PARSONS BRINCKERHOFF

Hirwaun power

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Hirwaun Power Project

Preliminary Environmental Information Report

[PEIR]

Hirwaun Power Limited

CONTENTS

LIST OF ABBREVIATIONS

ACC	Air Cooled Condenser
AEL	Associated Emissions Levels
AES	Annual Energy Statement
AGI	Above Ground Installation
AQMA	Air Quality Management Area
AQS	Air Quality Standards
BAT	Best Available Technique
BBNPA	Brecon Beacons National Park Authority
BGS	British Geological Survey
BPD	Building Proximity Distance
CCGT	Combined Cycle Gas Turbine
CCR	Carbon Capture Readiness
CCS	Carbon Capture and Storage
CEMP	Construction Environmental Management Plan
CHP	Combined Heat and Power
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CSM	Conceptual Site Model
DAS	Design and Access Statement
DBA	Desk Based Assessment
DCS	Distributed Control System
DECC	Department for Energy and Climate Change
DEFRA	Department for Environment, Food & Rural Affairs
DCO	Development Consent Order
EC	European Community
EfW	Energy from Waste
EIA	Environmental Impact Assessment
ELV	Emission Limit Value
EMR	Electricity Market Reform
ES	Environmental Statement

EU	European Union
GCN	Great Crested Newt
GGAT	Glamorgan and Gwent Archaeological Trust
GT	Gas Turbine
HER	Historic Environment Record
HPL	Hirwaun Power Limited.
HPP	Hirwaun Power Project
HRSG	Heat Recovery Steam Generator
IAQM	Institute of Air Quality Management
IDB	Internal Drainage Board
IEA	Institute of Environmental Assessment
IED	Industrial Emissions Directive
IGE	Institute of Gas Engineers
IPC	Infrastructure Planning Commission (Now abolished and references to "IPC" should be read as "PINS" or "the Secretary of State", as appropriate).
IPPC	Integrated Pollution Prevention and Control
km	Kilometres
kV	Kilovolt
LCA	Landscape Character Assessment
LCPD	Large Combustion Plant Directive
LTS	Local Transmission System
LVIA	Landscape and Visual Impact Assessment
m	Metres
m^2	Metres Squared
mm	Millimetres
MOC	Minimum Offtake Connection
MWe	Mega Watt Electrical
MWth	Mega Watt Thermal
NGC	National Grid Company
NGET	National Grid Electricity Transmission
NO_x	Nitrous Oxides

NPS	National Policy Statement
NRW	Natural Resources Wales
NSIP	Nationally Significant Infrastructure Project
NSR	Noise Sensitive Receptor
NTS	National Transmission System
PA 2008	Planning Act 2008
PIG	Pipeline Inspection Gauge
PINS	The Planning Inspectorate
PPW	Planning Policy Wales
PTF	Pig Trap Facility
RCTCBC	Rhonda Cynon Taf County Borough Council
RGE	Reciprocating Gas Engine
ROV	Remotely Operable Valve
SAC	Special Areas of Conservation
SCGT	Simple Cycle Gas Turbine
SCR	Selective Catalytic Reduction
SoS	Secretary of State
SO_x	Sulphur Oxides
SPA	Special Protection Areas
SPV	Special Purpose Vehicle
SSSI	Site of Special Scientific Interest
SWMP	Site Waste Management Plan
TA	Transport Assessment
TAN	Technical Advice Note
UK	United Kingdom
UK-D	United Kingdom Distribution
UK-T	United Kingdom Transmission
USA	Updating and Screening Assessment
WG	Welsh Government
WFD	Water Framework Directive
WPL	Watt Power Limited.

WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Overview

1.1.1 This document is the Preliminary Environmental Information Report (PEIR) for the Hirwaun Power Project. It has been prepared by Parsons Brinckerhoff on behalf of Hirwaun Power Limited (HPL).

1.1.2 HPL is promoting a new thermal generating station (hereafter referred to as the Power Generation Plant) on land at the Hirwaun Industrial Estate, in Aberdare, South Wales (approximate grid reference SN 938 061). The Project Site location is shown in Figure 1.1.

1.1.3 The Power Generation Plant will operate as a Simple Cycle Gas Turbine (SCGT) peaking plant and will be designed to provide an electrical output of up to 299 Megawatts electrical (MWe). The plant will be fuelled by natural gas, supplied to the Power Generation Plant Site by a new gas pipeline connecting the Power Generation Plant to the existing National Gas Transmission system (NTS).

1.1.4 Peaking plants are required to operate when there is 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 plant which are constantly operational (e.g. a sudden outage).

1.1.5 Operating as a peaking plant, the proposed Power Generation Plant will also help to 'balance out' the grid at times of peak electricity demand and will help to support the grid at times when other technologies (e.g. wind and solar farms) cannot generate electricity due to their intermittent operation and reliance on weather conditions. Peaking plant are therefore vital in 'evening out' the power in the grid. The Power Generation Plant would operate for up to 1500 hours per year (as per the definition of a peaking plant defined by DECC).

1.1.6 The Project constitutes a Nationally Significant Infrastructure Project (NSIP) under the terms of the Planning Act 2008 (PA 2008) and therefore an application for a development consent order (DCO) is proposed to be made to the Secretary of State (SoS) (the proposed DCO Application).

1.1.7 The three main elements of the Project comprise:

- A new **Power Generation Plant**, a SCGT gas fired 'peaking' power generating station capable of providing up to 299 MWe;

- A new electrical connection either by underground cable or overhead line (referred to as the **'Electrical Connection'**) to export electricity from the Power Generation Plant into the National Grid; Rhigos Substation and
- A new underground gas pipeline connection (referred to as the **'Gas Connection'**) to bring natural gas to the Power Generation Plant from the existing high pressure gas network NTS in the vicinity of the Project Site.

1.1.8 The proposed Power Generation Plant, Gas Connection and Electrical Connection together with all access requirements are referred to as the **Project** and are all integral to the generation of electricity and the subsequent export of that electricity to the National Grid. The proposed DCO Application includes the whole of the Project.

1.2 Structure of the PEIR

1.2.1 This PEIR has been prepared in distinct sections to allow the reader to fully understand the Project, the purpose of the document, the regulatory framework in which it has been prepared, and the proposed methodology for undertaking the Environmental Impact Assessment (EIA).

1.2.2 The PEIR is set out as follows:

- **Section 1** Comprises a description of the developer, a brief description of the Project, an introduction to the consenting regime, the need for and benefits of the Project, and the consultation strategy;
- **Section 2** Provides a brief description of the planning policy background and regulatory framework in which the PEIR has been prepared;
- **Section 3** Provides a description of the Project Site and surrounding area, and includes a more detailed description of the Power Generation Plant, Gas Connection and Electrical Connection, together with all access requirements;
- **Section 4** Provides a description of the Methodology employed in undertaking the EIA for the Project;
- **Section 5** Provides a description of alternatives which have been considered; and
- **Sections 6 to 16** then provide a description of the environmental assessment information which has been gathered to date under specific environmental topics, as well as details of the next steps required to complete the EIA process.

1.3 Application for an Order Granting Development Consent

1.3.1 As the generation capacity of the Power Generation Plant will exceed 50MWe it is classed as an NSIP and therefore Development Consent is required under the PA 2008.

1.3.2 Development Consent for a NSIP may only be granted by a DCO through an application under Section 37 of the PA 2008 to the Secretary of State (SoS). Section 37 of the PA 2008 also governs the content of an application for a DCO, including the requirements for the necessary accompanying documents. These requirements are specified in the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 ("APFP Regulations").

1.3.3 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (the EIA Regulations) require an EIA to be carried out in respect of development that is classed as EIA development. All development in Schedule 1 to the EIA Regulations ("Schedule 1 development") requires EIA. Development in Schedule 2 to the EIA Regulations ("Schedule 2 development") requires EIA if it is likely to have significant effects on the environment.

1.3.4 The definition of a Schedule 1 development includes thermal generating stations with a heat output of 300 MWth or more (Schedule 1 paragraph 2(a)).

1.3.5 The thermal output of the Power Generation Plant will be greater than 300MWth and therefore an EIA will be required under the EIA regulations[1].

1.3.6 Section 5(2)(a) of the APFP Regulations, requires that any Environmental Statement (ES) required pursuant to the EIA Regulations, together with any scoping or screening opinions or directions, must accompany the DCO Application.

1.4 Need for and Benefits of the Project

1.4.1 This section briefly summarises why the Project is needed and how it would contribute towards ensuring greater reliability of electricity supply in the UK. A fuller needs case will be presented within the DCO Application.

[1] Thermal output is commonly defined as the amount of 'useable heat' which is produced as part of the process of the combustion of fuel. Only a part of this useable heat can be converted to electrical energy, which is why this is a larger value than electrical output.

1.4.2 Under Section 31 of the PA 2008 a DCO is required to authorise an NSIP. In England and Wales, an onshore electricity generating station is considered to be a NSIP if the generating capacity is greater than 50 MWE. As the generation capacity of the Power Generation Plant will exceed this threshold, development consent is required. When determining the DCO Application the SoS must have regard to, *inter alia*, any relevant National Policy Statements (NPSs) designated in respect of that type of infrastructure. Further explanation of the decision-making process under the PA 2008 is set out in Section 2.3 of this PEIR.

1.4.3 The overarching NPS for Energy is NPS EN-1 which is one of the relevant NPSs for this Project, alongside EN-2, EN-3 and EN-5. (See Section 2). EN-1 sets out national policy for energy infrastructure and explains the need for such infrastructure.

1.4.4 NPS EN-1 re-affirms the transitional role of new gas generation, confirms that a diverse energy mix is required and that there is a significant need for new energy generation infrastructure to replace capacity that will be lost through the closure of existing large coal plant. Indeed it states that the decision-maker 'should start with a presumption in favour of granting consent to applications for energy NSIPs' (paragraph 4.1.2).

1.4.5 NPS EN-1 therefore establishes the general need case for energy NSIPs, including gas generation. This has been preceded and followed by other government policy and evidence, some of which is summarised below to provide further context.

1.4.6 Paragraph 3.6.1 of NPS EN-1 confirms that gas generation will play an important role in the UK's energy mix, "Fossil fuel power stations play a vital role in providing reliable electricity supplies: they can be operated flexibly in response to changes in supply and demand, and provide diversity in our energy mix. They will continue to play an important role in our energy mix as the UK makes the transition to a low carbon economy..."

1.4.7 Section 3.7 of NPS EN-1 sets out the need case for new electricity network infrastructure.

1.4.8 Paragraph 3.7.10 states that ".....there is an urgent need for new electricity transmission and distribution infrastructure (and in particular for new lines of 132 kV and above) to be provided. The [SoS] should consider that the need for any given proposed new connection or reinforcement has been demonstrated if it represents an efficient and economical means of connecting a new generating station to the transmission or distribution network, or reinforcing the network to

ensure that it is sufficiently resilient and has sufficient capacity (in the light of any performance standards set by Ofgem) to supply current or anticipated future levels of demand" (Paragraph 3.7.10).

1.4.9 To ensure that there is reliability of supply, it is government policy that the electricity generation mix needs to incorporate a balance of technologies that continuously and reliably produce stable and controllable power and that within this scenario, gas-fuelled electricity generating technologies can play a significant role. Thus in the second Annual Energy Statement (AES) (November, 2011), the Department of Energy and Climate Change (DECC) directed the need to build new power generation infrastructure. In line with this requirement, DECC acknowledged the need for gas to continue to feature strongly in the energy mix, and also stated that while it is important that businesses play their part in the transition to a low-carbon economy, it is also important to remain competitive.

1.4.10 These statements are supported by the more recent Gas Generation Strategy, released by DECC in December 2012[2]. The Strategy sets out the important role that gas generation—as a reliable, flexible source of electricity—will play in any future generation mix, supporting a secure, low-carbon and affordable electricity system. It states that "Gas currently forms an integral part of the UK's generation mix and is a reliable, flexible source of electricity. Using gas as a fuel in our power stations currently provides a significant proportion of our electricity generation (around 40% in 2011)".

1.4.11 Moreover, it suggests that there could be as much as 26 gigawatts (GW) of new gas generation infrastructure required if the decarbonisation target is set at 200g/CO_2/kWh. It also indicates that in 2030 we could need more overall gas capacity than we have today, although operating at lower load factors. The modelling shows that gas could play a more extensive role, with higher load factors, should the 4th Carbon Budget be revised upwards" (Executive Summary).

1.4.12 The strategy also presents scenarios which indicate that up to 41 GW of new gas generation capacity will be needed by 2030 to underpin long term electricity supplies and provide back-up to nuclear and wind generation at times of peak demand.

1.4.13 In October 2012, Ofgem (the electricity and gas regulatory body) prepared a report entitled 'Electricity Capacity Assessment' which was submitted to the SoS and estimates a set of plausible electricity

[2] http://www.decc.gov.uk/en/content/cms/meeting_energy/oil_gas/gasgenstrat/gasgenstrat.aspx#

capacity margins that could be delivered by the market over the next four years and the associated risks to security of supply.

1.4.14 One of the key findings of the Ofgem report is that electricity supply will decrease significantly from the current historically high levels. This is primarily because of a significant reduction in electricity supplies from coal and oil plants, which are due to close under European environmental legislation. An updated Electricity Capacity Assessment report issued by Ofgem in June 2013 has indicted that the risks to electricity security of supply over the next six winters have increased since the report in October 2012.

