section 3, Part 2, London

cultural sensitivity of the asset being determined along with the appropriate form of mitigation (Table 13.1, below).

Table 13.1: Criteria used to determine Importance of Heritage

Assets

Cultural value /Sensitivity	Criteria	Mitigation
Very high (international)	World Heritage Sites; Sites of International Importance.	To be avoided
High (National)	Scheduled Monuments; All Listed Buildings; Registered Parks and Gardens.	To be avoided
Medium (Regional/County)	Conservation Areas containing buildings that contributes significantly to its historic character; Areas of Archaeological Importance; Locally listed buildings.	Avoidance recommended
Low (Local/Borough)	Archaeological sites and remains with a local or borough interest for education, cultural appreciation, locally listed buildings; Assets which contribute to local or cultural understanding of the area.	Avoidance recommended
Negligible (Neighbourhood)	Relatively numerous types of remains, of some local importance; Isolated findspots with no context; Areas in which investigative techniques have revealed no, or minimal, evidence of archaeological remains, or where previous large-scale disturbance or removal of deposits can be demonstrated.	Avoidance not envisaged
Uncertain/Potential	Potential archaeological sites for which there is little information. It may not be possible to determine the importance of the site based on current knowledge. Such sites are likely isolated findspots, place names or cropmarks identified on aerial photographs.	Avoidance unnecessary

13.3.17 Table 13.1 is a general guide to the attributes of Heritage Assets and it should be noted that not all the qualities listed need be present in every case and professional judgement is used in balancing the different criteria.

13.3.18 In order to assess the potential impact of the Project on built heritage or buried archaeological remains, consideration has been afforded to (where relevant):

- Assessing in detail any impact and the significance of the effects arising from the construction and operation of the Project;
- Reviewing the evidence for past impacts that may have affected the archaeological sites of interest identified during the desk-based assessment; and
- Outlining suitable mitigation measures, where possible at this stage, to avoid, reduce, or remedy adverse effects.

13.3.19 Each potential impact has been determined as the predicted deviation from the baseline conditions, in accordance with current knowledge of the Project Site and the Project. The impact is assessed in terms of the sensitivity or value of the Heritage Asset and the magnitude of change or potential scale of impact during the Project. The magnitude, or scale of an impact is often difficult to define, but will be termed as substantial, moderate, minor, or negligible, as shown in Table 13.2, below.

Table 13.2: Criteria used to determine Scale of Impact

Magnitude of Impact	Description
Substantial	Significant change in environmental factors; Complete destruction of the site or feature; Change to the site or feature resulting in a fundamental change in ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.
Moderate	Significant change in environmental factors; Change to the site or feature resulting in an appreciable change in ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.
Minor	Change to the site or feature resulting in a small change in our ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.
Negligible	Negligible change or no material changes to the site or feature. No real change in our ability to understand and appreciate the resource and its cultural heritage or archaeological value/historical context and setting.

13.3.20 The interaction of the potential scale of impact (Table 13.2) and the importance of the Heritage Asset (Table 13.1) produce the effect's significance. This may be calculated by using the matrix shown in Table 4.3.

13.3.21 As there is currently no set procedure for the assessment of impact on setting within Wales, guidelines published by English Heritage have

been used. The definition of setting used here is taken from the NPPF⁸⁹: “setting is the surroundings in which an asset is experienced. Its extent is not fixed and may change as the asset and its surrounding evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral”. Furthermore, the Cadw document ‘Conservation Principles for the Sustainable Management of the Historic Environment in Wales’⁹⁰ states that setting also relates to the asset’s local context, embracing present and past relationships to the adjacent landscape. English Heritage considers that the significance of a heritage asset derives not only from its physical presence and historic fabric, but also from its setting – the surrounding within which it is experienced.

13.3.22 English Heritage in its guidance document, ‘The Setting of Heritage Assets’⁹¹ has provided a stepped approach to the assessment of significance of setting to heritage assets. Following the initial identification of the heritage asset(s) and associated setting the following steps comprise:

- Assessing whether, how and to what degree the settings make a contribution to the significance of the heritage assets;
- Assessing the effect of the development on the setting, and the resulting implications for the significance of the heritage asset(s); and
- Maximising enhancement and minimising harm (mitigation).

13.3.23 In assessing whether, how and to what degree the settings make a contribution to the significance of the heritage assets, a number of potential attributes of a setting may help in determining its significance. These are presented in Table 13.3 below.

Table 13.3: Determining the contribution of setting to the significance of the Heritage Asset(s)

Magnitude of Impact
Description
<p>The asset’s physical surroundings:</p> <ul style="list-style-type: none"> • Topography; • Other heritage assets (archaeological remains, buildings, structures, landscapes, areas or archaeological remains); • Definition, scale and ‘grain’ of surrounding streetscape, landscape and spaces; • Historic materials and surfaces; • Land use;

⁸⁹ Department for Communities and Local Government, 2012 National Planning Policy Framework

⁹⁰ Cadw, 2011 ‘Conservation Principles for the Sustainable Management of the Historic Environment in Wales’

⁹¹ English Heritage, 2011 ‘The Setting of Heritage Assets’

- Openness, enclosure and boundaries; functional relationships and communications;
- Green spaces, trees and vegetation;
- History and degree of change over time;
- Integrity;
- Issues, such as soil chemistry and hydrology.

Experience of the asset:

- Surrounding landscape and town character;
- Views from, towards, through and across, including the asset;
- Visual dominance, prominence or role as focal point;
- Intentional intervisibility with other historic and natural features;
- Noise, vibration and other pollutants and nuisances;
- Tranquillity, remoteness, 'wildness';
- Sense of enclosure, seclusion, intimacy or privacy;
- Dynamism and activity;
- Accessibility, permeability and patterns of movement;
- Degree of interpretation or promotion to the public;
- The rarity of comparable survivals of setting.

The asset's associative attributes:

- Associative relationships between heritage assets;
- Cultural associations;
- Celebrated artistic representations;
- Traditions.

13.3.24 Having assessed the contribution of the setting to the significance of the asset, the effect of a development on the setting can be determined by consideration of the potential attributes of the development affecting setting. These are outlined in Table 13.4 below.

Table 13.4 Potential attributes of the Project

Attribute	Factors to consider
Location and siting of the development	<ul style="list-style-type: none"> • Proximity to asset; • Extent; • Position in relation to landform; • Degree to which location will physically or visually isolate asset; • Position in relation to key views
The form and appearance of the development	<ul style="list-style-type: none"> • Prominence, dominance, or conspicuousness; • Competition with or distraction from the asset; • Dimensions, scale and massing; • Proportions; • Visual permeability; • Materials (texture, colour, reflectiveness, etc); • Architectural style or design; • Introduction of movement or activity; • Diurnal or seasonal change

Other effects of the development	<ul style="list-style-type: none"> • Change to built surroundings and spaces; • Change to skyline; • Noise, odour, vibration, dust, etc; • Lighting effects and 'light spill'; • Change to general character (e.g. suburbanising or industrialising); • Change to public access, use or amenity; • Change to land use, land cover, tree cover; • Changes to archaeological context, soil chemistry or hydrology; • Changes to communications/accessibility/permeability
Permanence of the development	<ul style="list-style-type: none"> • Anticipated lifetime/temporariness; • Recurrence; • Reversibility
Longer term or consequential effects of the development	<ul style="list-style-type: none"> • Changes to ownership arrangements; • Economic and social viability; • Communal and social viability

13.3.25 Once the contribution of the setting has been determined and the potential attributes of the Project upon it have been identified, the contribution needs to be evaluated in order to determine the magnitude of the impact. This is undertaken using the definitions presented in Table 13.5 below.

Table 13.5: Definitions of Sensitivity for the Settings of Heritage Assets

Sensitivity	Contribution to significance of the asset	Examples for settings
Very high	Very substantial	A defined setting that is contemporary with and historically and functionally linked with the heritage asset, may contain other heritage assets of international or national importance, has a very high degree of intervisibility with the asset and makes a very substantial contribution to both the significance of the heritage asset and to the understanding and appreciation of the significance of the asset.
High	Substantial	Contemporary with and historically and functionally linked with the heritage asset, with minor alterations (in extent and/or character), has a high degree of intervisibility with the asset and which makes a substantial contribution to both the significance of the heritage asset and to the understanding and appreciation of the significance of the asset.

Sensitivity	Contribution to significance of the asset	Examples for settings
Medium	Moderate	Contemporary with and/or historically and/or functionally linked with the heritage asset but with alterations which may detract from the understanding of the heritage asset, and/or with a moderate degree of intervisibility with the asset and/or which makes a moderate contribution to the significance of the heritage asset and/or a moderate contribution to the understanding and appreciation of the significance of the asset.
Low	Minor	Largely altered so that there is very little evidence of contemporaneous and/or historic and/or functional links with the heritage asset, and/or with a low degree of intervisibility with the asset and/or which makes a minor contribution to both the significance of the heritage asset and to the understanding and appreciation of the significance of the asset.

13.3.26 Changes may occur in the surroundings of an asset that neither affects their contribution to the significance of the asset, nor the extent to which its significance can be experienced. In such instances it will be considered that there is no impact upon setting.

13.3.27 The criteria for assessing the magnitude of direct impacts on setting are presented below (Table 13.6). The sensitivity of a heritage asset to changes in its setting can be evaluated in the first instance by reference to any relevant designation, whereby those designated as internationally important will generally be considered the most sensitive. At the other end of the scale assets that are imperceptible or very difficult to perceive on the ground will generally be less sensitive than those that are more readily appreciable as they are to some extent already divorced from their setting.

Table 13.6: Criteria for Assessment of Magnitude of an Impact on the Setting of a Heritage Asset

Magnitude	Guideline Criteria
Major beneficial	The contribution of setting to the cultural heritage asset's significance is considerably enhanced as a result of the development; a lost relationship between the asset and its setting is restored, or the legibility of the relationship is greatly enhanced. Elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance are removed.

Magnitude	Guideline Criteria
Moderate beneficial	The contribution of setting to the cultural heritage asset's significance is enhanced to a clearly appreciable extent as a result of the development; as a result the relationship between the asset and its setting is rendered more readily apparent. The negative effect of elements of the surroundings that detract from the asset's cultural heritage significance or the appreciation of that significance is appreciably reduced.
Minor beneficial	The setting of the cultural heritage asset is slightly improved as a result of the development, slightly improving the degree to which the setting's relationship with the asset can be appreciated.
Negligible	The setting of the cultural heritage asset is changed by the development in ways that do not alter the contribution of setting to the asset's significance.
Minor adverse	The contribution of the setting of the cultural heritage asset to its significance is slightly degraded as a result of the development, but without adversely affecting the interpretability of the asset and its setting; characteristics of historic value can still be appreciated, the changes do not strongly conflict with the character of the site, and could be easily reversed to approximate the pre-development conditions.
Moderate adverse	The contribution of the setting of the cultural heritage asset to its significance is reduced appreciably as a result of the development. Relevant setting characteristics can still be appreciated but less readily.
Major adverse	The contribution of the setting of the cultural heritage asset to its significance is effectively lost or substantially reduced as a result of the development, the relationship between the asset and its setting is no longer readily appreciable.

Limitations

- 13.3.28 This preliminary assessment is based on the Project as presented at the time of compiling this report. Changes to the Project and any additional technical data made available will be considered as the assessment progress. Any comments received on the preliminary findings of the assessment from the appropriate Planning Archaeologist should also be taken into consideration for future assessment or investigations. Furthermore, the accuracy of the baseline data as supplied by recognised and approved organisations will not be questioned.