1.4.15 Furthermore, the Welsh Government (WG) publication, 'Energy Wales – a Low Carbon Transition' states that

"Gas will be a key transitional fuel because greenhouse gas emissions from gas are significantly less than coal subject to the method of extraction. Gas is a flexible, responsive and reliable source of energy which can play a key role in the transition to a genuinely low carbon energy system".

1.4.16 In the short term, gas, nuclear and bio-energy will provide the energy to compensate for the intermittency in supply from renewable resources" (Page 10 of the Low Carbon Transition Statement).

1.4.17 With the large number of wind turbines that are now providing electricity to the National Grid and the many proposals for further wind turbines onshore and offshore, coupled with proposed solar farm developments including in South Wales, significant consideration is being given to the need for flexible / peaking power on the network. Parsons Brinckerhoff's "Powering the Future" report[3] which maps the route to a low carbon economy, has predicted that up to 9,000 MW of flexible power would be needed by 2050 to help stabilise the National Grid due to the increased level of intermittent supply.

1.4.18 At present, thermal peaking capacity in the UK is relatively small due to the nature of the electricity generation mix on the Grid. Although recently there has been a significant increase in the number of proposals for flexible / peaking plant in the UK, a large proportion of these are focussed on small capacity (c 20MWe) liquid fuel fired plants.

1.4.19 Given the above, there is therefore a clear and significant requirement for further capacity to meet the projected need for reactive/flexible

[3] Powering the Future, Mapping our low carbon path to 2050, Parsons Brinckerhoff, 2010

generation. A dedicated gas fired peaking plant at the Power Generation Plant Site could allow for the rapid provision of reserve capacity to the National Grid, thus playing a role in meeting the energy requirements of the UK going forward.

1.5 The Developer

1.5.1 The Developer of the proposed Project is HPL.

1.5.2 HPL is the Special Purpose Vehicle (SPV) which has been set up to develop the Project and has been established by Watt Power Limited. (WPL). WPL has been established to develop flexible gas fired generation assets to support the UK Government drive to a low carbon economy. WPL is resourced through Stag Energy, a company founded in 2002. The company draws on a depth of experience with 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 was delivered in the UK.

1.5.3 Similarly, Stag Energy provides resources to WPL. Stag Energy has recently also provided resources to the Gateway Storage Company Ltd, which is developing an offshore salt cavern gas storage facility in the East Irish Sea. The project has been consented by the UK Government and the local planning authority (Barrow-in-Furness, Cumbria) (for further information on the project visit: www.gatewaystorage.co.uk).

1.5.4 WPL and HPL are committed to the development of assets to support the UK Government drive to a low carbon economy. WPL and HPL recognise the need to balance commercial benefits with the environmental issues and concerns of energy projects and believe this can be responsibly delivered at a local level.

1.5.5 HPL is also committed to acting in a socially and environmentally responsible manner. As part of this policy, HPL will seek the views and concerns of the local community and have regard to them in preparing the proposed DCO Application. The Project and supporting infrastructure will be designed and developed to high quality, safety and environmental standards.

1.5.6 For further details on HPL and WPL, please visit: http://www.hirwaunpower.co.uk or http://www.wattpowerltd.co.uk

1.6 Purpose of this Document

Preliminary Environmental Information

1.6.1 As explained in Section 1.3, the Project is an EIA development under the EIA Regulations. As a result HPL is carrying out an EIA of the Project. Under Regulation 10(b) of the EIA Regulations HPL must consult on preliminary environmental information relating to the Project. That information has been compiled into this document, which is a PEIR. The PEIR represents the environmental information and assessments which have been completed to date.

The Consultation Process

1.6.2 This PEIR has been compiled to enable HPL to consult upon the proposed DCO Application in advance of submitting an application by providing up-to-date information about the Project. This pre-application consultation is a requirement under section 47 of the PA 2008. This PEIR has been published in the manner described in HPL's Statement of Community Consultation (SoCC), which explains how HPL proposes to consult those living in the vicinity about the proposed Project. The SoCC explains how feedback can be given about the proposed Project and the content of this PEIR.

1.6.3 This PEIR is intended to provide an assessment, on a preliminary basis, of the likely significant environmental effects of the Project. The proposed DCO Application is still being developed and refined. In particular, decisions are still to be made on the two route corridor options for the Gas Connection and Electrical Connection, as well as the layout of the plant within the Power Generation Plant Site. These options are described in more detail in Section 4. Feedback received during the consultation process will help inform the development of the proposed Project and the decisions on it still to be made.

Environmental Impact Assessment

1.6.4 The preliminary environmental information presented in this PEIR will be developed further in light of the consultation responses received and the methodologies proposed herein as part of the EIA process. The results of the EIA will ultimately be presented in an ES that will accompany the proposed DCO Application.

1.6.5 Before starting the EIA, HPL requested a Scoping Opinion from the SoS. This request was made on the 31st May 2013, and was supported by a Scoping Report entitled 'Hirwaun Power Project Environmental Impact Assessment Scoping Report'. This Scoping Report is available at the Planning Inspectorates website and HPL's website. It describes the key anticipated environmental issues that would require detailed evaluation as part of the EIA process and the methodologies proposed to assess these impacts. Rhondda Cynon Taf County Borough Council (RCTCBC) and other local and national

bodies were consulted by PINS on the Scoping Opinion and responded.

1.6.6 A Scoping Opinion was subsequently issued by the SoS and this is also available on the Planning Inspectorates website. . The EIA process and this PEIR take the Scoping Opinion and the consultation responses provided by the SoS into account.

1.6.7 In preparing this document due regard has been paid to advice and good practice such as:

- Planning Inspectorate - Advice note three: EIA consultation and notification - Republished July 2013 (version 5)
- Planning Inspectorate - Advice note seven: Environmental Impact Assessment, screening and scoping - Republished July 2013 (version 4)
- Appropriate guidance and legislation relevant to specific environmental topics, as described in each topic Section in this PEIR.

SECTION 2

REGULATORY AND POLICY BACKGROUND

2 REGULATORY AND POLICY BACKGROUND

2.1 Introduction

2.1.1 This section of the PEIR outlines the main regulatory and policy framework that is relevant to the proposed Project.

2.1.2 Relevant EU directives are considered first, at a high level.

2.1.3 This section also gives an overview of the current and emerging policies relevant to the Project at the national, regional and local levels as they relate to the consideration of the likely scope of EIA.

2.1.4 Further 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 to support the proposed DCO Application. A summary of relevant and important planning policy will also be presented more fully within the ES.

2.2 European Union (EU)

2.2.1 Current EU directives of particular relevance to the Project with respect to environmental requirements are as follows:

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

2.2.2 The EIA Directive ensures that plans, programmes and projects likely to have significant effects on the environment are made subject to an environmental assessment, prior to their approval or authorisation. The Directive sets the thresholds for projects that require an EIA (as stated in Section 1.3) and also outlines the impacts on the environment to be assessed in the EIA process. This Directive is implemented in the respect of NSIPs in the UK by the EIA Regulations.

Directive 2003/35/EC of 26 May 2003 (the Public Participation Directive)

2.2.3 The Public Participation Directive implements the obligations arising from the Århus Convention and amends the EIA Directive and the Integrated Pollution Prevention and Control (IPPC) Directive (see 2.2.4 below) to improve public participation.

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

2.2.4 In December 2010 the EU adopted a Proposal for a Directive on industrial emissions (IED). The IED recasts seven existing directives related to industrial emissions, in particular Directive 2008/1/EC of 15 January 2008 concerning integrated pollution prevention and control (the IPPC Directive) and Directive 2001/80/EC of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants (the Large Combustion Plant Directive (LCPD)), into a single legislative instrument to improve the permitting, compliance and enforcement regimes adopted by Member States. However, the general principles of the IPPC Directive and the LCPD Directive described below are retained and will remain relevant to the Project.

2.2.5 The purpose of the IPPC Directive was to achieve integrated prevention and control of pollution arising from certain potentially polluting processes and to ensure a high level of protection for the environment taken as a whole. Measures were laid down to prevent or, where that is not practicable, to reduce emissions in the air, water and land with the introduction of emission limit values (ELV) and best available techniques (BAT). With regard to power projects, combustion installations with a rated thermal input exceeding 50 MW are subject to the IPPC Directive. The IPPC Directive is transposed into UK legislation via the Environmental Permitting (England and Wales) Regulations 2010 (as amended) and the IED is to be transposed through amendments to the Environmental Permitting (England and Wales) Regulations 2010. An Environmental Permit will be required for the operation of the Power Generation Plant.

2.2.6 The purpose of the LCPD was to limit the emissions of certain pollutants into the atmosphere from large combustion processes. The LCPD applied to combustion plants with a rated thermal input equal to or greater than 50 MW. The emissions of nitrogen oxides (NOx), sulphur dioxide (SO_2) and particulates were subject to the stringent ELVs stipulated in the LCPD. The LCPD requirements for new plant are implemented in the UK regulations by the Environmental Permitting (England and Wales) Regulations 2010.

Directive 1992/43/EEC of 21 May 1992 on the Conservation of natural habitats and of wild fauna and flora (the Habitats Directive)

2.2.7 The aim of the Habitats Directive is to contribute towards ensuring bio-diversity through the conservation of natural habitats and of wild fauna and flora. Measures taken pursuant to this Directive by the Member States are designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of community interest whilst also taking into account economic, social and cultural requirements and regional and local characteristics. The

Conservation of Habitats and Species Regulations 2010 implement the Habitats Directive in England and Wales.

Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds (the Birds Directive)

2.2.8 The Birds Directive provides a comprehensive scheme for the protection of wild bird species naturally occurring within the EU. The Directive places great emphasis on the protection of habitats suitable for supporting endangered and migratory species, introducing a system of Special Protection Area designation to protect important habitats. The Wildlife and Countryside Act 1981 and the Conservation of Habitats and Species Regulations 2010 implement the requirements of the Birds Directive in England and Wales.

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

2.2.9 Council Directive 96/62/EC on ambient air quality assessment and management (the Air Quality Framework Directive) described the basic principles of how air quality should be assessed and managed in the Member States. Subsequent 'Daughter Directives' introduced numerical limits, thresholds and monitoring requirements for a variety of pollutants including oxides of nitrogen and sulphur dioxide to guarantee that there are no adverse effects with regard to human health. The Air Quality Standards Regulations 2010 give effect, in England and Wales, to the Ambient Air Quality Directive.

2.3 Overview of Decision Making under the Planning Act 2008 & Policy Context

2.3.1 The Power Generation Plant, with its integral components, is categorised as a NSIP and therefore will be determined by the SoS under the regime established by the PA 2008.

2.3.2 Section 104 of the PA 2008, provides that in making decisions on DCO applications, the SoS must have regard to any relevant NPS and must decide applications in accordance with it unless the adverse impacts of the proposal would outweigh its benefits (or in certain other limited circumstances).

2.3.3 As set out in NPS EN-1, 'this NPS, when combined with the relevant technology-specific energy NPS, provides the primary basis for decisions' (paragraph 1.1.1) and that the SoS 'should start with a presumption in favour of granting consent to applications for energy NSIPs' (paragraph 4.1.2).

2.3.4 Section 104 of the PA 2008 also requires the SoS to have regard to any Local Imapct Report and other matters which the SoS "thinks are both important and relevant to the Secretary of State's decision". These matters may include the Development Plan Documents or other documents in the Local Development Framework.

2.3.5 Indeed, Paragraph 4.1.5 of NPS EN-1 states "other matters that the SoS may consider both important and relevant to [his] decision making (see paragraph 2.3.2 above) may include Development Plan Documents or other documents in the Local Development Framework. In the event of a conflict between these or any otherf documents and an NPS, the NPS prevails for purposes of decision making given the national significance of the infrastructure".

2.3.6 The proposed DCO Application will be examined by the SoS either by a single commissioner or a panel, which will submit a report containing a recommended decision to the Secretary of State who takes the final decision as to whether to grant a DCO for the proposed Project.

2.4 National Policy Statements

2.4.1 The NPSs which are relevant to the consideration of the proposed DCO Application are:

- NPS EN-1The Overarching National Policy Statement for Energy ;
- NPS EN-2 National Policy Statement for Fossil Fuel Electricity Generating Infrastructure ;
- NPS EN-4 National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines; and
- NPS EN-5 National Policy Statement for Electricity Networks Infrastructure

2.4.2 NPS EN-1 contains government policy on energy and energy infrastructure development, representing the needs case for any proposal for an energy NSIP.

2.4.3 NPS EN-1 recognises that there is a significant need for new energy infrastructure. It states that pending plant closures in the UK will reduce available capacity by 22 GW by 2020 as a result of tightening environmental legislation and older power stations approaching the end of their useful life (paragraphs 3.3.7 to 3.3.9).

2.4.4 NPS EN-1 also sets out guidance on the consideration of alternatives when developing a new energy generation project (paragraphs 4.4.2-

4.4.3) and guidance relating to criteria for 'good design' of new developments (Section 4.5)

2.4.5 Specific guidance on good design is also provided in NPS EN-2, including that "applicants should demonstrate good design particularly in respect of landscape and visual amenity (…) and in the design of the project to mitigate impacts such as noise and vibration, transport impacts and air emissions." (Paragraph 2.3.16).

2.4.6 In Section 4.6 of EN-1, the consideration of Combined Heat and Power (CHP) is denoted as an assessment principle in itself and references to other guidance and viability considerations are set out. It is stated that applicants should consider CHP from the earliest point and it should be a criterion for site selection (paragraph 4.6.7).