Consultation and Consultation Responses

- 13.3.29 Appendix 4.1 provides a summary of scoping responses and set out the actions that have been undertaken, or will be undertaken to address

them.

13.4 Baseline Conditions and Receptors

13.4.1 The Heritage Assets referred to in this Section are shown in Figure 13.1 and 13.2.

13.4.2 No designated Heritage Assets have been identified within the Project Site. The following designated assets have been located within the 5 km outer Study Area:

- Clydach Upper Forge Scheduled Monument;
- Landore New Quay Scheduled Monument;
- Gwernllwynchwyth Engine House Scheduled Monument;
- Garn Goch Round Barrow Scheduled Monument;
- Llangyfelach Cross Base Scheduled Monument;
- Morris Castle Scheduled Monument;
- Mynydd Pysgodlyn Round Barrow Scheduled Monument;
- Ring Cairn on Craig Fawr Scheduled Monument;
- Pant-y-Ffa Round Cairn Scheduled Monument;
- Remains of Astronomical Observatory at Penllergaer Scheduled Monument;
- Cae Castell (Rhyndwyclydach Medieval Earthwork) Scheduled Monument;
- Ring Cairn on Tor Clawdd Scheduled Monument;
- Scott's Pit Engine House and Traces of Ancillary Buildings Scheduled Monument;
- Mynydd Carn-Goch Roman Earthworks Scheduled Monument;
- Earthwork 1,080 m NNW of Fforest Newydd Scheduled Monument;
- Penllergaer Orchideous House Scheduled Monument;
- Townshend's Great Leat & Waggonway Scheduled Monument;
- Capel Tabernacl, Woodfield Street (East side) Grade I Listed Building;
- The Water Mill/Melin Felindre Grade II* Listed Building;
- New Siloh (Seilo Newydd) Congregational Chapel including gates and railings Grade II* Listed Building;

- Capel Gellionnen (Gellionnen and Graig Unitarian Church) Grade II* Listed Building;
- Church of St David and St Cyfelach Grade II* Listed Building;
- Tower of Church of St David and St Cyfelach Grade II* Listed Building;
- The Equatorial Observatory, Penllergare Grade II* Listed Building;
- Scott's Pit Engine House Grade II* Listed Building;
- Penllergaer Grade II Historic Park and Garden;
- Cwmgelli Cemetery Grade II Historic Park and Garden;
- Parc Llewelyn Grade II Historic Park and Garden;
- Morriston Conservation Area; and
- LLansamlet Conservation Area.

13.4.3 In addition there are 47 Grade II Listed Buildings within the 5 km outer Study Area.

13.4.4 Five non-designated Heritage Assets have been identified within the Project Site and their importance (value) assessed in accordance with the DMRB criteria outlined in Table 13.1:

- HA11 (Quarry); an Industrial period site of a quarry situated within Mawr. First identified on 1896-97 OS mapping, the asset is depicted as a 'Gravel Pit' to the south west of Aber-gelli-fach (HA29). The site of asset has since been redeveloped. The asset is considered to be of low (local) value;
- HA29 (Aber-gelli-fach); an Industrial period site of an extensive farmstead first identified on the Map of Glamorgan (1799). The site may have earlier origins. The farmstead has since been demolished and replaced with two modern residential buildings. The asset is considered to be of low (local) value;
- HA30 (Aber-gelli-fawr); an Industrial period site of a farmstead first identified on 2":1 mile maps of Glamorgan and Monmouthshire (1812-14). The farmstead has been demolished and the plot remains empty. The asset is considered to be of low (local) value;
- HA31 (possible ancient field boundary): Field boundary with stoned foundations located immediately north of HA29. First

identified 2":1 mile maps of Glamorgan and Monmouthshire (1812-14), indicating it may have earlier origins. The asset is considered to be of medium (regional) value; and

- HA32 (Aber-gelli Colliery); Standing remains of Modern period colliery buildings located 50m north of Aber-gelli-fach (HA29). First identified on 1935-1938 OS mapping. The asset is considered to be of medium (regional) value.

13.5 Power Generation Plant Assessment

Construction/Decommissioning

13.5.1 Table 13.7 sets out the findings of the preliminary assessment of effects of the Power Generation Plant on all Heritage Assets identified in Section 13.3 during construction. No impacts are envisaged during the decommissioning phase; therefore this element of the assessment has been scoped out.

Table 13.7: Findings of Preliminary Assessment of Effects of Power Generation Plant during Construction

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment and Laydown Area				
Undesignated Heritage Asset (HA31) comprising potential ancient field boundary	Ground disturbance required during the construction of the Power Generation Plant is likely to have an adverse effect upon HA31.	Avoid asset or if avoidance is not possible then A survey of the field boundary should be carried out prior to impact and the asset reinstated on completion of excavation.	Effects are anticipated to be neutral	No further actions required

Hitherto unknown below-ground archaeological Remains	Significant ground disturbance during construction is likely to disturb or destroy any surviving below ground archaeological remains.	Should any archaeological remains be found during construction, work will be halted and advice sought from the Planning Archaeologist. Where necessary, recommendations will be made for a mitigation strategy to preserve in-situ or if not practicable to preserve by record any significant archaeological assets.	Effects are anticipated to be neutral	No further actions required
Access Road – Option 1				
Undesignated Heritage Asset (HA32) comprising standings buildings associated with Aber-gelli Colliery	It is envisaged that the original access (via a north-south aligned lane) to the colliery will be used to transport construction equipment and materials to and from the Project Site. There is therefore a risk of a moderate/large adverse impact upon the colliery buildings	The colliery buildings should be demarcated on the ground prior to the use of the lane for construction traffic to avoid harm to the asset	Effects are anticipated to be neutral	No further actions required
Access Road – Option 2				
None	No impact envisaged at this stage of the Assessment	No mitigation required	No effect	No further actions required

Operation

- 13.5.2 Table 13.8 sets out the findings of the preliminary assessment of effects of the Power Generation Plant on Heritage Assets identified in Section 13.3 during operation.

Table 13.8: Findings of Preliminary Assessment of Effects of Power Generation Plant during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Specific Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Generating Equipment				
Scheduled Monument GM353 Ring Cairn on Tor Clowdd; Scheduled Monument GM299 Llangyfelach Cross Base; socketed base of pillar cross standing in Llangyfelach church yard Grade II* Listed Building 26236 Tower of Church of St David and St Cyfelach, Llangyfelach; A medieval tower of a former church located within Llangyfelach churchyard. Grade II* Listed Building 26235 The Church of St David and St Cyfelach, Llangyfelach; a nineteenth century church located in	The Project Site is located 5.16 km south of GM353 and 2.3 km north of GM99, LB26236 and LB26235. The proposed Power Generation Plant is likely to be seen from the assets at a distance. However, the addition of a power related development to a landscape that is already dominated by this sector will have a minimal impact upon the setting of these heritage assets.	No mitigation required	Effects are anticipated to be neutral	No further actions required

Llangyfelach churchyard.				
Access Road – Option 1				
No impact envisaged at this stage of the Assessment	No impact envisaged at this stage of the Assessment	No mitigation required	No effect	No further actions required
Access Road – Option 2				
No impact envisaged at this stage of the Assessment	No impact envisaged at this stage of the Assessment	No mitigation required	No effect	No further actions required

13.6 Gas Connection Assessment

Construction/Decommissioning

13.6.1 Table 13.9 sets out the findings of the preliminary assessment of effects of the Gas Connection on Heritage Assets identified in Section 13.3 during construction. No impacts are envisaged during the decommissioning phase; therefore this element of the assessment has been scoped out.

Table 13.9: Findings of Preliminary Assessment of Effects of Gas Connection during Construction

Receptor name and description	Preliminary Assessment of Impacts	Potential Specific Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Undesignated Heritage Asset (HA31) comprising potential ancient field boundary	If the Gas Connections was routed through this asset, there will be a moderate/major adverse impact caused by the destruction of all or part of this asset	Avoid asset or if avoidance is not possible then; a photographic survey should be carried out prior to impact and the asset reinstated on completion of the works.	Effects are anticipated to be neutral.	No further actions required

Hitherto unknown archaeological remains	Significant ground disturbance during construction is likely to disturb or destroy any surviving below ground archaeological remains.	Should any archaeological remains be found during construction, work will be halted and advice sought from the Planning Archaeologist. Where necessary, recommendations will be made for a mitigation strategy to preserve in-situ or if not practicable to preserve by record any significant archaeological assets.	Effects are anticipated to be neutral.	No further actions required
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Operation

13.6.2 There will be no impact upon Heritage Assets during this phase.

13.7 Electrical Connection Assessment

Construction/Decommissioning

13.7.1 Table 13.10 sets out the findings of the preliminary assessment of effects of the Electrical Connection on Heritage Assets identified in Section 13.3 during construction. No impacts are envisaged during the decommissioning phase; therefore this element of the assessment has been scoped out.

Table 13.10: Findings of Preliminary Assessment of Effects of Electrical Connection during Construction

Receptor name and description	Preliminary Assessment of Impacts	Potential Specific Mitigation	Potential Residual Effects	Further assessments and consultation to be undertaken
Hitherto unknown	Significant ground disturbance during	Should any archaeological remains be found	Effects are anticipated to be	No further actions required

archaeological remains	construction is likely to disturb or destroy any surviving below ground archaeological remains	during construction, work will be halted and advice sought from the Planning Archaeologist. Where necessary, recommendations will be made for a mitigation strategy to preserve in-situ or if not practicable to preserve by record any significant archaeological assets.	neutral.	
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Operation

13.7.2 There will be no impact upon Heritage Assets during this phase.

13.8 Project (as a whole)

13.8.1 The effects of the Project as whole will be the same as described for the Power Generation Plant and the Gas Connection.

13.9 Cumulative Effects

Construction/Decommissioning

13.9.1 The development of the Project or other planned developments identified in Section 4.8 are not anticipated to have any significant cumulative effects as they will not likely create a larger impact upon standing or below ground archaeological remains than the individual projects taken in isolation. The level of effects are comparable with the conclusions reached in the Landscape Chapter (Section 11.7) and are as follows;

- Construction of the Mynydd y Gwair Wind Farm is occurring 6 km from the Project and is not within the ZTV. The proposed development is unlikely to be noticeable in and around or in combination with the Project Site. The area identified for the wind farm is not within the Zone of Visual Influence for the Project. Preliminary viewpoint pVP6 (see Figure 11.2) is located on the northern side of the wind farm and as it is expected that the Project

Site will be out of view from this location, there will be no cumulative effects from viewpoints in the north. Views from the south looking northwards to the Project Site will have the wind farm as a backdrop. The addition of the stacks associated with the Project will increase the amount of utility infrastructure in the view. However, these are different types of vertical structures (stacks/wind turbine) and will be perceived as different types of development in the landscape. It is expected that there will be some cumulative visual effects on viewpoints south of the Project Site.

- The Felindre Business Park is currently under construction and is therefore likely to be complete before the construction of the Project commences (other than minor works). The urban village is not yet at planning stage and is unlikely to be on site in the near future. Therefore it is not expected that there will be any significant cumulative effects during the construction period.
- The solar park at Brynhillach Farm is at planning application stage and it is feasible that it maybe be underway on site at the same time as the Project. Although some cumulative effects can be expected, for most receptors there will be no effect as intervisibility with the Project Site at ground level (where most of the construction activities will be taking place) is limited.

Operation

- 13.9.2 There are not anticipated to be any significant cumulative effects resulting from the operation of the Project or operation of other planned developments within the vicinity of the Project Site.

13.10 Summary and Conclusions

- 13.10.1 At this preliminary stage of the assessment, it has been determined that there will be a neutral to negligible effect upon the setting of historic assets within the 5 km Study Area resulting from the construction and operation of the Power Generation Plant.
- 13.10.2 There is the potential for a moderate/major effect upon the standing remains of HA32 resulting from damage to the asset by construction traffic along Access Road Option 1. There is also potential for a moderate/major effect upon HA31 if the Gas Connection is routed through the asset. However, these effects will be limited by implementation of appropriate mitigation measures, which are to be devised in consultation with the Planning Archaeologist (and relevant statutory consultees).

Table 13.11: Summary of Effects

	Receptor name and description	Potential Mitigation	Preliminary Assessment of Residual Effects
Power Generation Plant			
Construction / Decommissioning	<p>The construction phase of the Power Generation Plant is likely to have a negligible impact upon the setting of the following designated assets;</p> <p>Scheduled Monument GM353 Ring Cairn on Tor Clowdd;</p> <p>Scheduled Monument GM299 Llangyfelach Cross Base; socketed base of pillar cross standing in Llangyfelach church yard</p> <p>Grade II* Listed Building 26236 Tower of Church of St David and St Cyfelach, Llangyfelach; A medieval tower of a former church located within Llangyfelach churchyard.</p> <p>Grade II* Listed Building 26235 The Church of St David and St Cyfelach, Llangyfelach; a nineteenth century church located in Llangyfelach churchyard.</p>	No mitigation required.	Effects are anticipated to be neutral.
	The construction of the Power Generation Plant is likely to have a moderate/major impact upon HA31 (a potential ancient field boundary)	Avoid asset or if avoidance is not possible then; a photographic survey of the asset should be carried out prior to impact and the hedge	Effects are anticipated to be neutral.

		reinstated on completion of the works.	
	The construction phase of the Power Generation Plant is likely to have an impact upon hitherto unknown archaeological remains, the potential for which is low across the Project Site	Should any archaeological remains be found during construction, work will be halted and advice sought from the Planning Archaeologist. Where necessary, recommendations will be made for a mitigation strategy to preserve in-situ or if not practicable to preserve by record any significant archaeological assets.	Effects are anticipated to be neutral.
	The Power Generation Plant (Access - Option 1) has the potential to have a moderate/major adverse effect upon HA32 (standings buildings associated with Aber-gelli Colliery)	The colliery buildings should be demarcated on the ground prior to the use of the lane for construction traffic to avoid harm to the asset	Effects are anticipated to be neutral.
Operation	<p>The operation phase of the Power Generation Plant is likely to have a negligible effect upon the setting of the following designated assets;</p> <p>Scheduled Monument GM353 Ring Cairn on Tor Clowdd;</p> <p>Scheduled Monument GM299 Llangyfelach Cross Base; socketed base of pillar cross standing in Llangyfelach church yard</p> <p>Grade II* Listed Building 26236 Tower of Church of St David and St Cyfelach, Llangyfelach;</p>	No mitigation recommended	Effects are anticipated to be neutral.

	<p>A medieval tower of a former church located within Llangyfelach churchyard.</p> <p>Grade II* Listed Building 26235</p> <p>The Church of St David and St Cyfelach, Llangyfelach; a nineteenth century church located in Llangyfelach churchyard.</p>		
Electrical Connection			
Construction / Decommissioning	<p>The construction phase of the Electrical Connection is likely to have an impact upon hitherto unknown archaeological remains, the potential for which is low across the Project Site.</p>	<p>Should any archaeological remains be found during construction, work will be halted and advice sought from the Planning Archaeologist. Where necessary, recommendations will be made for a mitigation strategy to preserve in-situ or if not practicable to preserve by record any significant archaeological assets</p>	<p>Effects are anticipated to be neutral.</p>
Operation	No impact envisaged		
Gas Connection			
Construction / Decommissioning	<p>HA31 (potential ancient field boundary)</p>	<p>Avoid asset or if avoidance is not possible then; a programme of strip and record to be carried out during any significant ground moving activities at this location.</p>	<p>Effects are anticipated to be neutral.</p>

	The construction phase of the Gas Connection is likely to have an impact upon hitherto unknown archaeological remains, the potential for which is low across the Project site	Avoid asset or if avoidance is not possible then; a programme of strip and record to be carried out during any significant ground moving activities at this location.	Effects are anticipated to be neutral.
Operation	No additional impact envisaged		
Project (as a whole)			
Construction / Decommissioning	As per Power Generation Plant and Gas Connection	Mitigation measures as listed above.	Residual effects are anticipated to be neutral.
Operation	As per Power Generation Plant and Gas Connection	Mitigation measures as listed above	Residual effects are anticipated be neutral.
Cumulative Effects			
Construction / Decommissioning	No significant cumulative effects identified during the construction period.	No mitigation recommended	None
Operation	No significant cumulative effects identified during operation period.	No mitigation recommended	None

14 SOCIO-ECONOMICS

14.1 Introduction

14.1.1 This chapter provides the socio-economic preliminary environmental assessment of the proposed Abergelli Power Project based upon assessment carried out up to end of September 2014. The proposed development is set out in Chapter 2 which forms the primary basis for the assessment carried out to date.

14.1.2 The following factors have specifically been taken account of in this preliminary assessment. The project assessment scenario is based on the possible worst case in terms of job requirements and demand on community infrastructure which presents worst case scenario from a socio-economic point of view. The assessment has considered potentially significant effects which may be caused by the construction, operation and decommissioning of the Project on the labour market, tourism businesses and community infrastructure.

14.2 Approach

Relevant Policy and Guidance

14.2.1 The socio-economic assessment in the PEIR has taken account of planning policy and guidance set out in Section 3.

14.2.2 The assessment will follow UK Government guidelines and best practice. The methodology used to estimate impacts follows guidance set out in the HM Treasury's Green Book and Homes and Communities Agency (HCA) Additionality Guide, as well as taking account of the Department for Business Innovation and Skills research on additionality.

Study Areas

14.2.3 The socio-economic and tourism study areas are as follows:

- **Socio economic study area** - The socio-economic assessment is based on drive time catchment areas from the Project. The 'local area' is defined within a 30 minute drive time, 'wider area' within a 45 minute drive time, and 'wider region' within a 60 minute drive time (see Socio-economic Figures document: Figure 14.1);
- **Tourism study area** - The tourism assessment is focussed on the area defined by a 15 km radius from the Project. Facilities or notable points of focus of visitor attraction within this area have been reviewed. Any significant tourism facilities located just outside the boundary have also been included (see Socio-economic Figures document: Figure 14.2);

- **Community Infrastructure study area** - As proximity is likely to be the main determinant of impacts and their scale, the status (or catchment) of community facility receptors in an area determines the scale and significance of any impacts.

Assessment Methodology

- 14.2.4 Data and information from national, regional and local databases have been reviewed, identifying information gaps and requirements for data gathering e.g. business, accommodation and other surveys.
- 14.2.5 The study area's socio-economic position has been described using standard indicators. This provides a baseline from which potential impacts can be assessed as follows:
- **Economic/Labour Market:** the area has been defined using a combination of: standard sources and indicators: research available at study area level; and research into the business and labour market structure of the local economy;
 - **Tourism:** the area's visitor attraction has been profiled including: visitor attractions; visitor accommodation; tourism volume and value; and the local tourism economy;
 - **Social:** Indices of deprivation and demographic structure have been examined. An audit of community infrastructure has been prepared; and
 - **Policy Context:** planning, economic development and other relevant policy has been reviewed to identify related economic, social and regeneration objectives which the Project may affect (whether contributing to their realisation or otherwise).
- 14.2.6 A detailed assessment of likely effects on the local, regional and national economy has been prepared. This assesses the scale of:
- **Direct economic impacts:** jobs and Gross Value Added (GVA) that are wholly or largely related to construction, decommissioning, and operation and maintenance of the Project;
 - **Indirect economic impacts (positive and negative):** jobs and GVA generated in the study area in the chain of suppliers of goods and services to the direct activities;
 - **Induced economic impacts:** jobs and GVA created by direct and indirect employees' spending in the study area or in the wider economy; and
 - **Wider economic (catalytic) impacts (positive and negative):** employment and income generated in the economy related to the

wider role of the Project in influencing economic activities (including wider socio-economic effects).

- 14.2.7 The availability of appropriate labour and skills to meet the Project's construction and operational requirements is a critical consideration in examining economic impacts. Adequate capacity results in a low sensitivity while a shortfall or constrained capacity yields a high sensitivity.
- 14.2.8 The key socio-economic indicators for the Study Area include:
- The proportion of skilled workers in the study area relative to national averages;
 - Educational attainment levels compared with British averages;
 - The proportion of employment in relevant sectors (i.e. manufacturing and construction workers) in the Study Area;
 - The availability of labour (including the unemployed workforce); and
 - Relevant education and training provision, including existing and proposed programmes provided by institutions serving the study area.
- 14.2.9 Tourism and recreational behaviour will only be detrimentally affected where the effects of the Project either change the visitor/user pattern in terms of numbers, and/or their patterns of expenditure for the worse. As such, opportunities for tourist and visitor expenditure, any potential variation in expenditure or visitor numbers, and consequent effects on turnover or employment are of key importance.
- 14.2.10 A business survey has been carried out to gain a more detailed understanding of the local tourism economy and its current performance. Businesses contacted include key visitor accommodation providers, leisure activity providers and other relevant tourism businesses.
- 14.2.11 Visitor facilities and notable points of focus in the study area have been identified. Based on the Project's anticipated visibility, the assessment comments on the likelihood of the Project influencing visitor and tourist attitudes and behaviour towards them.
- 14.2.12 The significance of effects on Tourism is assessed by reference to the sensitivity of the receptor and the anticipated magnitude of impact.
- 14.2.13 In considering the level of tourism sensitivity, the standing of the receptor or resource is the defining factor. This is established against:

- Tourism business' relative attraction to customers from outside the Study Area and the Project's potential to influence broader perceptions of the area. Where a majority of trade is non-local this is more likely to be the case; and
- The relative importance of tourism as a business sector. Where tourism is more important relative to other sectors, impacts may have the potential to generate broader impacts. Similarly, where it is of relatively low significance, impacts on tourism and related sectors are unlikely to generate a high level of adverse impact across the broader economy.

14.2.14 An assessment of the likely significant effects on local, regional and national community receptors during construction, operation and decommissioning of the Project have been carried out. This assessment includes an audit of community infrastructure facilities/receptors within the local area and its associated effects (i.e. effects on local schools, local authority services and other infrastructure).

14.2.15 The assessment of residual effects examines the likely impacts of the Project; whether the Project will have residual effects on its local and wider socio-economic context, and the potential impact of the Project when combined with other development proposals in the area.

Significance Criteria

14.2.16 In addition to quantitative and qualitative assessment, significance of effects is defined by the combination of the sensitivity of receptors and the magnitude of impacts upon them. The criteria set out below are specific to socio-economic factors and have been adopted to assess receptor sensitivity and impact magnitude. They therefore differ from those listed in Chapter 4 of this PEIR.

Table 14.1 Socio-Economic Sensitivity Criteria

Sensitivity	Example
Very High	The area has a shortfall of appropriate labour and skills. The Project will lead to excessive labour market pressure and distortions (i.e. skills and capacity shortages, import of labour, wage inflation).
High	The area has constrained supply of labour and skills. The Project will lead to labour market pressure and distortions (i.e. skills and capacity shortages, import of labour, wage inflation).
Medium	The area has a low/ limited supply of labour and skills. The Project could lead to labour market pressure or distortions.
Low	The receptor has a readily available labour force. The Project is unlikely to lead to labour market pressure or distortions.

Sensitivity	Example
Negligible	The area has a surplus of readily available labour with directly relevant and transferable skills. The Project will not lead to labour market pressure or distortions.