2.4.7 Section 4.8 of NPS EN-1 also sets out how applicants and the SoS should take the effects of climate change into account when developing and consenting NSIPs. Paragraph 4.8.11 requires any adaptation measures to be based on the latest set of UK Climate Projections, the Government's latest UK Climate Change Risk Assessment (when available) and in consultation with the Environment Agency (or Natural Resources Wales in the case of the Project).

2.4.8 Other assessment principles that are particularly likely to be relevant to energy NSIPs are set out as follows in EN-1 (relevant paragraph numbers given in brackets):

- Pollution control (4.10) describes the relationship with other regimes (e.g. Environmental Permitting) which is essentially that the decision maker should be satisfied that "potential releases can be adequately regulated under the pollution control framework" without unacceptable cumulative impacts arising;

- Safety (4.11) and Hazardous Substances (4.12): describes the relationship with other regimes and the general requirement that the decision maker will need to be satisfied that they are complied with.

- Health (4.13): requires that an assessment of potential health impacts is made in relation to each element of the project, such as in relation to air quality, waste or noise and describing the relationship with other regimes, stating at 4.13.5 that where separate air quality regulations are (or will be) satisfied then the decision maker is likely to consider these effective mitigation, whereas for noise or other aspects it will take account of health concerns when setting requirements.

- Nuisance and amenity (4.14): the relationship with common law nuisance, statutory nuisance, and the importance to be attached by the SoS to their consideration during the determination process, are set out.

- Security (4.15): government policy is set out as being '*to ensure that, where possible, proportionate protective security measures are designed into new infrastructure projects at an early stage in the project development*' with documentary requirements and relationships to other guidance set out.

2.4.9 As well as generic assessment principles, EN-1 also identifies a generic list of impacts which could arise from an energy NSIP and criteria by which they should be assessed. These specific topics include ecology, landscape, noise and socio-economics. These topics are discussed in more detail when describing the preliminary assessment of impacts presented in this PEIR.

2.4.10 NPS EN-2 (Fossil Fuel Electricity Generating Infrastructure) supplements EN-1 in providing specific Government policy on fossil fuel generating NSIPs such as the Project. NPS EN-2 sets out a number of specific impacts that could arise from a fossil fuel generating NSIP and criteria by which they should be assessed. These specific topics include air quality, landscape and visual, noise and vibration, and water quality and resources. These topics are discussed in more detail when describing the preliminary assessment of impacts in this PEIR.

2.4.11 It is noted that the Gas Connection and Electrical Connection are below the relevant size thresholds to be categorised as NSIPs themselves. However, given the integral nature of these components they will form part of the proposed DCO Application. Accordingly, NPS EN-4 and EN-5 are recent and relate to a similar nature of development, they are likely to be important and relevant in the determination of the application in respect of these components.

2.4.12 The main provisions of these NPSs are set out below. Policies and assessment criteria pertaining to particular environmental topics are set out in the relevant topic chapter elsewhere in this PEIR.

2.4.13 NPS EN-4 sets government policy on the relevant considerations and factors that should be taken into account as to route selection for developers for, *inter alia*, gas pipeline NSIPs. The NPS sets out a number of impacts that could arise from such development and criteria by which they should be assessed. These specific topics include biodiversity, noise and vibration, soil and geology, and water quality and resources. These topics have been discussed in more detail when describing the preliminary assessment of impacts in this PEIR.

2.4.14 NPS EN-5 provides the primary basis for decisions taken by the SoS on applications it receives for electricity network NSIPs, including the relevant considerations and factors that should be taken into account related to route selection. The NPS sets out a number of impacts that could arise from such development and criteria by which they should be assessed. These specific topics include biodiversity and geological conservation, landscape and visual, noise and vibration, and Electric and Magnetic Fields. These topics have been discussed in more detail when describing the preliminary assessment of impacts in this PEIR.

2.5 Welsh Planning Policy

Planning Policy Wales (Edition 5, November 2012) (PPW) and Associated Technical Advice Notes (TAN)

2.5.1 'Planning Policy Wales' (PPW) sets out the land use planning policies of the Welsh Government (WG) and is supplemented by 21 topic based Technical Advice Notes (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. Both the PPW and TANs are material considerations in determining planning applications under the Town and Country Planning Act (TCPA) regime. It may be determined that these policy documents are relevant and important under the Planning Act (PA) 2008 regime.

2.5.2 Potentially relevant chapters of PPW are:

- Chapter 4 - Planning for Sustainability;
- Chapter 5 - Conserving and Improving Natural Heritage and the Coast;
- Chapter 7 - Economic Development;
- Chapter 12 - Infrastructure and Services; and
- Chapter 13 - Minimising and Managing Environmental Risks and Pollution.

2.5.3 Potentially relevant TANs to the proposed Project are:

- 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.

2.6 Local Planning Policy

Rhondda Cynon Taf Local Development Plan up to 2021 (2011)

2.6.1 The Rhondda Cynon Taf Local Development Plan up to 2021 was adopted by the Council in March 2011 and sets out *".....the framework for decisions to be made up until 2021 on how land is used in the County Borough, for example what type of development is appropriate or desirable and how best to protect our environment*".

2.6.2 The Local Development Plan provides part of the Development Plan against which applications under the TCPA regime are to be determined, and parts may be relevant and important under the PA 2008 regime.

2.6.3 Section 4 of the plan sets out the Core Strategy for Rhondda Cynon Taf and outlines the spatial strategy for guiding all future development and land use in the Borough. Section 5 sets out detailed area wide policies, and Section 6 outlines specific policies for the northern and southern areas of the Borough.

2.6.4 The area of Hirwaun Industrial Estate proposed for the development of the Power Generation Plant is designated in the Proposals Map as Policy CS 9 Waste Management. The Hirwaun Industrial Estate is identified as a regional site that is able to accommodate a range of waste management options to meet the capacity requirements set out in the South East Wales Regional Waste Plan. The Local Development Plan notes that "in identifying Hirwaun Industrial Estate as a suitable site for waste management, it is not the intention that the employment uses at the site should cease."

2.6.5 Other policies of the Local Development Plan of potential relevance to the proposed Project are:

- CS1 – Development in the North
- CS9 – Waste Management
- AW2 – Sustainable Locations
- AW5 – New Development
- AW6 – Design and Placemaking
- AW8 – Protection and Enhancement of the Natural Environment
- AW10 – Environmental Protection and Public Health

- AW12 – Renewable and Non-Renewable Energy
- NSA 12 – Housing Development within and adjacent to Settlement Boundaries
- NSA 14 – Employment Allocations
- NSA 15 – Small Industrial and Business Sites
- NSA 16 - Re-development of Vacant / Redundant Industrial Sites

2.7 Other Relevant Policy and Guidance

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

- The Electricity Market Reform (2012);
- A Low Carbon Revolution: Wales' Energy Policy Statement (2010);
- Environment Strategy for Wales (2006);
- Gas Generation Strategy (2012); and
- Turning Heads – A Strategy for the Heads of the Valleys (June 2006).
- Energy Wales – A Low Carbon Transition

2.7.2 A comprehensive review of potentially relevant policy and evidence will be undertaken during the pre application process.

<u>The Electricity Market Reform (2012)</u>

2.7.3 The Electricity Market Reform (EMR) has been developed to meet three main objectives:

- Ensuring the future security of electricity supplies;
- Driving the decarbonisation of electricity generation; and
- Minimising costs to consumers.

2.7.4 These measures are designed to provide both technical and economic encouragement for an increase in the development of low carbon technologies.

2.7.5 In terms of the proposed Project, one of the most relevant aims of the EMR is to provide ".... a mechanism to support security of supply, if needed, in the form of a Capacity Market" (Paragraph 23).

2.7.6 Although the EMR focuses heavily on the need for decarbonisation, there is also a strong focus on the need for security of supply and a mix of energy generation technologies on line at any one time. The EMR

also recognises that gas fired power generation will continue to play a crucial role in the UK energy mix going forward.

2.7.7 The Energy Bill will be the primary piece of legislation to come about as a result of the EMR, although it is currently at Committee Stage in the House of Lords. The Energy Bill seeks to enact the key drivers that are necessary to achieve the recommendations set out in the EMR.

A Low Carbon Revolution: Wales' Energy Policy Statement (2010)

2.7.8 In terms of energy production, the WAG reflects the UK policy position, the work of the UK Climate Change Commission and the UK National Policy Statements on Energy and Renewables through its Policy Statement: 'A Low Carbon Revolution: Wales' Energy Policy Statement, March 2010.' The statement sets out a framework for carbon reduction in Wales, provides targets and advice to LPAs for implementation of policy into LDPs.

2.7.9 The Energy Policy Statement aims to maximise energy savings and energy efficiency to make producing the majority of the energy Wales needs from low carbon sources that are more feasible and less costly. Secondly the statement recognises energy needs in a modern society will remain considerable, and must be met securely from low carbon sources.

2.7.10 It draws on the work of: the Wales Climate Change Strategy; the National Energy Efficiency and Savings Plan; the Green Jobs Strategy; and the Ministerial Advisory Group on Economy and Transport's report on "The Energy Sector".

2.7.11 The statement also reflects the UK policy position, the work of the UK Climate Change Commission and the UK National Policy Statements on Energy and Renewables.

The Environment Strategy for Wales (2006)

2.7.12 The Environment Strategy for Wales outlines the WAG's long term strategy for the environment of Wales, setting out the strategic direction for the next 20 years. The purpose of the Strategy is to provide a framework within which to achieve an environment that is clean, healthy, biologically diverse and valued by the people of Wales. The WAG wish to see the Welsh environment thriving and contributing to the economic and social well-being and health of all of the people of Wales.

Gas Generation Strategy (2012)

2.7.13 The Gas Generation Strategy sets out the Government's view on the need for gas energy generation and how the UK will address barriers to help build investor confidence and encourage the new capacity that the Government will need over the coming years. It sets out the required work to maintain gas supply security and ensure that the best use of this natural resource is implemented.

Turning Heads – A Strategy for the Heads of the Valleys (2006)

2.7.14 Turning Heads – A Strategy for the Heads of the Valleys 2020 outlines a strategy for regenerating the northern valley areas of South East Wales. In Rhondda Cynon Taf the strategy area includes Treorchy, Treherbert, Ferndale, Hirwaun, Mountain Ash and Aberdare. The objectives of the programme reflect those of the Wales Spatial Plan in seeking to ensure:

- An attractive and well used natural, historic and built environment;
- A vibrant economic landscape offering new opportunities;
- A well educated, skilled and healthier population;
- An appealing and coherent tourism and leisure experience, and
- Public confidence in a shared bright future.

SECTION 3

ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

3 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

3.1 Content of the Preliminary Environmental Information Report

3.1.1 As outlined in Section 1, this PEIR has been prepared to accompany the consultation process and is required under Regulation 10(b) of the EIA Regulations.

3.1.2 As also explained in Section 1, the proposed DCO Application will be accompanied by an ES. The information required to be included in the ES is set out in Part 1 of Schedule 4 of the EIA Regulations. This PIER contains such of this information as has been compiled by HPL and which is reasonably required to assess the environmental effects of the proposed Project.

3.1.3 The information presented in this PEIR represents the available environmental information in respect of the proposed Project at the time of writing, based on up-to-date desk top studies, field surveys and assessments. Where additional information or studies are required in order to complete assessment of the environmental impacts for the ES, this has been highlighted within this document. Details are also provided as to the additional research and assessments required to comprehensively gauge the environmental impact of the proposed Project.

3.1.4 Table 3.1 presents the information requirements set out in Part 1 of Schedule 4 of the EIA Regulations and indicates where the information requirements have been considered in the different sections of this PEIR.

Table 3.1: Information for Inclusion in Environmental Statements

Relevant Paragraph No of Schedule 4 to the EIA Regulations	Required Information	PEIR Reference
17	A description of the development, including in particular: A description of the physical characteristics of the whole development and the land-use requirements during the construction and operational phases; A description of the main characteristics of the production processes, for instance, nature and quantity of the materials used; An estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc) resulting from the operation of the proposed development.	Section 4 and Sections 6 to 15
18	An outline of the main alternatives studied by the applicant and an indication of the main reasons for the applicant's choice, taking into account the environmental effects.	Section 5
19	A description of the aspects of the environment likely to be significantly affected by the development, including, in particular, population, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the inter-relationship between the above factors.	Sections 6 to 15

Relevant Paragraph No of Schedule 4 to the EIA Regulations	Required Information	PEIR Reference
20	A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from: The existence of the development; The use of natural resources; The emissions of pollutants, the creation of nuisances and the elimination of waste, And the description by the applicant of the forecasting methods used to assess the effects on the environment.	Sections 6 to 15
21	A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment.	Sections 6 to 15
22	A non-technical summary of the information provided under paragraphs 1 to 5 of this Part.	Non-Technical Summary
23	An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant in compiling the required information.	Sections 6 to 15

3.1.5 This PEIR identifies some likely approaches to mitigation measures which are envisaged to avoid, reduce and, if possible, remedy any significant adverse impacts identified. For impacts that cannot be entirely remedied, this PEIR identifies the likely residual adverse impacts once the mitigation is considered. This PEIR is issued in the context of a consultation undertaken in accordance with Chapter 2 of Part 5 to the PA 2008. As such, it is intended that mitigation will be

further developed as a result of the consultation exercise and remains to be confirmed in the ES that will accompany the proposed DCO Application.

3.1.6 In due course, the information in this PEIR will be added to through consultation and the continuing work indicated, as is necessary, to allow for preparation and finalisation of a comprehensive ES that will accompany the DCO Application in respect of the proposed Project.