14.2.17 The magnitude of the effect of potential socio-economic impacts is assessed against the thresholds shown in Table 14.2.

Table 14.2 Socio-Economics Magnitude Criteria

Magnitude	Adverse/ Beneficial	Example
Major	Adverse	Effects will be observed on an international, national or regional scale; where the number of jobs lost in the Study Area will be greater than 250 (based upon the EU definition of small and medium enterprises ⁹²). and/or Effects will be of long-term duration (i.e. greater than 5 years).
	Beneficial	Effects will be observed on an international, national or regional scale; where the number of jobs created in the Study Area will be greater than 250 (based upon EU definition of small and medium enterprises). and/or Effects will be of long-term duration (i.e. greater than 5 years).
Moderate	Adverse	Noticeable effects will arise that may be judged to be important at a local scale, either because there are large effects on few receptors or smaller effects on a larger proportion of receptors; where the number of jobs lost in the Study Area will be greater than 50, but fewer than 250. and/or Effects will be medium-term (i.e. 3-5 years).
	Beneficial	Noticeable effects will arise that may be judged to be important at a local scale, either because there are large effects on few receptors or smaller effects on a larger proportion of receptors; where the number of jobs created in the Study Area will be greater than 50, but fewer than 250. and/or Effects will be medium-term (i.e. 3-5 years).
Minor	Adverse	Small scale effects will arise, with a limited number of affected receptors; and/or where the number of jobs lost in the Study Area will be greater than 10, but fewer than 50. and/or Effects will be short-term (i.e. 1-2 years).
	Beneficial	Small scale effects will arise, with a limited number of affected receptors; and/or where the number of jobs created in the Study Area will be greater than 10, but fewer than 50. and/or Effects will be short-term (i.e. 1-2 years).

⁹² <http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/>

Magnitude	Adverse/ Beneficial	Example
Negligible	Adverse	Very minor loss
	Beneficial	Very minor benefit
No Change		No change will be perceptible, either positive or negative.

- 14.2.18 The main factors relevant to determining tourism sensitivity are outlined below in Table 14.3

Table 14.3 Tourism Receptor Sensitivity Criteria

Sensitivity	Example
Very High	International status and/or high visitor numbers.
High	National status and/or high visitor numbers.
Medium	Regional status and/or medium visitor numbers.
Low	Local status and/or few visitor numbers.
Negligible	Sub local and/or minimal numbers.

- 14.2.19 The magnitude of effect is gauged by estimating the amount of change to the receptor arising from the proposed Project and relevant components. It is evaluated in line with the criteria set out below in Table 14.4.

Table 14.4 Tourism Magnitude of Effect Criteria

Magnitude	Adverse/ Beneficial	Example
Major	Adverse	A permanent or long term adverse impact on the value of receptor.
	Beneficial	Large scale or major improvement of the facilities quality; extensive restoration or enhancement; major improvement of receptor quality.
Moderate	Adverse	An adverse impact on the value of receptor, but recovery is possible in the medium term and no permanent impacts are predicted.
	Beneficial	Benefit to, or addition of, key characteristics, features, or elements or improvement of receptors quality.
Minor	Adverse	An adverse impact on the value of receptor, but recovery is expected in the short- term and there will be no impact on its integrity.

Magnitude	Adverse/ Beneficial	Example
	Beneficial	Minor benefit to, or addition of key characteristics, features or elements; some beneficial impact on receptor.
Negligible	Adverse	Very minor loss
	Beneficial	Very minor benefit
No Change		No change will be perceptible, either positive or negative

- 14.2.20 In considering the level of community infrastructure sensitivity, the area served by the facility or that from which people travel to access it is the defining factor (Table 14.5).

Table 14.5 Community Infrastructure Receptor Sensitivity Criteria

Sensitivity	Example
Very High	Facility is of international importance e.g. Major research or academic centre
High	Facility is of national importance e.g. University, Centre of Excellence for health care
Medium	Facility is of regional importance e.g. hospital.
Low (or lower)/Negligible	Facility is of local importance e.g. GP facility, local schools, community centre

- 14.2.21 The magnitude of the effect on community infrastructure is gauged by estimating the amount of change on the receptor arising from the scheme. The magnitude of change is evaluated in line with the criteria below Table 14.6.

Table 14.6 Community Infrastructure Magnitude of Effect Criteria

Magnitude		Example
Major	Adverse	A permanent or long term adverse impact on the integrity and value of a facility
	Beneficial	Large scale or major improvement of the facilities quality; extensive restoration or enhancement; major improvement of facilities quality.
Moderate	Adverse	An adverse impact on the value of a facility, but recovery is possible in the medium term and no permanent impacts are predicted.
	Beneficial	Benefit to, or addition of, key characteristics, features, or elements or improvement of a facilities quality.

Magnitude		Example
Minor	Adverse	An adverse impact on the value of a facility, but recovery is expected in the short- term and there will be no impact on its integrity.
	Beneficial	Minor benefit to, or addition of key characteristics, features or elements; some beneficial impact on attribute or a reduction in the risk of a negative impact occurring.
Negligible	Adverse	Very minor loss
	Beneficial	Very minor benefit
No Change		No change will be perceptible, either positive or negative.

- 14.2.22 In line with Table 4.3, the sensitivity of receptors as defined in the tables above is considered against the magnitude of impact to determine the significance of effect. The assumption relating to which effects are significant is set out in paragraph 4.6.3.

Limitations

- 14.2.23 A comprehensive socio-economic assessment will be carried out for the ES. The following tasks will provide greater precision on the likely impact of the Project:
- Economic Impact Model (net additional employment and GVA impact of Project);
 - Tourism related business survey (will help define the sensitivity of tourism related businesses with 15km of the Project); and
 - Mapping of tourism and recreation and community infrastructure facilities.

Consultation and Consultation Responses

- 14.2.24 The consultation responses received to date in relation to socio-economics are set out in Appendix 4.1.

14.3 Baseline Conditions and Receptors

Socio-economics

- 14.3.1 The socio-economic profile sets a context for the assessment and highlights key economic issues. The indicators are also used to determine the overall sensitivity of the labour market (socio-economic receptor).

- 14.3.2 As indicated in Table 14.7, all areas have experienced population increases since 2001, a trend which is expected to continue to 2021. Over the same period the population of the UK has increased and is expected to rise further. The local area population is expected to grow at a slightly higher rate in the future than that experienced between 2001 and 2013. Population growth in the wider area and wider region is expected to slow. This is consistent with the UK trend.

Table 14.7 Population

	Study Area			Comparator
	Local Area	Wider Area	Wider Region	United Kingdom
Population (2001)	442,964	294,207	738,408	58,791,867
Population (2013)	467,179	308,379	785,904	63,539,349
Population (2021)	493,941	318,454	835,684	67,014,954
% change				
2001-2013	5.5%	4.8%	6.4%	8.1%
2013-2021	5.7%	3.3%	6.3%	5.5%

Source: Experian 2013, Census 2011

- 14.3.3 Projections indicates that the local area, wider area and wider region are expected to see a reduction in the working age population and increases in their dependency ratio⁹³ which is likely to put additional pressure on services in the various areas. By 2021 over a fifth of the local and wider area's population is expected to be of retirement age. This is greater than the projected UK averages.
- 14.3.4 Table 14.8 below sets out the age structure in the vicinity of the Project Site.

Table 14.8 Age Structure

	Study Area			Comparator
	Local Area	Wider Area	Wider Region	United Kingdom
2001				
Children (0-15)	20%	20%	21%	20%
Working age (16-64)	62%	62%	63%	64%
Retirement age (65+)	18%	18%	16%	16%
2013				
Children (0-15)	18%	18%	18%	19%
Working age (16-64)	62%	61%	65%	64%
Retirement age (65+)	20%	21%	17%	18%

⁹³ The dependency ratio (or proportion of working age people) is significant as it measures the relationship between the productive element of a population and the economically dependent

	Study Area			Comparator
	Local Area	Wider Area	Wider Region	United Kingdom
2021				
Children (0-15)	18%	19%	20%	19%
Working age (16-64)	60%	56%	61%	62%
Retirement age (65+)	22%	24%	19%	19%

Source: Experian 2013, Census 2011

- 14.3.5 The economic activity rate is a useful measure of the labour market opportunities available in the area⁹⁴. As Table 14.9 shows, Levels of economic activity in the local area, wider area and wider region are higher than the national average .

Table 14.9 Economic Activity

	Study Area			Comparator
	Local Area	Wider Area	Wider Region	United Kingdom
Total population (16-74)	302,911	194,968	511,679	41,126,540
Economically Active (%)	72.5%	74.9%	74.3%	69.7%
Economically Inactive (%)	16.2%	16.2%	15.0%	30.3%

Source: Experian 2013, Census 2011

- 14.3.6 The local area, wider area and wider region are all characterised by marginally higher levels of unemployment compared to the national average. Each area also has a higher proportion of people who are permanently sick/disabled than the UK average. This is summarised in Table 14.10.

Table 14.10 Economic Activity by Type

	Study Area			Comparator
	Local Area	Wider Area	Wider Region	United Kingdom
Economically Active				
Employees Part-time (%)	22%	22%	20%	20%
Employees Full-time (%)	55%	55%	56%	55%
Self – employed (%)	10%	13%	11%	14%
Unemployed (%)	7%	7%	7%	6%
Full-time student (%)	5%	4%	6%	5%
Economically Inactive				
Retired (%)	44%	49%	41%	46%

⁹⁴ The economic activity rate measures the percentage of the population, both in employment and unemployed that represent the labour supply regardless of their labour status. The figure represents the degree of success of the area in engaging people in productive activity.

	Study Area			Comparator
	Local Area	Wider Area	Wider Region	United Kingdom
Student (%)	18%	13%	22%	19%
Looking after home/family (%)	11%	10%	12%	14%
Permanently sick/disabled (%)	21%	21%	19%	14%
Other (%)	6%	7%	6%	7%

Source: Experian 2013, Census 2011

- 14.3.7 Retail-related occupations are the main employment category in the local area, in line with the national average. Employment in health and social work activities is higher than the UK average while employment in manufacturing is slightly higher than nationally. Construction employment is consistent with the UK average. This is summarised in Table 14.11.

Table 14.11 Employment Structure

	Study Area			Comparator
	Local Area	Wider Area	Wider Region	United Kingdom
Agriculture, forestry and fishing	1%	1%	1%	1%
Manufacturing	10%	11%	10%	9%
Electricity, gas, steam and air conditioning supply	0%	1%	1%	1%
Water supply; sewerage, waste mgt. and remediation	1%	1%	1%	1%
Construction	8%	9%	8%	8%
Wholesale and retail; repair of motor cycles and vehicles	16%	15%	15%	16%
Transport and storage	4%	4%	4%	5%
Accommodation and food service activities	6%	6%	6%	6%
Information and communication	2%	2%	3%	4%
Financial and insurance activities	3%	3%	4%	4%
Real estate activities	1%	1%	1%	1%
Professional, scientific and technical activities	4%	4%	5%	7%
Administrative and support service activities	4%	4%	4%	5%
Public administration, defence, compulsory social security	10%	9%	8%	6%
Education	10%	10%	11%	10%
Human health and social work activities	15%	16%	15%	13%
Other	4%	4%	5%	5%

Source: Experian 2013, Census 2011

- 14.3.8 National Readership Survey (NRS) social grades are a system of demographic classification widely used in market research⁹⁵. The NRS social grades also provide an insight into the skills profile of a population.
- 14.3.9 As shown in Table 14.12, the local area, wider area and wider region each have a lower than average proportion of people in the highest and second highest social grades (AB and C1). Each area also a higher proportion of people in the lowest social grades (DE).

Table 14.12 National Readership Survey (NRS) Social Grade

	Study Area			Comparator
	Local Area	Wider Area	Wider Region	United Kingdom
AB - High/intermed mgr/admin/prof	15%	18%	19%	23%
C1 - Supervis/clerical/jr mgr/admin/prof	30%	28%	31%	31%
C2 - Skilled manual	22%	23%	21%	21%
DE - Semi-skilled/unskilled manual/State benefit/unempl/lowest grade	32%	30%	29%	26%

Source: Experian 2013, Census 2011

- 14.3.10 Educational attainment rates in the local area, wider area and wider region are generally lower than UK levels, with a higher proportion of people achieving no qualifications and a lower proportion achieving level 4/5 qualifications. This is summarised in Table 14.13.

Table 14.13 Qualifications⁹⁶

	Study Area			Comparator
	Local Area	Wider Area	Wider Region	United Kingdom
Level 4/5	22%	25%	25%	27%
Level 3	13%	11%	13%	12%
Apprenticeship	5%	4%	3%	4%
Level 2	16%	16%	15%	15%

⁹⁵ Originally developed by the National Readership Survey (NRS). Now used by many other organisations for wider applications and a standard for market research.

⁹⁶ Level 1: qualifications cover: 1+'O' level passes; 1+ CSE/GCSE any grades; NVQ level 1; or Foundation level GNVQ.

Level 2: qualifications cover: 5+'O' level passes; 5+ CSE (grade 1's); 5+GCSEs (grades A-C); School Certificate; 1+'A' levels/'AS' levels; NVQ level 2; or Intermediate GNVQ.

Level 3: qualifications cover: 2+ 'A' levels; 4+ 'AS' levels; Higher School Certificate; NVQ level 3; or Advanced GNVQ.

Level 4: Qualifications cover: First Degree, Higher Degree, NVQ levels 4 and 5; HNC; HND; Qualified Teacher Status; Qualified Medical Doctor; Qualified Dentist; Qualified Nurse; Midwife; or Health Visitor.

Level 1	13%	13%	13%	13%
Other qualifications	4%	4%	4%	6%
No Qualifications	27%	28%	26%	23%

Source: Experian 2013, Census 2011

14.3.11 The socio-economic study area⁹⁷ surrounding the Project is characterised by:

- An increasing population (2001-2013);
- Projected population increase of c.6% between 2013 and 2021, higher than the UK average;
- a growing retirement age population;
- an economic activity rate higher than the UK average;
- slightly higher levels of unemployment comparable to the UK average;
- A slightly higher proportion of people working in manufacturing;
- A comparable proportion of people working in the construction sector;
- A higher proportion of people employed in semi-skilled/unskilled jobs and lower proportion of people in highly skilled jobs and;
- A higher proportion of people achieving no qualifications and low level qualifications compared to the UK average.

14.3.12 The socio-economic study area exhibits some characteristics consistent with a low sensitivity labour market (i.e. increasing population, above average economic activity, appropriate levels of construction and manufacturing workers) and some characteristics consistent with a medium sensitivity labour market (i.e. low skills and educational profile). It is unlikely that the Project will lead to undue labour market pressure or distortions (i.e. wage inflation, skills and capacity shortages, import of labour).

14.3.13 The overall sensitivity of the labour market is assessed as low/ medium.

Tourism Volume and Value

14.3.14 A tourism business survey will be carried out in preparing the final ES Chapter. This will provide an indication of the sensitivity of the local tourism economy. Tourism related businesses will be asked provide an

⁹⁷ Defined as the area within a 60 minute drive time

indication of their current and future business prospects and the main factors that influence them.

- 14.3.15 In the PEIR, the tourism economy is assessed using visitor statistics for Swansea and the South West Wales area.
- 14.3.16 Domestic visitor tourism spending and bed-nights are at their highest level since 2006-08 (Table 14.14). Visitor trips, despite falling recently, remain high and above average. Overseas tourism appears to be declining in Swansea. Overseas trips, bed-nights and spending are at their lowest level since 2006.

Table 14.14 Trips, Nights and Spend in Swansea

	2006-8	2007-9	2008-10	2009-11	2010-12
Trips (thousands)					
GB based Visitors: Total	503	532	487	559	547
Overseas Visitors: Total	93	82	80	77	73
Nights (thousands)					
GB based Visitors: Total	1914	1555	1504	1731	1748
Overseas Visitors: Total	725	598	601	626	590
Spend (£million)					
GB based Visitors: Total	108	81	77	90	93
Overseas Visitors: Total	30	28	28	30	28

Source: Welsh Government. Local Authority Tourism Profiles 2010-12 Swansea (Great Britain Tourism Survey, International passenger survey)

- 14.3.17 Table 14.15 shows the top 10 paid and unpaid visitor attractions in South West Wales. Two attractions, the LC (Leisure Centre⁹⁸) and the National Waterfront Museum, are in the tourism study area. The LC was the top paid attraction in Wales in 2013 and the National Waterfront Museum was ranked as number 8 in the free attractions. Both attractions are indoor and more than 5km from the Project. Each attraction will be assessed as an individual receptor in ES Chapter and included in the tourism business survey to establish perceived impact on visitor activity.
- 14.3.18 The overall sensitivity of the Project's tourism economy and main visitor attractions within the study area is assessed as low.

Table 14.15 Top 10 free and paid attractions in South West Wales

Attraction	Rank	Distance from Project	2013	2012	% change 2012/2013
Paid					

⁹⁸ Wales' biggest indoor Waterpark

Attraction	Rank	Distance from Project	2013	2012	% change 2012/2013
The LC (Wales' biggest indoor Waterpark)	1	c.8km	712,616	736,949	-3.3%
Folly Farm Adventure Park	2	c.55km	419,614	Not provided	-
Margam Country Park	4	c.20km	182,055	105,329	+72.8%
Free					
Pembrey Country Park	5	c.25km	367,172	388,416	-5.5%
National Waterfront Museum	8	c.8km	253,708	267,362	-5.1%

Source: Visit Wales – Visits to Tourist Attractions in Wales 2013, Beaufort Research 2014

Community Infrastructure

14.3.19 Demand for community infrastructure facilities could arise from the in-migration of construction workers during the temporary construction phase. This requirement is likely to be minimal. An initial audit of community facilities indicates the provision of the following community infrastructure facilities in the area.

- 21 schools within 3 miles of the Project Site;
- 5 GP surgeries;
- 1 hospital;
- 6 pharmacies; and
- 1 library.

14.3.20 The level of existing community infrastructure is considered to be sufficient to accommodate additional demand. The overall sensitivity of the local area's community infrastructure is assessed as low.

14.4 Power Generation Plant Assessment

Construction/Decommissioning

14.4.1 Table 14.16 summarises the impacts of the construction and decommissioning of the Power Generation plant on the socio-economics of the area.

Table 14.16 Findings of Preliminary Assessment of Effects of Power Generation Plant during Construction/Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
Power Generation Plant				
<p>Labour Market</p> <p><u>Construction</u>-the number of workers on site varies from 25 to 127 over a 22 month period, totaling 135 person years of employment. This is equivalent to 13 FTE jobs.</p> <p><u>Decommissioning</u>-Similar to construction</p>	<p>Additional construction workers and supply chain contracts for local workforce and businesses</p> <p>Minor beneficial</p>	<p>None required (although positive impacts and local opportunities could be explored with relevant local business and enterprise organisations, education providers or local Job Centres)</p>	<p>Slight beneficial</p>	<p>An economic impact model will be built to calculate the impact of construction employment on the local, regional and national economy</p>
<p>Tourism Economy</p> <p>Tourism receptors such as accommodation providers, visitor facilities and recreational routes may be affected by the following potential impacts:</p> <ul style="list-style-type: none"> • visual • noise • traffic/ accessibility • air quality 	<p>Minor beneficial impact to accommodation providers from temporary construction workers</p> <p>Negligible/Minor adverse impacts to tourism receptors from noise and traffic restrictions during temporary construction and decommissioning phases</p>	<p>None required</p>	<p>Slight beneficial for accommodation providers.</p> <p>Neutral/Slight adverse effects for tourism economy and receptors.</p>	<p>Tourism Business Survey to establish perceived effect within a 15km radius.</p> <p>Mapping of tourism receptors alongside the Projects ZTV to assess effects based on sensitivity of receptor and magnitude of impact.</p> <p>Review of the relevant findings of the Projects LVIA, Noise, Traffic and Air Quality Chapters to determine residual impact on receptors</p>
Community Infrastructure	The likely construction	None required	Neutral/Slight adverse	Community infrastructure

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
<p>Community Infrastructure receptors such as hospitals, schools GP surgeries and dentists may be affected by the in-migration of construction workers and their families.</p> <p>Access to some community facilities may be affected in the construction phase.</p>	<p>programme and experience of other similar assessments indicates a low number of in migrant construction workers will choose to permanently live in the area with their families. Demand for community facilities from this development is considered to be minimal.</p> <p>Any impacts would also only be relevant during temporary construction and decommissioning phases.</p> <p>Negligible/Minor adverse</p>			<p>mapping and review of existing capacity.</p> <p>The estimated requirement based on in-migrants and their families will be evaluated against existing capacity to determine the pressure and impact on community facilities.</p>

Operation

14.4.2 Table 14.17 below summarises the impacts of the operational phase of the Power Generation plant on the socio-economics of the area

Table 14.17: Findings of Preliminary Assessment of Effects of Power Generation Plant during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Specific Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
Power Generation Plant				
<p>Labour Market</p> <p>15 FTE employees</p>	<p>Long term employment opportunities for</p>	<p>None required (although beneficial impacts</p>	<p>Slight beneficial</p>	<p>An economic impact model will be built to</p>

Receptor name and description	Preliminary Assessment of Impacts	Potential Specific Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
Operational phase will last up to 25 years	local workforce Maintenance contracts could be available to local businesses Minor beneficial	and local opportunities could be explored with relevant local business and enterprise organisations, education providers or Job Centers)		calculate the net additional employment and GVA impact that would be created locally, regionally and nationally
Tourism Economy Tourism receptors such as accommodation providers and visitor facilities may be affected by the following potential impacts: <ul style="list-style-type: none"> • visual • noise • traffic/ accessibility • air quality 	Potential minor adverse visual impact however the visual impact of energy infrastructure has already been established in the area surrounding the Project Site. The surrounding area has a substantial amount utilities infrastructure including a network of electricity pylons connecting National Grid's two 400kV electrical substations southwest of Abergelli Farm. Operational noise, traffic and air quality impacts are likely to be neutral during the operational phase. Negligible/Minor beneficial	None required	Slight adverse or neutral	Tourism Business Survey Mapping of tourism receptors alongside the Projects ZTV to assess impact Review of the operation and maintenance programme and the relevant findings of the Projects LVIA, Noise, Traffic and Air Quality Chapters
Community	Minimal demand	None required	Neutral	Community

Receptor name and description	Preliminary Assessment of Impacts	Potential Specific Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
Infrastructure Community Infrastructure receptors such as hospitals, schools GP surgeries and dentists may be affected by the in-migration of construction workers and their families.	for community facilities from the operational and maintenance workforce. Negligible			infrastructure mapping and review of existing capacity. The estimated requirement from the operational and maintenance workforce will be evaluated against existing capacity to determine the pressure and impact on facilities.