3.2 Methodology of the Environmental Impact Assessment

3.2.1 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 impacts resulting from the Project;
- Determining how the potential environmental impacts 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 impacts in conjunction with other impacts arising from the Project and those from other neighbouring developments and / or sources (in-combination and cumulative impacts); and
- Proposing options as to how any significant residual impacts will be mitigated, managed and monitored.

3.2.2 A brief description of these steps is provided here.

<u>Establishing the Scope of the Environmental Impact Assessment</u>

3.2.3 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, HPL first met Rhonda Cynon Taf County Borough Council (RCTCBC) to discuss the Project in April 2011. HPL is continuing to consult with RCTCBC throughout all phases of the Project.

3.2.4 Before commencing the EIA, HPL requested a Scoping Opinion from PINS in May 2013. The request was supported by a Scoping Document that described the key anticipated environmental issues that would require detailed evaluation as part of the EIA process. The formal Scoping Opinion was received in July 2013, and has allowed for agreement on the likely significant environmental impacts of the Project and, therefore, the aspects of the environment on which the EIA should focus.

3.2.5 The Scoping Report can be found on the Planning Inspectorates website and HPLs website; the Scoping Opinion can also be found on the Planning Inspectorates' website.

Establishment of 'Worst Case Scenario'

3.2.6 The Project Scoping Report, submitted to PINS in May 2013 set out a number of potential development alternatives to generate up to 299MWe at the Project Site. These development alternatives have now been refined since issue of the Scoping Report and SCGT has been identified as the preferred and most appropriate technology (see Section 5 of this PEIR for further details). Despite this, there are still several configuration options of SCGT plant available to generate up to 299MWe at the Project Site. These different options mainly relate to the number of gas turbine generator units used at the Power Gneration Plant Site. Each gas turbine generator unit consists of one or two gas turbines venting to a single stack. As described in Section 4 of this PEIR, it is possible that only one unit, of up to 299MWe is used. Alternatively, it may be that up to five units of up to circa 59MWe each are used. The proposed DCO Application will be flexible enough to allow HPL to achieve a 299 MWe project by building between one to five gas turbine generator units. For the reasons explained in Section 5, it will not be possible to make a decision on this in advance of submitting the proposed DCO Application.

3.2.7 It should be noted that the other integral supporting infrastructure at the Power Generation Plant Site including water tanks, administration building, stores, electricity banking compound, gas receiving station, and gatehouse will remain constant, no matter how many gas turbine generator units are used. Additionally, the Gas Connection and Electrical Connection route corridor options will also remain the same. Both routing options for the Gas connection and both routing options (one underground and one overhead) for the Electrical Connection are considered in this PEIR. A decision on the preferred option for each will be made before submission of the proposed DCO Application and a preferred option assessed in the ES.

3.2.8 As stated in Sections 5 and 6 of this PEIR, air quality modelling has indicated that a minimum stack height of 25m would be required for adequate dispersion of exhaust gases and to meet legislative air quality targets (i.e. IED). Taking 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, it is envisaged that the maximum height of stacks at the Power Generation Plant will be 35m. This height applies to all technology choices and is not dependent on the number of units present at the Power Generation Plant Site. Therefore if one gas turbine generator is used, one stack of up to 35m would be required and if five gas turbine generators are used, five stacks of up to 35m each would be required.

3.2.9 In accordance with PINS Advice Note 9 (Rochdale Envelope), rather than assess every possible iteration for the Project the assessments 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.

3.2.10 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 impacts would be five gas turbine generator units. However, the stack heights assessed in these topic areas vary (either 25m or 35m) depending on the nature of the topic. This is explained in each section.

3.2.11 The assessment is based on the continuous operation of the Power Generation Plant. This is an appropriate basis for the assessment because the pattern of any intermittent operation cannot be predicted with certainty. Where there is the possibility that intermittent operation could give rise to more significant effects than continuous operation (for example start-up noise) this been considered in the individual topic chapters.

Project Definitions

3.2.12 Throughout the PEIR, the following terms have been used when describing different study areas used to assess potential impacts:

- Power Generation Plant Site – Describing the Power Generation Plant Site only, as shown as the blue outline on Figures 1.1 and 4.2.
- Project Site – Describing the entire area covered by the Project including the Power Generation Plant and all connection route corridor options. As shown by the red line on Figures 1.1 and 4.2.

- Gas Connection route corridor option 1 – as described in section 4 of this PEIR and shown on Figures 1.1 and 4.2.
- Gas Connection route corridor option 2 – as described in section 4 of this PEIR and shown on Figures 1.1 and 4.2.
- Electrical Connection route corridor option 1 – as described in section 4 of this PEIR and shown on Figures 1.1 and 4.2.
- Electrical Connection route corridor option 2 – as described in section 4 of this PEIR and shown on Figures 1.1 and 4.2.

Measurement and Establishment of Environmental Baseline

3.2.13 In undertaking an EIA for any project it is important to identify the environmental baseline for the potential receptors which may be impacted by the Project by e.g. noise, ecology, air quality. This allows the impacts of the proposed Project to be compared and / or combined with the existing quality of the environment in order to ensure an informed assessment of the potential impacts and to allow the identification of the most appropriate mitigation which could be employed to minimise any adverse impacts.

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

- Documentary information on the Power Generation Plant Site, Gas Connection and Electrical Connection route corridors, 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.

Description of the Proposed Development and Identification of Potential Impacts

3.2.15 A full description of the Project Site and surroundings is provided in Section 4 of this PEIR. The environmental topics to be assessed and reported in this PEIR are:

- Air Quality– Section 6;
- Noise and Vibration – Section 7;
- Ecology– Section 8;
- Water Quality and Resources – Section 9;
- Geology, Ground Conditions and Hydrogeology– Section 10;
- Landscape and Visual – Section 11;
- Waste Management and Health– Section 12;
- Traffic, Transport and Access – Section 13;
- Archaeology and Cultural Heritage – Section 14; and
- Socio-Economics – Section 15.

Evaluation and Quantification of Potential Impacts

3.2.16 To help evaluate and quantify the likely significant environmental effects of the Project, environmental significance criteria will be employed to ensure that the identified impacts are fully understood. Effects may be positive (i.e. beneficial) or negative (i.e. adverse).

3.2.17 Environmental significance criteria are important as they will help inform the determination by the competent authority of the overall acceptability of the Project. An understanding of the significance criteria for all assessed impacts will be an important and relevant consideration in the determination of the proposed DCO Application in respect of the Project.

3.2.18 The significance of environmental effects resulting from the construction (including demolition), operation and decommissioning of the Project will generally be presented in this PEIR and the final ES using a series of matrices. These will be developed to describe the sensitivity of receptors which have the potential to be impacted by the development and the magnitude of any impacts which are likely to arise. The magnitude of impact and sensitivity of receptor will be cross referenced to give an overall significance of effect for any potential impact. Where it is not possible to quantify impacts, a precautionary qualitative assessment will be carried out, based on available knowledge and professional judgement.

3.2.19 The operational life of the proposed Power Generation Plant is approximately 25 years, following which the decommissioning phase will take place. Given the longevity of the proposed Project, assumptions have been made based on current knowledge of decommissioning practices of plants of this type.

3.2.20 In order to provide a consistent approach and enable comparison of impacts upon different environmental components, the assessments generally follow the structure and use the terminology outlined below in Tables 3.2 – 3.4. However, it is noted here that for some impact sections, significance criteria may need to differ depending on the conditions encountered at the Project Site. The criteria will therefore be subject to further discussion with statutory consultees. Each technical chapter of the ES will clearly identify and explain any specific criteria used. Unless otherwise stated, effects of moderate significance or above are considered to be significant for the purposes of the EIA Regulations.

3.2.21 Two broad types of potential mitigation measures will be described in the ES: embedded mitigation namely design/standard control measures, which will be used to produce an initial assessment of impact; and further specific mitigation, which may be introduced where appropriate and taken into account in the assessment of residual impacts.

Table – 3.2 Determining Receptor Sensitivity

Sensitivity	***Example***
Very High	Internationally designated site (e.g. Ramsar / Special Protection Area / World Heritage Site.
High	Nationally designated site (Site of Special Scientific Interest), / designated Landscape (e.g. National Park) / principal aquifer / main watercourse / human health.
Medium	Regionally designated ecology / heritage site / secondary aquifer / minor watercourse
Low (or lower)	Locally designated ecology / heritage site; area of hardstanding / brownfield land / industrial site / low ecological value.
Negligible	No sensitivity to change

Table 3.3 – 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.
	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 would 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 would be perceptible, either positive or negative.

Table 3.4 – 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

Mitigation and Monitoring

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

3.2.23 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 reduced and, finally, off-set.

3.2.24 Significant adverse effects are best avoided by incorporating appropriate measures during the detailed design process. As such, the iterative nature of the EIA can help to inform the development of the final design of the Project.

3.2.25 The Project has and will continue to be developed in such a way that the reduction and, wherever possible, elimination of any associated significant adverse environmental impacts are integral to the overall design philosophy.

3.2.26 Where it is not possible to avoid adverse significant environmental effects, potential mitigation and monitoring measures will be discussed in each assessment chapter.

Indirect / Secondary and Cumulative Impacts

3.2.27 Indirect and secondary impacts are those which arise as a result of a direct / primary impact. For example, deterioration of water quality in a watercourse due to an effluent discharge (which would be a direct impact) could have an indirect / secondary impact on aquatic biodiversity. Cumulative impacts occur when a receptor is subject to

multiple impacts from multiple schemes. Indirect / secondary impacts are discussed in each impact section of this PEIR. A preliminary discussion of cumulative impacts is presented in Section 16.

3.3 Presentation of the Preliminary Environmental Impact Assessment in this Document

3.3.1 Sections 6 to 15 present the preliminary assessment of the likely environmental impacts associated with the development of the Project. These assessments are not final and still ongoing. Accordingly the preliminary findings presented in this PEIR are the findings as at this time; they are subject to refinement and change as the ES is prepared. Each section deals with a specific environmental topic area and has been broken down to include a number of sub-sections. Typically, these are:

Introduction

3.3.2 This sub-section will provide details of the key issues with regard to the specific environmental topic and impacts being considered.

Legislative and Policy Context

3.3.3 This sub-section addresses relevant legislation and policy in respect of the topic under consideration insofar as not already addressed in Section 2.

Worst Case Scenario for Assessment

3.3.4 This sub-section will describe the realistic 'worst case' Power Generation Plant scenario for the topic being assessed from within the proposed Project parameters described in Section 4..

3.3.5 Both route corridor options for the Gas Connection and Electrical Connection are assessed in each technical section.

Assessment Methodology and Significance Criteria

3.3.6 This sub-section will provide details of the assessment methodology adopted for the purposes of the EIA insofar as it differs from that set out in this Section 3. The assessment methodology chosen reflects the relevant guidelines and legislative standards. In addition, significance criteria to be used to quantify the extent of the environmental impact of the Project will be identified and related to the generic criteria set out above in Tables 3.2 - 3.4.

Baseline Conditions and Receptors

3.3.7 This sub-section will identify the study area for each specific impact topic and will describe and discuss the environmental baseline conditions, and provide, as appropriate, justification for the selection of receptors to be considered within the analysis of the impact of the Project.

Preliminary Assessment of Potential Impacts

3.3.8 This sub-section discusses the preliminary findings of the EIA studies. In undertaking this assessment both quantitative and qualitative evaluations are necessary, in varying degrees, depending on the nature of the environmental impact being assessed. The significance of the environmental impacts identified is addressed as appropriate with reference to the significance criteria established. Unless otherwise stated, effects of moderate significance or above are considered to be significant for the purposes of the EIA Regulations.

Potential Mitigation / Management Techniques

3.3.9 This sub-section will provide details of the emerging mitigation measures that are proposed to ensure that any potential adverse environmental impacts are either minimised or, wherever possible, avoided altogether. Where relevant, monitoring may be identified to allow it to be demonstrated that the mitigation measures employed are effective.

Preliminary Assessment of Residual Impacts

3.3.10 This section will assess, on a preliminary basis, using the information compiled to date by HPL, the significance of the environmental impacts following the application of any identified mitigation measures. The section will conclude with a preliminary statement of the overall significance of the impact.

Next Steps

3.3.11 Where information on the baseline or likely potential impacts of the Project is not currently available, 'Next Steps' are proposed in order to identify the assessment methodologies and or additional information required to provide a comprehensive description of the relevant environmental baseline and the potential for impact on the relevant receptors.

Section 16 discusses the preliminary cumulative impacts of the Project with other planned projects in the area.

SECTION 4

PROJECT AND SITE DESCRIPTION

4 PROJECT AND SITE DESCRIPTION

4.1 Overview of the Project

4.1.1 As previously described in Section 1 of this PEIR, the proposed Project consists of three main elements: the Power Generation Plant, the Gas Connection and the Electrical Connection.

4.1.2 The Power Generation Plant would be situated within Hirwaun Industrial Estate, approximately 1.3 km north east of Rhigos, 2km west of Hirwaun, and 5 km west of Aberdare, in south Wales. The approximate Grid Reference of the Power Generation Plant Site is SN 938 061. The Power Generation Plant would be located on an area of land which is currently occupied by a large industrial building used for storage and distribution – owned by International Greetings UK Ltd.

4.1.3 The location of the proposed Project Site is shown in Figure 1.1. The Power Generation Plant Site, which is within the Project Site, covers an area of approximately 7.5ha. However, the footprint of the Power Generation Plant would be smaller than this (approximately 5ha). Figure 4.1 shows an indicative illustration showing the position and layout of the Power Generation Plant. . This position will be refined prior to submission of the proposed DCO Application, having regard for consultation responses.