14.5 Gas Connection Assessment

Construction/Decommissioning

- 14.5.1** Table 14.18 below summarises the impacts of the Gas Connection on the socio-economics of the area

Table 14.18: Findings of Preliminary Assessment of Effects of Gas Connection during Construction & Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
Gas Connection				
Labour Market	Construction and decommissioning of the Gas Connection is likely to support a negligible number of temporary jobs Negligible	None	Neutral	Individual assessment of the employment impact of the construction phase of the Gas Connection to ensure labour market requirement is negligible

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
Tourism Economy	<p>The Gas Connection will be undergrounded.</p> <p>Minor visual, noise and traffic/ accessibility impacts may affect tourism receptors during the temporary construction phase.</p> <p>Negligible/Minor adverse</p>	None	Neutral/Slight adverse	<p>Mapping of tourism receptors alongside the Projects ZTV to assess impact</p> <p>Review of the relevant findings of the Projects LVIA, Noise, Traffic and Air Quality Chapters to determine impact on receptors</p>
Community Infrastructure	<p>Negligible employment required for this element.</p> <p>Negligible demand for community facilities from the in-migration of construction workers and their families</p> <p>Neutral</p>	None	Neutral	<p>Community infrastructure mapping and review of existing capacity</p> <p>The estimated labour market requirement based on in-migrants and their families will be evaluated against existing capacity to determine the pressure and impact on community infrastructure facilities</p>

Operation

14.5.2 Table 14.19 below summarises the impacts of the operational phase of the Gas Connection on the socio-economics of the area

Table 14.19: Findings of Preliminary Assessment of Effects of Gas Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
Gas Connection Assessment				
Labour Market	Minimal maintenance and labour required for Gas Connection element during operational phase. Neutral	None	Neutral	Individual assessment of the employment impact of the operation and maintenance of the Gas Connection to ensure requirement is negligible
Tourism Economy	Gas Connection will be undergrounded and therefore not visible to tourism receptors. Neutral	None	Neutral	Review of the relevant findings of the Projects LVIA, Noise, Traffic and Air Quality Chapters to determine impact on receptors
Community Infrastructure	Minimal maintenance and labour for Gas Connection element during operational phase. No demand or pressure will therefore be placed on community facilities Neutral	None	Neutral	The estimated labour market requirement based on in-migrants and their families will be evaluated against existing capacity to determine the pressure and impact on community infrastructure facilities

14.6 Electrical Connection Assessment

Construction/Decommissioning

14.6.1 Table 14.20 below summarises the impacts of the construction and operational phases of the Electrical Connection on the socio-economics of the area

Table 14.20: Findings of Preliminary Assessment of Effects of Gas Connection during Construction & Decommissioning

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
Electrical Connection				
Labour Market	Construction and decommissioning of the Electricity Connection is likely to support a negligible number of temporary jobs Negligible	None	Neutral	Individual assessment of the employment impact of the construction phase of the Electricity Connection to ensure requirement is negligible
Tourism Economy	An absence of tourism receptors have been identified from a preliminary audit of the area. Minor visual, noise and traffic/accessibility impacts may affect tourism receptors during the temporary construction phase. Negligible/Minor adverse	None	Neutral/Slight adverse	Mapping of tourism receptors alongside The Projects ZTV to assess impact Review of the relevant findings of MPL LVIA, Noise, Traffic and Air Quality Chapters to determine impact on receptors
Community Infrastructure	Negligible employment required for the Electricity Connection. Demand for community facilities will also be negligible Negligible	None	Neutral	Community infrastructure mapping and review of existing capacity The estimated requirement based on in-migrants and their families will be evaluated against existing capacity to determine the pressure and

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
				impact on community facilities

Operation

14.6.2 Table 14.21 below summarises the impacts of the operational phase of the Electrical Connection on the socio-economics of the area.

Table 14.21: Findings of Preliminary Assessment of Effects of Gas Connection during Operation

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
Electrical Connection				
Labour Market	Minimal maintenance and labour for Electrical Connection element during operational phase. Negligible	None	Neutral	Individual assessment of the employment impact of the construction phase of the Electricity Connection to ensure requirement is negligible
Tourism Economy	Electrical Connection will be undergrounded and not therefore visible Negligible /Minor beneficial	None	Neutral	Mapping of tourism receptors alongside the Projects ZTV to assess impact. Review of the relevant findings of the Projects LVIA, Noise, Traffic and Air Quality Chapters to determine impact on receptors
Community Infrastructure	Minimal maintenance and labour for Electrical	None	Neutral	Community infrastructure mapping and

Receptor name and description	Preliminary Assessment of Impacts	Potential Mitigation	Potential Residual Effects	Further Assessments and Consultation to be Undertaken
	<p>Connection during operational phase.</p> <p>No demand or pressure will therefore be placed on community facilities</p> <p>Negligible</p>			<p>review of existing capacity</p> <p>The estimated requirement based on in-migrants and their families will be evaluated against existing capacity to determine the pressure and impact on community facilities</p>

14.7 Cumulative Effects

14.7.1 The projects identified in Section 4.8 have been identified as having the potential to have cumulative effects alongside the Project. Proposed development within the Swansea Vale Development Area will also be considered. The cumulative effect of these developments will be assessed alongside the Project in detail in the final ES.

14.8 Summary and Conclusions

14.8.1 No significant labour market, tourism and recreation and community infrastructure effects are anticipated given there is an availability of skilled, construction labour with a 60 minute drive time. The visual impact of energy infrastructure has also already been established in the area surrounding the Project.

14.8.2 Building from this preliminary assessment the following steps will be undertaken in the next phase of socio-economic analysis and presented in the ES:

- A mapping of the ZTV analysis against tourism and recreational receptors in the area to gain a better understanding of the potential visual impact of the assessment;
- The impact assessment will be informed in part by a Business Survey, which will ask local tourism-related businesses in the area what impact the Project will have on their business and on tourism in the wider area;

- Detailed estimates of the economic impact of the construction and operation of the Project; and
- An impact assessment of the community facilities.

15 CONCLUSION**15.1 Conclusion**

15.1.1 The preliminary assessment as described in the PEIR has identified the following significant residual effects resulting from the Project:

- The risk of flooding is low. However, should it occur, such as from a burst watermain, the effects may be significant due to the possible damage to the Project or harm to workers that may occur;
- Some views of the stacks are unlikely to be mitigated by planting;
- It is considered unlikely that there will be permanent residual effects associated with the construction of the Project. The effects relating to construction activities are all temporary; and
- During construction it is anticipated that there will be some increases in traffic and some disruption to the road network during off peak times. These effects will all be temporary as there will be limited traffic during operation of the Project.

15.1.2 As the design work and EIA are completed, the Applicant will seek to identify further mitigation measures to aim to reduce these effects where appropriate.

15.2 Cumulative Effects

15.2.1 The preliminary findings of the assessment have concluded that there are unlikely to be any adverse cumulative effects when the Project is considered in combination with those developments identified in Section 4.8 of this PEIR. This work will be further refined and presented in the ES.

15.2.2 The likely significant environmental effects of the Project on receptors identified in this PEIR when considered cumulatively i.e. more than one effect on the same receptor, will be considered as part of the full EIA. However, the preliminary assessment indicates that there are unlikely to be any significant cumulative effects.

PROJECT GLOSSARY AND ABBREVIATIONS

Term (Abbreviation)	Definition
Abergelli Power Limited (APL)	A special purpose vehicle which has been established by Watt Power Limited (WPL) to develop the Project.
Above Ground Installation (AGI)	The Above Ground Installation incorporates the minimum offtake connection (MOC) facility, which would be owned by National Grid, and a Pipeline Inspection Gauge (PIG) Trap Facility (PTF), owned by APL. The AGI forms part of the Gas Connection.
Above Ordnance Datum (AOD)	Ordnance Datum is the vertical datum used by Ordnance Survey as the basis for deriving height of ground level on maps. Topography may be described using the level in comparison to 'above' ordnance datum.
Access Road	The proposed purpose built access road from the public highway to the Generating Equipment Site. It is located within the Power Generation Plant Site.
agriculture	<p>Section 336(1) of the Town and Country Planning Act 1990 defines agriculture as including:</p> <ul style="list-style-type: none">• Horticulture, fruit growing, seed growing, dairy farming;• The breeding and keeping of livestock (including any creature kept for the production of food, wool, skins or fur, or for the purpose of its use in the farming of land);• The use of land as grazing land, meadow land, osier land, market gardens and nursery grounds; and• The use of land for woodlands where that use is ancillary to the farming of land for other agricultural purposes.
Agricultural Land Classification (ALC)	The ALC provides a method for assessing the quality of farmland to enable informed choices to be made about its future use within the planning system.
air pollutants	Amounts of foreign and/or natural substances occurring in the atmosphere that may result in adverse effects on humans, animals, vegetation and/or materials.
Air Quality Information System (AQIS)	A comprehensive source of information on air pollution and the effects on habitats and species.
Air Quality Management Area (AQMA)	A defined area by virtue of Section 82(3) of the Environment Act 1995, where it appears that the air quality objectives prescribed under the UK Air Quality Strategy will not be achieved. In these areas, a Local Authority must designate Air Quality Management Areas, within which an Action Plan can be proposed to secure improvements in air quality so that prescribed air quality objectives can be achieved.
Air Quality Sensitive Receptors	People, property or designated sites for nature conservation that may be at risk from exposure to air pollutants that could potentially arise as a result of the Project.
amenity	The preferable features of a location which contribute to its overall character and the enjoyment of residents or visitors.

Ancient Woodland	Ancient woodland is defined as an area that has been wooded continuously since at least 1600 AD. Ancient Woodland is divided into ancient semi-natural woodland and plantations on ancient woodland sites. Both types of stand are classed as ancient woods.
APFP Regulations	The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009, as amended, which prescribe various matters in connection with the making of an application for Development Consent under the Planning Act 2008.
Application for Development Consent	The Application for Development Consent made to the SoS under section 37 of the PA 2008 in respect of the Project, required pursuant to section 31 of the PA 2008 because the Project constitutes an NSIP under section 14(1)(a) and section 15 PA 2008 by virtue of being an onshore generating station in England or Wales of 50 MWe capacity or more.
Applicant	Abergelli Power Limited (APL)
Area of Outstanding Natural Beauty (AONB)	An area designated by Natural England under the National Parks and Access to the Countryside Act 1949 by virtue of being a precious landscape whose distinctive character and natural beauty are so outstanding that it is in the nation's interest to safeguard them.
Archaeological Desk Based Assessment	An assessment of the known or potential archaeological resource within a specified area or site on land, inter-tidal zone or underwater. It consists of a collation of existing written, graphic, photographic and electronic information in order to identify the likely character, extent, quality and worth of the known or potential archaeological resource in a local, regional, national or international context as appropriate.
archaeological interest	Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
Balance of Plant	All infrastructure required to support Gas Turbine Generators within the Generating Equipment Site and includes: stacks; Air Cooled Condensers (ACC)/ cooling plant; demineralised water tank; raw/ fire water tank; administration/ workshop/ control building and gas receiving facility.
baseline	Environmental conditions at specific periods of time, present on, or near a site, against which future changes may be measured or predicted.
Best Available Technique (BAT)	The most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole.

biodiversity	Abbreviated form of 'biological diversity' referring to variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part.
Biodiversity Action Plan (BAP)	Plans which set specific, measurable, achievable, realistic and time bound conservation targets for species and habitats. The UK BAP is the UK Government's response to the Convention on Biological Diversity (CBD) signed in 1992. More information is available at www.ukbap.org.uk .
British Standards (BS)	The display of a British Standard number shows that the manufacturer claims to have made the produce in accordance with British Standard. A standard is a published document that contains a technical specification or other precise criteria designed to be used consistently as a rule or definition. Standards are designed for voluntary use and do not impose any regulations. However, laws and regulations may refer to certain standards and make compliance with them compulsory. Sometimes BS will be accompanied by the letters EN and/or ISO. These mean that the standard was developed as a European (EN) or International (ISO) standard and then adopted by the UK as a British Standard.
Carbon Capture Readiness (CCR)	A large-scale source (emitter) of CO ₂ which could and is intended to be retrofitted with CCS technology when the necessary regulatory and economic drivers are in place.
Carbon Capture and Storage (CCS)	The process of capturing waste CO ₂ from large point sources, such as fossil fuel power plants, transporting it to a storage site, and depositing it where it will not enter the atmosphere.
Carbon Monoxide (CO)	A colourless, odourless and tasteless gas that is produced from the partial oxidation of carbon containing compounds.
City and County of Swansea Council	The Local Planning Authority which covers Felindre.
Climate Change Risk Assessment (CCRA)	It sets out the main priorities for adaptation to climate change in the UK.
Combined Cycle Gas Turbine (CCGT)	Gas plant technology system comprising Gas Turbine(s) fuelled by natural gas, a Heat Recovery Steam Generator(s) utilising heat from the Gas Turbine exhaust gases, and a steam turbine plant with associated condensing system.
Combined Heat and Power (CHP)	A cogeneration power station capable of supplying power to the National Grid and also heat to local heat users (such as industry or leisure) through a direct connection to waste heat/steam produced as part of the combustion process.
Conceptual Site Model	The objective of constructing a Conceptual Site Model is to record all the potential pollutant linkages between the source of contamination and the receptors, i.e. the reasonably possible ways in which the receptors may experience exposure and consequent adverse effects.