4.1.4 Construction of the Power Generation Plant and Gas and Electrical Connection will require a temporary area for equipment / materials laydown which will also provide an area for the assembly of large plant items within a reasonable distance of the construction site.

4.1.5 A small area to the south of the Power Generation Plant (to the south of Main Avenue) could be used as a laydown area for the storage of plant and equipment during construction. The laydown area is indicated on Figure 4.2.

4.1.6 This laydown area may also be used periodically during operation for any maintenance activities that require movement of large plant items.

4.1.7 Currently, two Gas Connection route corridor options are being considered (hereafter referred to as Gas Connection route corridor options 1 and 2). Option 1 will run from the Power Generation Plant in a southerly direction into Feeder 2 on the gas NTS, with an approximate length of 1.1 km. Option 2 would run in an easterly direction alongside Rhigos Road before heading south alongside the A4061. Gas connection route corridor option 2 would also connect into Feeder 2 and is of a similar length.

4.1.8 Similarly, there are two Electrical Connection route corridor options under consideration (hereafter referred to as Electrical Connection route corridor options 1 and 2). The Electrical Connection will connect the Power Generation Plant to a new substation, approximately 250m west of the Power Generation Plant Site (Rhigos Substation). The substation is currently under construction by National Grid Company (NGC) in connection with the development of the Pen Y Cymoedd Wind Farm, which has recently been granted Section 36 consent (under the Electricity Act 1989) and deemed planning consent. The Electrical Connection would either be an overhead line which would run directly from the Power Generation Plant in a west / north westerly direction to the Rhigos substation (route corridor option 1), or an underground cable alongside existing roads (Main Avenue and Fourteenth Avenue) and into the substation (route corridor option 2)).

4.1.9 A decision on the preferred Gas Connection and Electrical Connection route corridor options will be made before the proposed DCO Application is submitted and feedback from consultation will also feed into this decision.

4.1.10 Figure 4.2 shows the Project Site along with Electrical Connection and Gas Connection route corridor options.

4.2 Site and Surroundings

4.2.1 The Power Generation Plant Site will be situated entirely within the Hirwaun Industrial Estate. The Industrial Estate currently accommodates several industrial units including a metal recycling facility and an industrial plant hire business. The Power Generation Plant Site is currently occupied by industrial buildings with hardstanding (owned and occupied by International Greetings UK Ltd.).

4.2.2 The Project is entirely within the administrative boundary of RCTCBC, although it is also close to the area administered by the Brecon Beacons National Park Authority (BBNPA).

4.2.3 The Power Generation Plant Site and immediate surrounding area are in an environment characterised by industrial buildings, hardstanding, scrub grassland and plantation woodland. The Power Generation Plant Site (as shown on Figures 1.1, 4.1 and 4.2) is currently occupied by a large distribution warehouse building.

4.2.4 To the north west of the Power Generation Plant Site, close to the Rhigos Substation, the Industrial Estate gives way to marshy, waterlogged grassland comprising some rushes and reeds. No construction is proposed on this area. Although Electrical Connection

route corridor option 1 is shown to cross directly over the marshy grassland, this will only be the case if it is an overhead line.

4.2.5 The Power Generation Plant Site is accessed via Main Avenue and Fourth Avenue, which both run through the Hirwaun Industrial Estate. These roads connect to Fifth Avenue, which in turn connects to Rhigos Road (to the south of the Power Generation Plant Site). The Industrial Estate is well served in terms of highway connections.

4.2.6 The road network in the vicinity of the Power Generation Plant Site can be seen in Figure 1.1 and is discussed in more detail in Section 13 of this PEIR.

4.2.7 Surrounding developments include the A465 'Heads of the Valleys' Road (which runs approximately 0.1km north of the Power Generation Plant Site), Tower Colliery (approximately 1 km south of the Power Generation Plant Site) and Penderyn Reservoir (approximately 1 km north of the Power Generation Plant Site). The closest residential areas include;

- Rhigos (1.3km south west);
- Hirwaun (1.4km east);
- Penderyn (1.8km north); and
- Aberdare (5km east).

4.2.8 Both Electrical Connection route corridor options are also situated entirely within the area administered by RCTCBC. Land over which Electrical Connection route corridor 1 is situated is characterised by minor roads, hardstanding and scrub within Hirwaun Industrial Estate.

4.2.9 Electrical Connection route corridor option 2 crosses over marshy, waterlogged ground to the west of the Power Generation plant Site. The closest residential properties to the Electrical Connection are the same as those identified for the Power Generation Plant Site.

4.2.10 Land over which the Gas Connection route corridor options will cross is initially similar to the Power Generation Plant Site (i.e. industrial in nature) although the final two thirds of the routes run through agricultural land. The Gas Connection would run alongside the Hirwaun Industrial Estate, alongside roads, through some agricultural land, and close to industrial buildings. The Gas Connection would also be situated entirely within the area administered by RCTCBC. The closest residential areas to the Gas Connection route corridor options are as for the Power Generation Plant Site and Electrical Connection route corridor options.

4.3 Relevant Planning History

4.3.1 Hirwaun Industrial Estate was established in WWII as a Royal Ordnance Factory (ROF), one of four across South Wales.

4.3.2 The estate passed into public sector ownership, eventually coming under the control of the Welsh Development Agency who invested in the location and undertook the speculative development of smaller factory units around the estate. In the 1960s, GEC Marconi established a TV factory at Hirwaun; in c.1974 a joint venture was entered into by GEC with Hitachi and in 1984 Hitachi took over the factory entirely. Hitachi expanded the plant with the 'Advance Factory' constructed in 1988 however by 2001 the decision had been taken to close the plant.

4.3.3 In 2002 International Greetings UK Ltd. acquired the freehold interest in the entire facility and has operated a storage and distribution facility for its paper gift wrap product since that date.

4.3.4 Enviroparks were granted planning permission in 2010 to build an Energy from Waste (EfW) plant on a site approximately 500m north of the proposed Power Generation Plant Site. The plant will process around 150,000 tonnes of waste per year by 2014/15. By 2016, it is envisaged that the plant will process around 240,000 tonnes of waste per year.

4.3.5 Land immediately to the south of the Power Generation Plant Site and adjacent to the potential laydown area has recently been developed by Green Frog Power Ltd as a 20MW Power Generation Plant. The plant comprises 52 x 440kW diesel generator engines which are fired on liquid fuel. The plant only operates at times of peak demand or to balance the grid.

4.3.6 The Pen Y Cymoedd Wind Farm has recently been granted consent under Section 36 of the Electricity Act 1989 and deemed planning permission. It is approximately 5km south west of the proposed Power Generation Plant Site at its closest point and comprises 76 turbines across an area of 4,680 hectares. The land ranges in altitude between 360m and 600m AOD, with each turbine being up to 145m in height. Site preparation, in the form of tree felling has already begun at the site.

4.3.7 The land south of Hirwaun has been designated as a Strategic Site in the RCT Local Development Plan. This land has been allocated for the construction of 400 dwellings, 89 acres of employment, a new primary school, a 2000m^2 retail store, medical / community centre and informal recreation. Development of the Strategic Site will be subject to a large-scale reclamation scheme due to the fact that it overlaps with the site of

Tower Colliery, presently subject of open cast operation likely to last for approximately six years hence.

4.4 Brecon Beacons National Park (BBNP) Authority

4.4.1 The boundary of the BBNP lies approximately 250m north of the Project at its closest point.

4.4.2 The BBNP covers an area of 250 square miles. It was first designated in 1957 as an area of natural beauty and one which contains unique and important flora and fauna

4.4.3 The two statutory purposes of the National Park Authorities are to conserve and enhance the natural beauty, wildlife and cultural heritage of the Park and to promote opportunities for the enjoyment and understanding of its special qualities.

4.4.4 In April 1996, the Brecon Beacons National Park Authority (BBNPA) came into being. It replaced the former Brecon Beacons National Park Committee which had managed the Park since 1974. The National Park Authority has 24 members: 16 appointed by the Unitary Authorities and 8 appointed by the National Assembly for Wales.

4.5 Detailed Description of Power Generation Plant and Generating Technology

4.5.1 The Power Generation Plant will be designed to provide a total output of up to 299 MWe at rated site conditions, and will be fired on natural gas.

4.5.2 Previous consultation (i.e. the 'Hirwaun Power Project Scoping Report (issued to PINS in May 2013)) identified four potential technology choices for the Power Generation Plant; Combined Cycle Gas Turbine (CCGT); SCGT and Reciprocating Gas Engines (RGE). The potential for utilising CHP opportunities at the Power Generation Plant Site using these technologies was also carefully considered. Since the Scoping Report was issued, a number of further studies have been undertaken to refine the technology choice. The outcome of these studies has determined that an SCGT plant is the most suitable technology choice for a 'peaking' plant generating up to 299MWe at the Project Site.

4.5.3 The results of these studies and the design evolution of the Project are presented in more detail in Section 5 of this PEIR.

4.5.4 The main generating equipment in a SCGT plant comprises gas turbine generators. Each gas turbine generator consists of an inlet air filter, an air compressor, combustion chamber, one or two power turbines,

generator, stack and exhaust silencer. Air will be compressed in the compressor of the gas turbine generator(s) and gaseous fuel injected into the combustion chamber(s) where the fuel will burn producing hot, high-pressure gases. These gases will expand across the rotor blades of the gas turbine generator(s), which will drive both the compressor and the electrical generator(s). The hot exhaust gases are then routed directly to the stack and emitted to the atmosphere. The stack contains a silencer to reduce noise pollution.

4.5.5 SCGT plants usually use aero-derivative gas turbine generator(s) (i.e. turbines derived from the aeronautical industry), primarily because of their suitability to frequent start-ups, flexibility, high efficiency and high-availability maintenance options. To achieve up to 299 MWE, HPL envisage using 3, 4 or 5 individual aero-derivitave GTGs.

4.5.6 However, 'industrial' type units can also be used which are typically larger and often more suited to longer operational hours. They offer more efficiency but less flexibility. Industrial gas turbines differ from aeronautical designs in that the frames, bearings, and blading are of heavier construction. To achieve up to 299 MWe, HPL would likely use 1 or 2 individual industrial gas turbine generators.

Peaking Plant

4.5.7 As explained in Section 1 and 4.5.2 above, the Power Generation Plant will be designed to operate as a 'peaking' or flexible plant. This means that the Power Generation Plant will operate for up to 1,500 hours per annum and only be used when it is required to even out the electricity grid, e.g. when there is 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 plant which are constantly operational (e.g. a sudden outage).

4.5.8 Peaking plants help to 'balance out' the grid at times of peak electricity demand and also help to support the grid at times when other technologies (e.g. wind and solar plant) cannot generate electricity due to the weather conditions. Typically, peaking plants do not operate for long periods of time. However when they do operate, they are nevertheless vital in 'evening out' the power in the grid.

Emissions and Stack

4.5.9 The exhaust gasses and waste heat produced as part of the combustion process will be discharged to the atmosphere by stacks. Typically, each gas turbine generator unit would have its own dedicated

stack. However, if the chosen configuration contains two separate turbines connected to one generator, the exhaust stacks from these individual turbines may be combined into one. Therefore, in total, the Power Generation Plant will consist of between one and five gas turbine generator units and between one and five stacks.

4.5.10 The gas turbine generators will be equipped with emissions control abatement, which limits the production of NOx to a maximum of 50 mg/Nm^3. Whether by water injection or dry low emission combustors, these techniques represent best available techniques (BAT) for limiting emissions of NO_x to atmosphere from gas turbine generators without the addition of chemical solutions, such as selective catalytic reduction using ammonia.

4.5.11 A stack height sensitivity study examined differing stack heights in intervals from 20 m to 80 m (inclusive). The stack height sensitivity considered long term and short term contributions to ground level concentrations of NO_2.

4.5.12 Stack emissions will be continuously recorded to ensure correct and efficient operation of the plant. Any significant deviations will be alarmed and corrections carried out on occurrence. Records will be maintained of performance and deviation. Full facilities for interfacing information, control and alarm systems will be installed so that the plant can be operated from the central control room via the distributed control system (DCS). In the event of a fault in the gas turbine generator(s) or other major plant items the Power Generation Plant will shut down automatically in a controlled manner.

4.5.13 Natural gas sourced from the NTS (where sulphur content in the gas is generally negligible) is a clean burning fuel and does not produce the particulate or sulphur emissions associated with burning coal; consequently flue gas cleaning equipment is not required.

4.5.14 Further discussion of emissions control is provided in Section 6 of this PEIR which sets out the environmental assessments undertaken to date for air quality.

Cooling

4.5.15 Since no cooling is required for the condensing of steam, the cooling requirements of SCGT plants are significantly lower than, for example, CCGT plants. The auxiliary cooling requirements (for lubrication oil, etc.) would be met via dry air cooling through the use of fin-fan coolers or Air Cooled Condensers (ACC).

Maintenance

4.5.16 Sufficient spares will be held to ensure reliable operation of the plant. Materials and finishes will be selected to meet this objective and to ensure that the appearance of the Power Generation Plant does not deteriorate with time. Periodic and routine maintenance will take place on average once every six months, to ensure optimal operation of the plant at all times.

4.5.17 Typically, planned maintenance would be carried out by one or two skilled personnel, meaning that traffic movements would be kept to a minimum.

Other Power Generation Plant Items

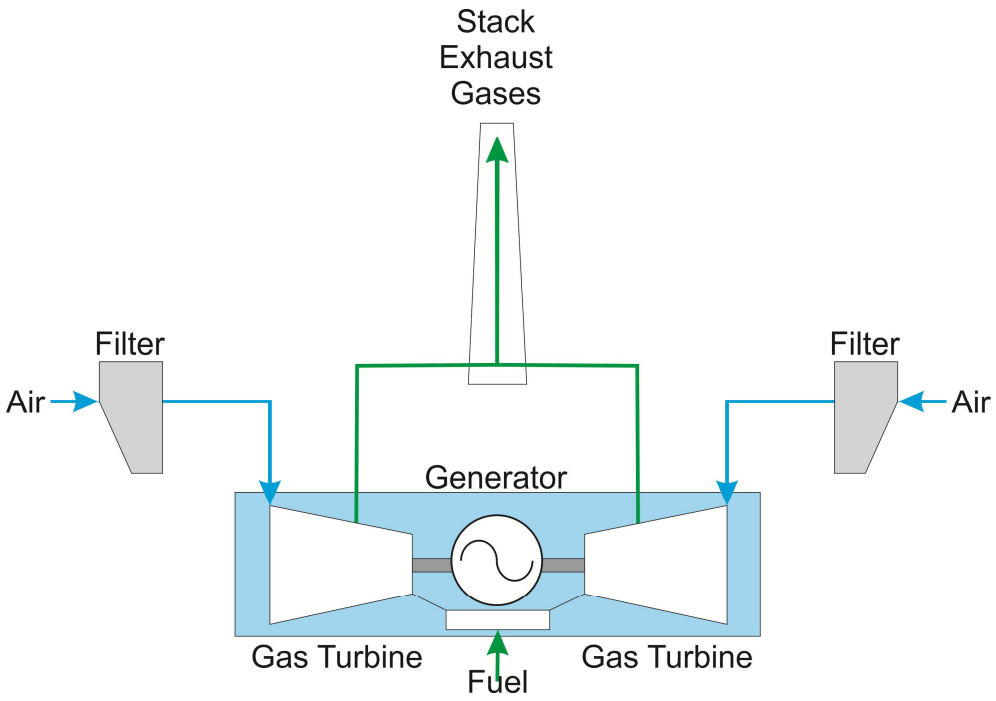
4.5.18 In addition to the main gas turbine generator units at the Power Generation Plant Site, the following integral buildings will also be present:

- **Process Water Tanks:** One or more water tanks will be required to store process water which will be used as make up for the gas turbine generators. High purity process water will be tankered in to the Power Generation Plant Site and stored in water tanks.
- **Fire Water Tanks:** The fire water storage tank will be designed to comply with the relevant fire regulations and will be installed together with fire pumps, hose reels, fire hydrants and portable extinguishers.
- **A Control Building:** Required in order to monitor the plant operation and house plant controls.
- **A Workshop and Stores Building**: To store certain strategic and routine maintenance spares and to provide a facility for carrying out minor maintenance of the plant. .
- **A Gatehouse:** Needed to provide security and maintain a log of site attendance, deliveries etc;
- **A Switchyard:** Required to connect the electrical infrastructure from the Power Generation Plant to transformers before export to the National Grid; and
- **A Gas Receiving Installation:** Required to process gas coming from the NTS to feed into the Power Generation plant Site at the right flow and pressure conditions.

4.5.19 Figure 4.1 shows an indicative illustration of the position and layout of the Power Generation Plant.

4.5.20 Insert 4.1 shows a simple schematic of SCGT operation.

Insert 4.1 – SCGT Schematic



4.5.21 Table 4.1 provides indicative dimensions for the main plant items which would be present at the Power Generation Plant Site.

Table 4.1 –Indicative dimensions of main plant items

Plant Item	***Minimum Dimensions(m)***	***Maximum Dimensions (m)***
Stacks	25 (height) 4 (diameter), 1 no.	35 (height) 8 (diameter), 5 no.
Gas turbine generator	20 (length) x 10 (width) x 9 (height)	35 (length) x 15 (width) x 20 (height).
Water tanks	10 (diameter) x 10 (height) for each tank. Minimum 1 no. fire water and 1	10 (diameter) x 10 (height) for each tank. Maximum of 3 no. tanks.

	no. process water tank.	
Administration / workshop / control building (All technology choices).	40 (length) x 10 (width) x 5 (height)	40 (length) x 10 (width) x 15 (height)
Gas receiving station (All technology choices)	30 (width) x 30 (length) x 10 (height)	30 (width) x 30 (length) x 10 (height)
Banking compound	20m x 20m.	50m x 50m.

4.6 Gas Connection

4.6.1 A new gas pipeline will be required to connect the Power Generation Plant to the NTS in order to provide a reliable supply of fuel.

4.6.2 The UK National Grid Gas system is split into two parts, the NTS and the LTS (Local Transmission System).

4.6.3 The NTS represents the infrastructure designed to transmit gas large distances around the country, these are generally large diameter pipelines (> 24"/600mm) operating at high pressure (~70barg). The NTS is the backbone of the UK gas infrastructure and as such does not reach all points of mainland Britain; the load driven extremities are covered by the LTS.

4.6.4 A Gas Connection Feasibility study was undertaken for the Project in December 2012. The purpose of the study was to define and evaluate the options available for connecting the Power Generation Plant to a suitable source of fuel gas, and provide a recommendation on the most appropriate option for this connection.

4.6.5 Preliminary pipeline calculations were performed, including Maximum Operating Pressure of the system, Maximum Incidental Pressure, Pipe Nominal Diameter, Design Factor, Wall Thickness, Minimum Building Proximity Distance and Area Classification.

4.6.6 A Crossing / Risk Register has been prepared for each potential corridor routeing. A Level 1 Route Study has been performed for this report, which has analysed a specified relevant area of interest for archaeological, natural and built environment issues having regard to considerations raised in NPS EN-4.

4.6.7 Previous consultation documents (e.g. 'Hirwaun Power Project Scoping Report' (issued to PINS in May 2013)) identified four possible connection points as being potentially suitable locations to connect into the NTS infrastructure. All four options connect to Feeder 2, a 600mm high pressure steel pipeline (known as the Garway to Rhigos Pipeline) that passes between the village of Hirwaun and the Power Generation Plant Site. No suitable connections were identified to the LTS.

4.6.8 Since the Scoping Report was issued, a number of further studies have been undertaken to refine the route corridor choice. The outcome of these studies is that there are now two remaining potential options to connect into the NTS and two potential suitable route corridors.

4.6.9 The refinement studies and the reasons for discounting two of the route corridor options are outlined in more detail in Section 5 of this PEIR.

4.6.10 The Location of Feeder 2 and the two possible remaining connection options are shown on Figure 4.2.

Gas Connection Route Corridor Option 1

4.6.11 Gas Connection route corridor option 1 is approximately 1.1 km in length including no major road crossings, two minor road crossings, no major water crossings, three minor water crossings and 0.19 km of in-road mainlaying.

4.6.12 The pipeline begins at the Power Generation Plant Site heading south, past industrial buildings in the Hirwaun Industrial Estate, across Main Avenue and then under Rhigos Road; a single carriageway that runs along the entire south side of Hirwaun Industrial Estate.

4.6.13 The route continues south of Rhigos Road into fields where it crosses under a set of overhead lines and continues heading south east where it then crosses two field drains. The route then turns east where it crosses under an unnamed minor road and another field drain. It then turns south east again, and heads towards the A4061. The route crosses under A4061 in an easterly direction. The route reaches the NTS east of the A4061 at Grid RefSN938055.

Gas Connection Route Corridor Option 2

4.6.14 Gas Connection route corridor option 2 is approximately 1.25 km in length including no major road crossings, no minor road crossings, no major water crossings, one minor water crossing and 0.79 km of in-road mainlaying.

4.6.15 The route begins at the Power Generation Plant Site heading south, immediately turning east, with mainlaying required down Main Avenue. Mid way down Main Avenue the route passes under an overhead walkway. The route then continues for a short distance up Main Avenue before turning south east through a field and reaches Fifth Avenue.

4.6.16 The route then turns south, mainlaying down Fifth Avenue, the single carriageway road that runs along part of the eastern boundary to the Power Generation Plant Site. The route then continues being mainlayed across the Rhigos Road/A4061 and continues heading south where it crosses under a set of overhead lines. The route continues being mainlayed down Rhigos Road/A4061 before leaving the road.

4.6.17 The route turns into the field east of the A4061 for a short distance before turning back to run south, parallel to the A4061 where it crosses under another set of overhead lines. Shortly after crossing the overhead lines the route turns to the east where it connects to the NTS east of A4061.

Common Elements

4.6.18 Both of these route corridors are shown together on Figure 4.2. It is noted that this Figure shows large buffers or potential areas in which each route may be developed. This is due to the fact that no detailed studies have yet been undertaken to assess constraints. However, following more detailed studies, the route choices will be refined as the Project progresses and the options narrowed to a preferred single route corridor option.

4.6.19 The actual diameter of the gas pipeline would be approximately 8 inches. The permanent right required for the Gas Connection would be approximately 10m in width, whereas the construction footprint required would be of the order of 25m in width on agricultural land but wider at crossing points.

4.6.20 Consultation feedback will be considered in determining which corridor option is the most appropriate.

4.6.21 Connection to the NTS at any high pressure pipeline would require two above ground facilities to be installed, an Above Ground Installation (AGI), typically in the form of a Minimum Offtake Connection (MOC) facility, which would be owned by NGC, and a PIG Trap Facility (PTF) which will be owned by HPL. The two facilities would contain the following pieces of equipment.

4.6.22 The MOC (approximately 30x30m) would contain:

- Remotely Operable Valve (ROV);
- Control and Instrumentation Kiosk;
- Electrical Supply Kiosk.

4.6.23 PTF (approximately 30x23m) would contain:

- PIG Launching Facility;
- Emergency Control Valve;
- Isolation Valve;
- Control and Instrumentation Kiosk;
- Electrical Supply Kiosk.

4.6.24 The gas pipeline would be designed, constructed and tested to comply with the Institute of Gas Engineers' (IGE) Recommendations on Transmission and Distribution Practice – IGE/TD/1: Edition 5, 2009 - Steel Pipelines and Associated Installations for High Pressure Gas Transmission (IGE/TD/1).

4.6.25 The standard gas pipeline wall thickness would comply with the requirements of IGE/TD/1, which defines the minimum safe separation distance between a high pressure gas pipeline and normally inhabited buildings / major roads / major railways. This minimum safe separation distance is known as the Building Proximity Distance (BPD). If normally inhabited buildings / major roads / major railways are closer than 1 BPD (i.e. the gas pipeline is in an area where additional protection is required), thicker wall steel pipe (known as proximity pipe) would be used. The exact locations and lengths of where thicker wall steel pipe will be used will be confirmed throughout the assessment and detailed design stages.

4.6.26 The gas pipeline would be buried to a depth of cover which is in accordance with recognised industry standards. For example, depths of cover would be:

- No less than 1.2m in agricultural land;
- No less than 2m under road crossings; and
- No less than 1.7m under water crossings.

4.6.27 The gas AGI would be accessed via the A4061. A short length of access track would be constructed between the A4061 and the gas AGI in order to allow infrequent maintenance visits.

4.7 Electrical Connection

4.7.1 A new connection would be required to allow electricity generated by the Power Generation Plant to be exported to the electricity transmission network.

4.7.2 A grid connection assessment was undertaken for the Power Generation Plant Site in 2012. This assessment was subsequently reviewed and updated. The assessments analysed the transmission and distribution grid connection options and determined the available thermal and fault level capacity on the electrical network. Discussions were also held with NGC.

4.7.3 Following discussions with NGC it is proposed that the most suitable point of connection for the Project is at the new 400 kV Rhigos substation, which will require a dedicated 400 kV connection of between 250-650m in length, depending on the route chosen from the Power Generation Plant to the substation. This substation is expected to be completed by 2016, when the nearby 256 MW Pen Y Cymoedd Wind Farm is also due to be connected.

4.7.4 Currently, there are two Electrical Connection route corridor options being considered for connection of the Power Generation Plant into the Rhigos Substation. These are as follows:

Electrical Connection route corridor option 1:

4.7.5 Electrical Connection route corridor option 1 is approximately 250m in length and would consist of a 400 kV overhead line. The line would run directly west from the Power Generation plant into the Rhigos Substation.

4.7.6 Up to three pylons of approximately 35m in height would be required in order to support the overhead line. Up to two pylons would be situated within the Power Generation Plant Site and one within the Rhigos Substation.

Electrical Connection route corridor option 2:

4.7.7 This route is approximately 650m in length. It would consist of a 400Kv buried underground cable. The cable would run from the Power Generation Plant, alongside Main Avenue, to the south of a disused industrial warehouse, before heading north, alongside Fourteenth Avenue in between disused industrial warehouse buildings before connecting into the Rhigos Substation.

4.7.8 During construction, a trench of approximately 3m in width and between 1-2m in depth would be excavated to lay the electricity cable.

4.7.9 Following more detailed studies, the Electrical Connection route corridor options will be refined as the Project progresses and the options narrowed to a preferred single route corridor option".

4.7.10 Both electrical connection route corridor options are shown on Figure 4.2.

Construction, Operational and Decommissioning

4.7.11 Construction (including demolition) and commissioning of the Project will take between 18 and 36 months, depending on the final choice of plant selected.