Conservation Area	An area of special environmental or historical importance that is protected from changes by law by statutory designation.
Construction Environmental Management Plan (CEMP)	Strategic document setting out best practice methods to minimise environmental impacts (including dust) during construction.
Common Bird Census (CBC)	Scheme for monitoring population trends among widespread breeding birds
consultation	Procedures for assessing public, landowner and statutory consultee opinion about a plan or major development proposal including seeking the views of affected neighbours or others with an interest in the Project or affected land
contamination	Where land has been affected by contamination it may present a risk to humans, ecosystems, water quality and property.
cropmarks	A mark that is produced by the effect of underlying archaeological or geological features influencing the growth of a particular crop.
Cultural Heritage	The legacy of physical artefacts and intangible attributes of a group or society inherited from past generations, maintained in the present and bestowed for the benefit of future generations. Cultural heritage includes both physical culture (such as buildings, monuments, landscapes, books, works of art and artefacts) as well as intangible culture (such as folklore, traditions, language and knowledge).
cumulative effects	The summation of effects that result from changes caused by a development in conjunction with other reasonably foreseeable development that is either consented but not yet constructed or is in the process of seeking consent.
Critical Load Function (CLF)	A quantitative estimate of an 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.
Design and Access Statement (DAS)	A short report accompanying and supporting a planning application. It provides a framework for applicants to explain how a proposed design is an appropriate response to the site and its setting, and demonstrate that it can be adequately accessed by prospective users.
Design Manual for Roads and Bridges (DMRB)	Local Air Quality Management itself forms a key part in the UK Government's and the Devolved Administrations' strategies to achieve the air quality objectives.
Desk Based Assessment (DBA)	Research based primarily on database and internet data gathering methods.
Development Consent Order (DCO)	A Development Consent Order (DCO) is made by the Secretary of State (SoS) pursuant to the Planning Act 2008 (PA 2008) to authorise a Nationally Significant Infrastructure Project (NSIP).

Development Plan Documents (DPD)	Development plan documents (DPD) include the core strategy, allocations, proposals map and action area plans.
Digital Terrain Model (DTM)	Topographic model of the bare earth – terrain relief - that can be manipulated by computer programs.
dust	Fine particles of solid materials capable of being re-suspended in air and settling only slowly under the influence of gravity where it may cause nuisance.
Dust Management Plan (DMP)	It sets out the site operation, dust control and monitoring procedures and designed to minimise emissions from dust.
Driver License and Vehicle Agency (DVLA)	The organisation of the UK Government responsible for maintaining a database of drivers and a database of vehicles in Great Britain.
Environment Agency (the equivalent body in Wales being Natural Resources Wales) (EA)	Executive Non-departmental Public Body responsible to the Secretary of State for Environment, Food and Rural Affairs.
Environmental Protection UK (EPUK)	UK association of environmental protection specialists.
Ecological Impact Assessment (EcIA)	A recommended procedure for the ecological component of Environmental Impact Assessment.
effect	The consequence of an impact on the environment.
Electrical Connection	The Electrical Connection will comprise all the necessary elements to enable power to be exported from the Generating Equipment to the NETS. It includes new electrical circuits proposed as either underground cable or overhead lines and cable terminal chambers on the GIS (Gas Insulated Switchgear) circuit at the point where the underground cable or overhead line emerges to facilitate its connection into the NETS.
Electrical Connection Opportunity Area	The area that was investigated for the location of the Electrical Connection.
emission	A material that is expelled or released to the environment. Usually applied to gaseous or odorous discharges to the atmosphere.
Environmental Health Officer (EHO)	Officer at a local authority which is primarily concerned with protecting the public from the harmful exposures they may encounter in the environment and with improving its health.
Environmental Impact Assessment (EIA)	A systematic means of assessing a development project's likely significant environmental effects undertaken in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009.
EIA Regulations	For this project the relevant EIA regulations are the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 as amended.
Electric Magnetic Field (EMF)	A magnetic field is the magnetic influence of electric currents and magnetic materials.

Environmental Statement (ES)	Statutory report summarising the findings of an environmental impact assessment.
European Protected Species (EPS)	European Protected Species are animals and plants that receive protection under the Conservation of Habitats and Species Regulations 2010, in addition to the Wildlife and Countryside Act 1981 (as amended).
Examining Authority (ExA)	Planning Inspector(s) responsible for conducting the examination of, and recommendation as to a decision on, the Application for Development Consent on behalf of the SoS.
features (landscape feature or element)	A component part of the landscape (e.g. hedgerow, wood, stream)
findspot	Location of individual or groups of archaeological artefacts.
Flood Consequences Assessment (FCA)	A desk based study which considers the contributing factors and predicts / quantifies the risk of flooding to and from a proposed development and also identifies a water level in the event of flooding.
Flood Zone	<p>An area identified, through modelling, that is at risk of flooding from rivers or the sea, to varying levels of magnitude and frequency. There are four classifications for flood zones as defined in the Technical Advice Note 15: Development and Flood Risk:</p> <ul style="list-style-type: none"> • Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding; • Zone B: Areas known to have been flooded in the past evidenced by sedimentary deposits; • Zone C: Based on Environment Agency extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal); • Zone C1: Areas of the floodplain which are developed and served by significant infrastructure, including flood defences; and • Zone C2: Areas of the floodplain without significant flood defence infrastructure.
Gas Connection	A new underground gas Pipeline connection and Above Ground Installation (AGI) to bring natural gas to the Generating Equipment from the Gas National Transmission System (NTS) or Local Transmission System (LTS).
Gas Connection Opportunity Area	The area that was investigated for specific route corridor options for the Gas Connection.
Gas Receiving Facility (GRF)	A facility that receives gas.
Gas Turbine Generators	Between one and five Simple Cycle Gas Turbine (SCGT) generators (as proposed in the Power Generation Plant) which utilise the combustion of gas and air to generate hot gases that are routed across turbine blades, which generate rotational forces that turn an electrical generator. The exhaust gases are discharged directly to the stack without providing heat for a secondary steam cycle. Each Gas Turbine Generator may constitute one or two gas turbines

	venting to a single stack. The Gas Turbine Generators form part of the Generating Equipment and are located within the Generating Equipment Site.
Generating Equipment	Gas Turbine Generators and balance of the plant which are located on the Generating Equipment Site.
Generating Equipment Site	The site where the Generating Equipment is located.
groundwater	Water occurring in the ground which can be reasonably attributed to relatively geologically recent recharge and which can be reasonably considered to be wholesome (potable) unless it has been contaminated (altered) by anthropogenic activity.
Great Crested Newt (GCN)_	Legally protected species of amphibian.
Glamorgan-Gwent Archaeological Trust (GGAT)	A local archaeology trust that provides a broad range of archaeological and heritage services across the preserved counties of Glamorgan and Gwent, including acting as advisors to local planning authorities.
Guidelines for Landscape and Visual Impact Assessment (GLVIA)	The third edition of Guidelines for Landscape and Visual Impact Assessment (GLVIA3) was published and came into force on 17 April 2013. Published jointly by the Landscape Institute and Institute of Environmental Management and Assessment.
habitat	The environment in which populations or individual species live or grow.
Habitat Regulations Assessment (HRA)	The UK habitats regulations are used to implement the EU Directive and require a Habitats Regulations Assessment.
Heavy Goods Vehicle (HGV)	A mechanically propelled road vehicle that is of a construction primarily suited for the carriage of goods or burden of any kind and designed or adapted to have a maximum weight exceeding 3,500 kilograms when in normal use and travelling on a road laden.
hectare	A unit of area (10,000 m ² / 2.471 acres).
heritage asset	A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage assets include designated heritage assets identified by the local planning authority (including local listing).
historic environment	All aspects of the environment resulting from the interaction between people and places through time including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped, planted or managed flora. Those elements of the historic environment that hold significance are called heritage assets.
Historic Environment Record (HER)	The repository for all archaeological and historical information relating to a county or district.
Historic Parks and Gardens	A register of historic parks and gardens of particular historic importance.

hydrology	The movement, distribution and quality of water throughout the earth.
Industrial Emissions Directive	European legislation recasting seven existing European Directives including the IPPCD and the LCBD.
impact	A physical or measurable change to the environment attributable to the Project.
Institute of Air Quality Management (IAQM)	Is the professional body for air quality professionals.
Institute of Ecology and Environmental Management (IEEM)	Is the professional body for Ecologist and Environmental professionals.
Institute of Environmental Management and Assessment (IEMA)	The largest environmental professional body, providing environmental practitioners with the knowledge, skills and tools to ensure sound environmental performance delivers real business benefit.
Joint Nature Conservancy Committee	A public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation.
kilometre (km)	Measurement of distance (1000 metres).
kilovolt (kV)	Measurement of the amount of electric potential energy.
landscape character	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement.
Landscape Character Assessment (LCA)	The tool that is used to help us to understand, and articulate, the character of the landscape. It helps us identify the features that give a locality its 'sense of place' and pinpoints what makes it different from neighbouring areas.
Landscape and Visual Impact Assessment (LVIA)	LVIA considers the landscape and visual aspects of a proposed development in accordance with recognised guidelines and methodologies
Laydown Area	The area required during construction for storing materials and equipment. It is located within the Power Generation Plant Site.
Listed Building	<p>The Secretary of State compiles a list of buildings of special architectural or historic interest for the guidance of local planning authorities in the exercise of their planning functions under the Planning (Listed Buildings and Conservation Areas) Act 1990 and the Town and Country Planning Act 1990. Buildings are graded as follows:</p> <ul style="list-style-type: none"> • Grade I – Buildings of exceptional interest; • Grade II* - Particularly important buildings of more than special interest; and • Grade II – Buildings of special interest.