4.7.12 The main works associated with the construction phase would be the demolition of existing buildings, removal of old foundations / hardstanding, excavation and site levelling for new foundations, potential piling (if required) and the installation of the Gas Connection and Electrical Connection. The demolition elements of the Project will be considered as part of the assessment of construction impacts.

4.7.13 The Power Generation Plant will be designed to have an operational life of up to 25 years, after which time 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 Power Generation Plant will be decommissioned.

4.7.14 Decommissioning would comprise the removal of all Power Generation Plant items and restoration of the Power Generation Plant Site. It is likely that some underground structures, including the Electrical and Gas connection, may be left in situ to avoid any adverse environmental impacts associated with their removal. Due regard would be paid to all best practice guidelines on the decommissioning of projects which are relevant at the time. Where possible, items of plant would be re-cycled or re-used.

SECTION 5

SITE SELECTION, ALTERNATIVES AND DESIGN EVOLUTION

5 SITE SELECTION, ALTERNATIVES AND DESIGN EVOLUTION

5.1 Introduction

5.1.1 The EIA Regulations[4] require that an ES should include an outline of the main alternatives that have been studied by the applicant and an indication of the main reasons for the ultimate choice of option, taking into account likely significant environmental impacts. Under the EIA Regulations there is no requirement to assess alternatives, only a requirement to provide information on those alternatives that have been considered.

5.1.2 The Project has gone through several iterations and evolutions in design, and the site selection itself has been an iterative process. The following alternatives have been considered for the Project as part of the design evolution process:

- Alternative development sites;
- Alternative layouts;
- Alternative technologies for electricity generation;
- Alternative options for the Electrical Connection; and
- Alternative options for the Gas Connection.

5.1.3 An account of these alternatives is provided below.

5.2 Alternative Development Sites

5.2.1 In deciding upon the site for the Power Generation Plant, WPL has had regard to a number of factors such as those described in NPS EN-2. However, in line with paragraph 2.2.1 of NPS EN-2, "it is for energy companies to decide which applications to bring forward and the government does not seek to direct applicants to particular sites for fossil fuel generating stations." Unlike, for example, nuclear generating stations.

5.2.2 As part of a detailed feasibility assessment, WPL has looked at a range of sites around the UK to support power generation plants of this nature. The key factors considered necessary in a site were broadly fourfold; technical, environmental, economic, and in line with local planning policy.

[4] See Paragraph 18 of Part 1 to Schedule 4 of the EIA Regulations.

5.2.3 In terms of technical constraints, the size of the site (i.e. large enough to support a Power Generation Plant of up to 299MWe and integral infrastructure and the proximity of a site to appropriate gas and electrical connection points are both key considerations.

5.2.4 From an environmental perspective, the site must have due regard to closest sensitive receptors (to avoid unnecessary impacts from noise and visual disturbance), the current make up of the surrounding area (to limit impacts on the landscape character of the area), previous site uses and land quality (to avoid sterilisation of the best quality agricultural land or mineral assets) and proximity to sensitive ecological habitats.

5.2.5 Based on these factors, the Project Site was considered suitable for the siting of a 299 MWe Power Generation Plant for the following reasons:

- Close proximity to the gas NTS;
- Close proximity to a suitable electrical substation with spare capacity;
- The Power Generation Plant Site is within an existing industrial estate;
- The Power Generation Plant Site is currently covered in hardstanding / buildings so there is minimal potential to impact on the runoff rate / drainage regime;
- The Project Site is surrounded by similar industrial developments including steel clad warehouses and a proposed EfW plant;
- Compatibility with local planning policies which seek to steer new development and employment opportunities to Hirwaun Industrial Estate (e.g. the RCTCBC Local Development Plan).
- The Project Site is outside of areas at risk of flooding;
- The Project Site is served by a well developed road network; and
- There is adequate space to develop the Power Generation Plant and integral infrastructure.

5.3 Power Generation Plant

5.3.1 Previous consultation documents (e.g. the Hirwaun Power Project Scoping Report (submitted to PINS in May 2013)) identified four potential technology options which could be developed to generate 299MWe.

5.3.2 The four options under consideration were: CCGT plant, SCGT plant and RGE plant. Consideration was also given to the potential utilisation of CHP.

5.3.3 Since the submission of the Scoping Report, further conceptual design studies and economic modelling have determined that an SCGT plant would be the most suitable option for a 299 MWe peaking plant at the Power Generation Plant Site. This has been determined based on the following environmental, business, and technical considerations.

Environmental

5.3.4 In a CCGT plant, the hot exhaust gases are routed through a heat recovery steam generator (HRSG), where they are condensed to form steam, which then drives a steam turbine. In comparison, the hot exhaust gases in a SCGT plant are discharged to the atmosphere via the stack, with the flue gases. This means that the flue gases discharged from a SCGT plant are significantly hotter than those discharged from a CCGT plant, and therefore the gases are much more buoyant.

5.3.5 This means that a much lower stack is required for a SCGT plant to achieve the same dispersion height and rate as a CCGT plant. The Project Scoping Report suggested that the stack of a single unit CCGT plant could be up to 90m to achieve adequate dispersion in order to meet air quality standards. Subsequent air quality modelling screening runs (described in detail in Section 6 of this PEIR) have determined that a suitable stack height to achieve adequate dispersion of pollutants from the Power Generation Plant is only 35m. This represents a significant overall reduction in stack height, and the associated landscape and visual impacts arising from the tallest structures on site. Further description of the Landscape and Visual assessment of the Project is outlined in Section 11 of this PEIR.

5.3.6 In comparison to RGE plant, although there is no benefit in terms of reduction of stack height (stack height for RGE units and SCGT units would be similar) the noise emissions from RGE plant are typically louder than for a SCGT plant. This is because RGEs operate using ignition of gaseous fuels and air in a specific mix which causes motion of a piston to generate electricity.

5.3.7 Furthermore, in order to generate steam for the steam cycle of a CCGT plant, a sizeable quantity of water would be required. It is clear that the availability of water in the local area is extremely limited. There are no surface watercourses that would be suitable for abstractions, and the Project Site is not underlain by a principal aquifer. As such, SCGT

technology is preferable in this area as the water requirement is significantly less, and could be met with the occasional delivery of water by tanker.

Business Drivers

5.3.8 Compared to both RGE and CCGT plant, SCGT units typically have a much smaller capital cost per MW installed. This is largely because CCGT plant are more complex in their operation (see below for technical considerations) however they are more efficient. RGE plant are also more flexible and allow operation on different fuels. However, as explained in Section 4, the nature of the Power Generation Plant is that of a peaking plant which will operate for up to 1500 hours per year. Over this timescale, HPL considers that the benefits in efficiencies or flexibility which can be achieved by using a CCGT or RGE plant are very minimal and do not justify the additional capital costs of these plant. As SCGT plants are less complex in operation than CCGT or RGE plant, they are also cheaper to construct and maintain.

Technical

5.3.9 As previously mentioned, technically, CCGT plant is more complex than a SCGT plant, primarily because of the presence of an HRSG and steam cycle. In turn, this leads to more difficult maintenance requirements and a much longer construction timescale because of the large number of interconnections.

5.3.10 Although CCGT plant are more efficient, due to their use of waste heat (around 60% compared to 40% for SCGT) this gain in efficiency becomes much more marginal given the limited number of operational hours which the Power Generation Plant will run (less than 1500). HPL considers that the marginal gains in efficiency of CCGT do not outweigh the landscape and visual, economic and technical drivers that favour SCGT for peaking plants such as the Project.

5.3.11 Another technical advantage of SCGT plants over CCGT is that they have much quicker start up times than CCGT plant. This is an advantage because peaking plant are typically only required to operate for short periods of time. Therefore, a SCGT plant is able to start generating electricity very quickly after it starts up and thus can benefit from delivering power and balancing out the grid much quicker.

5.3.12 Typically, RGE plant come in much smaller unit sizes (up to 20MWe) than either SCGT or CCGT plant (one unit can be up to 299MW). Therefore the construction timescales and overall land take are far

greater. Maintenance on such units is also more time consuming and costly.

5.3.13 Due to the method in which fuel is combusted in RGEs, there is also usually a requirement for additional control of NOx emissions in order to meet IED guidelines. This additional NOx control would usually be in the form of Selective Catalytic Reduction (SCR) which would not only require further landtake and more maintenance, but may also require ammonia or urea injection to operate. This then has impacts in terms of environmental disposal of catalysts, as well as ammonia slip which is released from the stack.

CHP

5.3.14 Efficient CHP plants are usually designed to meet the demands of an identified heat load. Electrical power generation is utilised, where applicable for local process plant, and the balance exported to the grid. The heat demands of industrial processes are usually continuous, and district heating demands are also usually continuous (albeit on a seasonal basis).

5.3.15 Therefore, this is in direct contrast to the operation of a peaking plant, which is designed to operate intermittently and unpredictably. Therefore, any heat loads would be better served, and met more appropriately and efficiently by dedicated CHP plants, allowing the peaking plant to provide the necessary support to the National Grid Electricity Transmission System.

5.3.16 With this in mind, CHP has not been a significant factor in the technology choice of the plant.

5.3.17 In addition, as SCGT plant do not have any associated HRSG / steam turbine plant, the provision of steam from an SCGT plant would not be possible without the provision of additional steam raising plant / equipment.

Conclusion

5.3.18 Following consideration of environmental, economic and technical drivers, HPL considers that the balance of these considerations clearly favours SCGT technology (without CHP) for delivery of a 299MW peaking plant.

5.4 Gas Connection

5.4.1 The Project Scoping Report identified four potential Gas Connection options to connect the Power Generation plant to Feeder 2 on the NTS.

5.4.2 Further analysis has determined that two of these route corridor options are no longer feasible (options 3 and 4). Therefore, route corridor options 1 and 2 (as identified in Section 4 of this PEIR) are still under consideration for the Project. (Option 1 has been modified slightly from the route which was originally put forward in the Scoping Report)

5.4.3 Further studies revealed that Route Corridor option 4 was the least suitable option for the Gas Connection. This is because it passes in close proximity to a cemetery, was the second longest route (and therefore the second most expensive option) and passed close to Hirwaun Ponds Nature Reserve. There is also limited potential to route the pipeline along linear features such as field boundaries and roads. Therefore it had the largest potential for environmental impacts.

5.4.4 Route corridor option 3 was also ruled out as it is the longest (and therefore most costly) route. It also requires 5 minor water crossings and passes very close to the Hirwaun Ponds Nature Reserve and so therefore has the biggest potential of all of the routes to negatively impact on sensitive ecology and hydrology. It also has the potential to impact on the operations of a number of buildings on the Hirwaun Industrial Estate.

5.5 Electrical Connection

5.5.1 Currently, two electrical connection options are still being considered, as described in Section 4 of this PEIR.

5.5.2 As stated in the Scoping Report, it was determined at an early stage that should the electrical connection pass directly from the Power Generation Plant to the Rhigos Substation (i.e. the route currently shown for Electrical Connection route corridor option 1) then it would be an overhead line, in order to avoid direct disturbance to potentially sensitive ecological habitats in the Hirwaun Industrial Estate Site of Important Nature Conservation (SINC).

5.5.3 The benefits of an overhead line connection are that it would be a shorter and more direct route than underground. This would have associated cost savings. The connection of an overhead line into the Rhigos Substation would also be simpler than for an underground cable, as the connections going into the substation from the Pen Y Cymoedd Wind Farm would also be via overhead line.

5.5.4 The disadvantage of an overhead line is that there would be above ground infrastructure, including up to three pylons and the overhead line itself. This has the potential to create a landscape and visual impact to the surrounding area.

5.5.5 Although an underground cable would not have the same associated landscape and visual impacts as an overhead line connection, it would require cable trenching works, which could give rise to noise and dust impacts during construction. The underground cable route is also longer and therefore more expensive.

5.5.6 Further refinement studies and the results of feedback from the formal consultation process will help to derive a preferred option for the Electrical Connection.

SECTION 6

AIR QUALITY

6 AIR QUALITY

6.1 Introduction

6.1.1 The construction, operation and decommissioning of the Power Generation Plant have the potential to impact on local air quality. During construction (including demolition) and decommissioning, all elements of the Power Generation Plant have the potential to generate air emissions (e.g. through generation of dust) and thus impact on local air quality and therefore will be assessed within the EIA. During operation, the only potentially significant emissions sources will comprise the stacks.

6.1.2 A preliminary assessment of the construction and decommissioning of both options for the Gas and Electrical route corridor options is also provided. However, the operation of these elements of the Project is not considered to have the potential to generate any impacts to air quality during their operation and are therefore not assessed further.

6.2 Legislative and Policy Context

Ambient Air Quality Directive

6.2.2 Council Directive 96/62/EC on ambient air quality assessment and management (the Air Quality Framework Directive) described the basic principles as to how air quality should be assessed and managed in the Member States. Subsequent Daughter Directives introduced numerical limits, thresholds and monitoring requirements for a variety of pollutants including NOx and SO_2 to guarantee that there are no adverse effects with regard to human health.

6.2.3 Directive 2008/50/EC of 21 May 2008 on ambient air quality and cleaner air for Europe (the Ambient Air Quality Directive) merges the Air Quality Framework Directive with the First, Second and Third Daughter Directives. The Ambient Air Quality Directive identifies desired maximum ground level concentrations and the date by which the objectives should be met and introduces new objectives for fine particles.

6.2.4 The Air Quality Standards (Wales) Regulations 2010 (the AQS Regulations) give effect, in Wales, to the Ambient Air Quality Directive.