Local Air Quality Management (LAQM)	Local Air Quality Management itself forms a key part in the UK Government's and the Devolved Administrations' strategies to achieve the air quality objectives.
Local Development Plan (LDP)	The set of documents and plans that sets out the local authority's policies and proposals for the development and use of land in their area.
Local Nature Reserve (LNR)	A site of importance for wildlife, geology, education or public enjoyment. Some are also nationally important Sites of Special Scientific Interest. Local Nature Reserves must be controlled by the local authority through ownership, lease or agreement with the owner.
Local Planning Authority (LPA)	The local authority or council that is empowered by law to exercise statutory town planning functions for a particular area of the United Kingdom.
Local Transmission System (LTS HP Pipeline)	The LTS distributes the gas supply from the NTS to the locations where the load requirement is required, generally in smaller pipelines (<24"/600 mm diameter) operating at lower pressure (<50 barg).
Multi Agency Geographic Information for the Countryside (MAGIC)	Authoritative geographic information about the natural environment from across government.
magnitude	A combination of the scale, extent and duration of an effect.
Megawatt electric (MWe)	Electric output of a power plant. The electric output of a power plant is equal to the overall power multiplied by the efficiency of the plant.
metre (m)	Measurement of length.
mitigation measures	Actions proposed to prevent, reduce and where possible offset significant adverse effects arising from the whole or specific elements of a development.
millimetre (mm)	Measurement of size.
Minimum Offtake Connection (MOC)	A connection that will offtake gas directly from the National Transmission System. The MOC forms part of the AGI and therefore the Gas Connection.
National Grid Company (NGC)	National Grid's principal operations are the ownership and operation of regulated electricity and gas infrastructure networks in the UK and the US, serving around 19 million consumers directly and many more indirectly.
National Grid Electricity Transmission System (NETS)	A high-voltage electric power transmission network connecting power stations and major substations and ensuring that electricity generated anywhere in England, Scotland and Wales can be used to satisfy demand elsewhere.
National Park	A national park is an area designated for its special landscape rich in character and distinctiveness, wildlife history and heritage.

National Policy Statement (NPS)	Overarching policy designated under the PA 2008 concerning the planning and consenting of NSIPs in the UK.
National Nature Reserve (NNR)	Established to protect sensitive features and to provide 'outdoor laboratories' for research.
National Transmission System (NTS)	A network of gas pipelines throughout the United Kingdom that supply gas to large industrial customers from natural gas terminals situated on the coast, and also gas distribution companies which lead indirectly to homes.
Nationally Significant Infrastructure Project (NSIP)	The Project constitutes a Nationally Significant Infrastructure Project (NSIP) by virtue of s.14(1)(a) and s.15 of the PA 2008 which include within the definition of a NSIP any onshore generating station in England or Wales of 50 MW capacity or more.
Natural Resources Wales (NRW)	The principal adviser to the Welsh Government on the environment, enabling the sustainable development of Wales' natural resources for the benefit of people, the economy and wildlife.
Nitrous Oxides (NO _x)	Gases produced during combustion, including nitric oxide (NO) and nitrogen dioxide (NO ₂).
noise	Noise defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB i.e 50dB + 50dB = 53 dB. Increases in continuous sound are perceived in the following manner: <ul style="list-style-type: none"> • 1dB increase – barely perceptible • 3dB increase – just noticeable • 10dB increase – perceived as twice as loud
Noise Sensitive Receptor (NSR)	Principally houses (existing or for which planning consent is being sought / has been given) and any building used for long-term residential purposes (such as a nursing home).
Non-Technical Summary (NTS)	A report which briefly describes the main points discussed in the Environmental Statement in a clear manner, without the use of technical jargon and phraseology.
National Planning Policy Framework (NPPF)	A document that sets out government's planning policies for England and how these are expected to be applied
Ordnance Survey (OS)	Great Britain's national mapping agency.
Original Equipment Manufacturers (OEM)	The organisation that was responsible for the original manufacture of the object in question.
particulate matter	Solid particles or liquid droplets suspended or carried in the air.
peaking plant	Peaking plants are operated when there is a stress event.
Phase 1 Habitat Survey	An ecological survey technique that provides a standardised system to record vegetation and wildlife habitats. It enables a basic assessment of habitat type and its potential importance for nature conservation.

photomontage	A type of visualisation or illustration that is based on photographs and that simulates the likely appearance of a proposed development in the photographic view. Photomontages are used as illustrations of the professional judgement of a landscape professional as to the significance of the effect of a project on landscape and visual receptors.
PIG Trap Facility (PFT)	PIG traps allow PIGs to be inserted into and removed from a pipeline which is to undergo a “pigging” program and which is likely to be under pressure. The PFT forms part of the AGI and therefore the Gas Connection.
Pipeline Inspection Gauge (PIG)	Means a device to perform various maintenance operations on a pipeline.
Pipeline	The new underground gas pipeline connection proposed as part of the Gas Connection.
Planning Act 2008 (PA 2008)	UK legislation which passes responsibility for examining Development Consent Order (DCO) Applications for NSIPs to the Planning Inspectorate, who will examine applications and make recommendations for a decision by the relevant Secretary of State (the Secretary of State for Energy and Climate Change in the case of energy NSIP applications).
Planning Inspectorate (PINS)	The work of PINS includes examining national infrastructure planning under the Planning Act 2008 process; processing planning and enforcement appeals; holding examinations into local plans and community infrastructure levy charging schedules on behalf of the SoS.
Planning Policy Wales (PPW)	Planning policy, decision-making, development plans, research and statistics for Wales.
Preliminary Environmental Information Report (PEIR)	The report that provides information referred to in Part 1 of Schedule 4 of the EIA Regulations (information for inclusion in Environmental Statements) which has been compiled by the Applicant; and is reasonably required to assess the environmental effects of the development (and of any associated development).
Power Generation Plant	A SCGT gas fired ‘peaking’ power generating plant capable of providing up to 299 MW comprising: the Generating Equipment; Access Road; and temporary Laydown Area. It will be located within the Power Generation Plant Site.
Project	The Power Generation Plant, Electrical Connection and Gas Connection located on the Project Site.
Peak Particle Velocity (PPV)	A term used to measure vibration through a solid surface. When a vibration is measured, the point at which the measurement takes place can be considered to have a particle velocity.
Project Site	The entire area covered by or required in order to deliver the Project.
Public Right of Way (PROW)	A right of passage by the public over the surface of the land without impediment. Public Rights of Way include public

	footpaths, bridleways and byways open to all traffic as well as Restricted Byways.
receptor	A component of the natural, created or built environment such as a human being, water, air, a building, or a plant that has the potential to be affected by the Project.
Reciprocating Gas Engine (RGE)	An engine that employs the expansion of hot gases to push a piston within a cylinder, converting the linear movement of the piston into the rotating movement of a crankshaft to generate power.
Remote Operable Valve (ROV)	A valve which forms part of the Minimum Offtake Connection.
residual effects	Those effects of a development that cannot be mitigated following implementation of mitigation proposals.
Restricted Byways	Rights of way along which it is legal to travel by any mode (including on foot, bicycle, horse-drawn carriage etc.) but excluding 'mechanically propelled vehicles'.
Rochdale Envelope	The Rochdale Envelope allows for a project to evolve over a number of years, within clearly defined parameters. The EIA takes account of the need for such evolution, within those parameters, and reflects the likely significant effects of such a flexible project in the ES.
ruderal	Plant species typical of the early stages of colonisation of disturbed ground, often short-lived species, or the community formed by a collection of such species in recently disturbed habitat.
Scheduled Monument	A building included in the Schedule of Monuments compiled under Section 1 of the Ancient Monuments, and Archaeological Area Act 1979. Scheduled Monuments have statutory protection under this Act (Section 2) and an application for Scheduled Monument Consent must be made to the Secretary of State for Culture, Media and Sport if work to a Scheduled Monument is proposed.
Scoping	An exercise undertaken pursuant to regulation 8 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 to determine the topics to be addressed within the Environmental Statement.
Screening	Consideration as to whether an environmental impact assessment is required for a project.
Secretary of State (SoS)	The decision maker for a NSIP application and head of a government department.
Simple Cycle Gas Turbine (SCGT)	Gas plant technology system comprising Gas Turbine(s) fuelled by natural gas. The hot exhaust gases are routed directly to the stack without passing through a secondary steam turbine. The generating technology used for the Power Generation Plant.
Site of Importance for Nature Conservation (SINC)	Sites of Importance for Nature Conservation are usually selected within a local authority area and support both locally and nationally threatened wildlife. Many sites will

	contain habitats and species that are priorities under the county or UK Biodiversity Action Plans (BAP).
Site of Special Scientific Interest (SSSI)	A site statutorily notified under the Wildlife and Countryside Act 1981 (as amended) as being of special nature conservation or geological interest. SSSIs include wildlife habitats, geological features and landforms.
The South East Wales Biodiversity Records Centre (SEWBREC)	The centre for the collation, management and dissemination of biodiversity data for South East Wales.
South Wales Trunk Road Agent (SWTRA)	responsible for managing, maintaining, and improving the motorways, trunk roads and associated assets throughout the South Wales region on behalf of the Welsh Assembly Government
Special Area of Conservation (SAC)	Areas of protected habitats and species as defined in the European Union's Habitats Directive (92/43/EEC).
Special Protection Area (SPA)	Sites classified in accordance with Article 4 of the EC Birds Directive (79/409/EEC) which came into force in April 1979. They are classified for rare and vulnerable birds (as listed on Annex 1 of the Directive), and for regularly occurring migratory species.
Special Purpose Vehicle	A legal entity created to fulfil the specific purpose of developing projects.
species	A group of interbreeding organisms that seldom or never interbreed with individuals in other such groups, under natural conditions; most species are made up of subspecies or populations.
stack	The structure by which the exhaust gases and waste heat are emitted to the atmosphere. Their height would be between 30m-35m and would contain a silencer to reduce noise emissions. The exhaust gases would be subject to emissions control abatement.
Statement of Community Consultation (SoCC)	A statement describing how the promoter (applicant) proposes to consult the local community about the proposals.
stress event	A surge in demand for electricity associated with a particular event (e.g. where many people across the country boil kettles following the end of a popular television programme or where there is a sudden drop in power being generated from plants which are constantly operational (e.g. a sudden outage).
Sustainable Drainage System (SuDS)	Sustainable management practices designed to control the rate and quality of surface water runoff into receiving waters, for example the use of swales and wetlands as buffers, as opposed to conventional drainage practices.
Site Waste Management Plan (SWMP)	A document that provides guidance on the effective management of materials and waste of a scheme.
Technical Advice Note (TAN)	Welsh Government papers which provide more detailed technical guidance notes to supplement policy documents.

topography	The natural or artificial features, level and surface form of the ground surface.
Transport Assessment (TA)	A quantitative assessment of transport effects of construction and operational phases of the Project.
Unitary Development Plan (UDP)	An old-style development plan prepared by a metropolitan district and some unitary local authorities that contains policies equivalent to those in both a structure plan and a local plan
United Kingdom	The territory of the United Kingdom
Valued Ecological Receptor (VER)	Species and habitats present within the zone of influence of the Project that are of sufficiently high value that an effect upon them as a result of the Project could be considered to be significant.
visual amenity	The value of a particular area or view in terms of what is seen.
visual effect	Change in the appearance of the landscape from available viewpoints as a result of development.
Water Framework Directive (WFD)	A European Union directive which commits European Union member states to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one nautical mile from shore) by 2015.
Water Protection Zone (WPZ)	An area which contains water bodies that are polluted by human activities.
Watt Power Limited (WPL)	Watt Power Limited was established to develop flexible gas fired generation assets to support the UK Government drive to a low carbon economy. WPL has set up Abergelli Power Limited (APL), a Special Purpose Vehicle to develop the Project.
Welsh Government	The executive branch of the devolved government in Wales.
Written Scheme of Investigation (WSI)	An archaeological method statement.
Zone of Theoretical Visibility (ZTV)	Areas from which a specified element of a development may be visible.