Air Quality Standards Regulations 2010

6.2.5 The AQS Regulations specify a series of standards and objectives for air quality in the UK. The objectives are summarised, as appropriate to the Project, in Table 6.1.

Table 6.1: UK AQS Objectives for Ambient Air Quality

Pollutant	Averaging Period	Objective (Ground Level Concentration) (µg/m3)	Number of permitted Exceedances
Nitrogen Dioxide (NO_2)	1 Hour Annual	200 40	18 -
Carbon Monoxide	8-hour rolling	10 000	-

6.2.6 Previous versions of the AQS Regulations were implemented through the *Air Quality Strategy for England, Wales, Scotland and Northern Ireland* (2007).

Local Air Quality Management

6.2.7 The Environment Act 1995 requires local authorities to review air quality within their district or borough in order to determine where pollutant levels identified in the Air Quality Framework Directive may be in excess of the standards.

6.2.8 If pollutant levels in an area are likely to exceed statutory objectives, then local authorities must declare an Air Quality Management Area (AQMA) and draft an Action Plan to achieve the statutory objectives. The Department of Environment, Food and Rural Affairs (DEFRA) has issued technical guidance[5] to local authorities to assist in undertaking this task.

6.2.9 This gives the local authority a clear picture of the sources which can be controlled or influenced, and aid the local authority to target more effectively the relative contributions of industry, transport and other sectors and ensure that the solutions are cost effective and proportionate when producing their Action Plan.

5 Local Air Quality Management Policy Guidance (PG09), February 2009

6.2.10 As part of the on-going review and assessment process of AQMAs, a phased approach has been adopted to ensure that the level of local authority assessment is commensurate with the risk of an air quality objective being exceeded. Therefore, each local authority is required to undertake an Updating and Screening Assessment (USA) of the AQMAs within their administrative area in order to identify changes which have occurred since the previous review and assessment that could potentially lead to a risk of an air quality objective being exceeded. Where a risk has been identified the local authority is required to undertake a more detailed assessment to determine the likelihood of an exceedance and revise the AQMA as appropriate.

Industrial Emissions Directive (IED)

6.2.11 Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control) (IED) recast seven directives related to industrial emissions, in particular Directive 2008/1/EC of 15 January 2008 concerning integrated pollution prevention and control (the Integrated Pollution Prevention and Control (IPPC) Directive) and Directive 2001/80/EC of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants (the Large Combustion Plant Directive (LCPD)), into a single legislative instrument to improve the permitting, compliance and enforcement regimes adopted by Member States.

6.2.12 The IPPC Directive laid down measures to prevent or, where that is not practicable, to reduce emissions in the air, water and land introducing ELVs and BAT. The LCPD prescribed ELVs for nitrogen oxides, sulphur dioxide and particulates. These are the pollutants relevant to the EIA of the Project.

6.2.13 The IED makes provisions for the continuation of the requirements and principles of the IPPC Directive and the LCPD and introduces new, more stringent, ELVs with full compliance required by 1st January 2016.

6.2.14 The LCPD and IPPC Directive are implemented in England and Wales by the Environmental Permitting (England and Wales) Regulations 2010 (the EP Regulations).

Environmental Permitting (England and Wales) Regulations 2010

6.2.15 The Environmental Permitting (England and Wales) (EP) Regulations 2007 sought to introduce a single streamlined environmental permitting and compliance regime to apply in England and Wales. They do this by integrating the previous regimes covering waste management licensing

and Pollution Prevention and Control. The EP Regulations increase the scope of the 2007 Regulations.

6.2.16 Natural Resources Wales (NRW) will control and regulate the Power Generation Plant with respect to the emissions to air from the stack(s) via an Environmental Permit that will be required for the Project, under the EP Regulations. The Environmental Permit will include specific ELVs to apply to the Power Generation Plant for the relevant pollutants considered within the IED. Such limits will be based on the associated emissions levels (AEL) of recognised BAT as per current Environment Agency (EA) guidance notes and the existing EU IPPC '*Reference Document on Best Available Techniques for Large Combustion Plant*' (2006) and the draft update of this document, '*Best Available Techniques Reference Documents for the Large Combustion Plants*' (2013) (together, "BREF Notes").

The Habitats Directive

6.2.17 The European Habitats Directive (92/43/EEC) sets out the legal framework requiring EU member states to protect habitat sites supporting vulnerable and protected species, as listed within the Directive. This Directive is transposed into UK law by the Conservation of Habitats and Species Regulations 2010 and requires protection of ecological sites including Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

6.2.18 The Habitats Directive is implemented in England and Wales by the Habitats and Species Regulations 2010.

The Ambient Air Quality Directive

6.2.19 Across the UK, site-specific critical levels (which relate to airborne pollutant concentrations at ground level) and critical loads (which relate to deposition of materials to soils) have been set for a variety of protected habitats and species in order to allow the quantitative assessment of the condition of ecologically sensitive sites and thus the protection of such sites by the relevant competent authorities.

6.2.20 The Ambient Air Quality Directive sets ambient air quality guidelines for NO_x for the protection of ecosystems. This imposes a long-term (annual average) limit for NO_x of 30 $\mu g/m^3$ (critical level). In terms of the limit for the protection of ecosystems, it is important to define the areas in which the limit is to be achieved. Directive 2008/50/EC states that sampling points to determine concentrations should be:

- 20 km from an agglomeration (which is defined as an area with a population of more than 250 000); or
- At least 5 km from other built-up areas, industrial installations or motorways or major roads with traffic counts of more than 50 000 vehicles per day;
- Representative of air quality in a surrounding area of at least 1000 km^2.

6.2.21 This is mirrored in the AQS Regulations.

National Policy Statements

6.2.22 As explained in Section 2, EN-1 explains the assessment principles to which the Secretary of State will have regard in the examination of an energy NSIP (such as the proposed Project), and explains the generic air emissions impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (EN-2). The NPSs for Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5) provide specific considerations potentially relevant to the Gas Connection and Electrical Connection respectively.

6.2.23 Paragraph 5.2.4 of EN-1 states that: “Emissions from combustion plants are generally released through exhaust stacks. Design of exhaust stacks, particularly height, is the primary driver for the delivery of optimal dispersion of emissions and is often determined by statutory requirements.”

6.2.24 EN-2 highlights, in paragraph 2.5.3, that the significant emissions to air from fossil fuel generating stations will be oxides of nitrogen and sulphur dioxide, whilst noting that the emissions of sulphur dioxide from gas-fired generating stations may be negligible.

6.2.25 In relation to the assessment of air quality impacts by a developer, paragraph 5.2.10 of EN-1 requires that the Secretary of State takes into account any relevant statutory air quality limits and that developers should work with the relevant authorities to secure appropriate mitigation measures to allow the proposal to succeed.

6.2.26 Paragraph 5.2.11 states that: “The SoS should consider whether mitigation measures are needed both for operational and construction emissions over and above any which may form part of the project application. A construction management plan may help codify mitigation at this stage.”

National and Local Policy

6.2.27 Whilst the PA 2008 is clear as to the primacy of the relevant NPS, other national and local planning policy may be considered important and relevant by the Secretary of State in the determination of an energy NSIP.

6.2.28 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. The document presents the commitment to sustainable development into the planning.

6.2.29 In addition, the Wales Spatial Plan sets a strategic framework that integrates the spatial aspects of national strategies for social inclusion and economic development, health, transport and environment.

6.2.30 PPW states that:

The goal of sustainable development is to "enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations."

6.2.31 The Welsh Government has a statutory duty, under the Government of Wales Act 2006 (Section 79), which requires Welsh Ministers to promote sustainable development and publish a scheme that sets out how this will be achieved (the latest of which was published in 2009).

6.2.32 The above scheme presents a definition of sustainable development in Wales. As per PPW:

"This means enhancing the economic, social and environmental well-being of people and communities, achieving a better quality of life for our own generations in ways which:

- promote social justice and equality of opportunity; and
- enhance the natural and cultural environment and respect its limits - using only our fair share of the earth's resources and sustaining our cultural legacy."

6.2.33 The following principles (amongst others) are noted in PPW as reflecting principles that the Welsh Government expects all parties involved in the planning system to follow:

- "taking a long term perspective to safeguard the interests of future generations, whilst at the same time meeting needs of people today;
- respect for environmental limits, so that resources are not irrecoverably depleted or the environment irreversibly damaged.

This means, for example, mitigating climate change, protecting and enhancing biodiversity, minimising harmful emissions, and promoting sustainable use of natural resources; and

- tackling climate change by reducing the greenhouse gas emissions that cause climate change and ensuring that places are resilient to the consequences of climate change."

6.2.34 PPW identifies the, "... natural heritage and valued landscapes of Wales are not confined to statutorily designated sites but extend across all of Wales - to urban areas, the countryside and the coast," and states:

"The Welsh Government's objectives for the conservation and improvement of the natural heritage are to:

- promote the conservation of landscape and biodiversity, in particular the conservation of native wildlife and habitats;
- ensure that action in Wales contributes to meeting international responsibilities and obligations for the natural environment;
- ensure that statutorily designated sites are properly protected and managed;
- safeguard protected species, and to
- promote the functions and benefits of soils, and in particular their function as a carbon store."

6.2.35 PPW states that: "Planning and environmental management are separate but complementary." The stated objectives in this regard are to:

- "maximise environmental protection for people, natural and cultural resources, property and infrastructure; and
- prevent or manage pollution and promote good environmental practice."

6.2.36 PPW requires that every local planning authority in Wales must prepare Local Development Plan (LDP) for its area. The LDP will be the development plan for each county or county borough council and each National Park, superseding the Unitary Development Plan (UDP) or any other existing development plan.

6.2.37 The *Rhondda Cynon Taf Local Development Plan 2006-2021* was adopted in 2011. Policy AW10 of the Local Development Plan covers Environmental protection and Public Health and states the following: "Development proposals will not be permitted where they would cause or result in a risk of unacceptable harm to health and / or local amenity

because of Air pollution..... unless it can be demonstrated that measures can be taken to overcome any significant adverse risk to public health, the environment and / or impact upon local amenity.

6.3 Realistic Worst Case Scenario for Assessment

6.3.1 In respect of Air Quality, the realistic worst case scenario from within the proposed Project parameters (which are described in Section 4 of this PEIR) are set out in Table 6.2.

6.3.2 The reason that this represents the realistic worst case in relation to air quality impacts is that the buoyancy of a plume is, principally, a function of its temperature and volume. Assuming the thermal efficiency of the units for all options of between one and five units is the same, a specific plant electrical output will require a specific amount of natural gas. The combustion of this gas would thus result in a specific volume of flue gas.

6.3.3 The temperature of the flue gases will be similar irrespective of the number of installed units. However, if the flue gases are split between multiple stacks, the volumetric flow rate of each plume will be reduced (e.g. the use of five stacks will emit 20 per cent of the total flue gas volume) thus reducing the buoyancy of the flue gases proportionately.

6.3.4 The reduction in buoyancy will limit the potential for atmospheric dispersion of the flue gases. For instance, simple plume rise calculations indicate that the potential plume rise for emissions from five individual stacks would be around half that which could be achieved for emissions for the same total volume of flue gas but from two individual stacks.

6.3.5 Additional evidence of this is provided in this Section as the assessment to date has considered two of the potential options for the number of units to be utilised for the Project. Therefore, the assumed realistic worst case scenario is considered robust.

6.3.6 A preliminary assessment of both options for the Gas Connection and the Electrical Connection is presented in this section. A decision on the preferred option for each will be taken following consultation.

Table 6.2 – Realistic Worst Case Scenario for Air Quality Impacts

Parameters	Details
Power Generation Plant	
Number of gas turbine units	5 (~ 59 MWe)
Number of stacks	5
Height of Stacks	25m
Unit type	Aero derivative

6.4 Assessment Methodology and Significance Criteria

6.4.1 The assessment methodology set out below is applicable to each of the construction, operation and decommissioning phases.

Construction

Airborne Particulate Matter

6.4.2 A preliminary assessment of the potential impact of construction site dust (including dust created from demolition) has been undertaken on a preliminary basis within this PEIR. It is based on the Institute of Air Quality Management (IAQM) '*Guidance on the Assessment of Construction on Air Quality and the Determination of their Significance'* (January 2012). A more detailed assessment, which will be more rigidly underpinned by this guidance will be presented in the final ES. This guidance states:

"The risk of emissions of dust (all types) from a demolition/construction site causing a statutory nuisance, loss of amenity and/or health or ecological effects will be related to:

- the activities being undertaken (demolition, number of vehicles and plant etc.);
- the meteorological conditions (wind speed, direction and rainfall);
- the proximity of receptors to the activity;
- the duration of the activity;
- the adequacy of the mitigation measures applied to reduce or eliminate dust; and
- the sensitivity of the receptors to dust.

Emissions of dust will vary depending on the activities being undertaken throughout the day; and mitigation must be designed to respond to this."

6.4.3 The preliminary assessment presented in the PEIR has focussed on an initial indication of the likely impacts from a 'typical' construction site of this nature. However, future assessment will incorporate a number of stages in order to:

- screen the requirement for a more detailed assessment so that activities unlikely to cause significant effects are not considered further;
- determine the risk of dust effects and hence the need for additional mitigation (i.e. above the standard mitigation that may be expected to be applied to any construction sites); and
- following the definition of the mitigation, the description of the residual effects and their significance.

6.4.4 Under the above Guidance, activities on-site are divided into four types to reflect their different potential impacts:

- Demolition;
- Earthworks;
- Construction; and
- Laying of access roads.

6.4.5 The assessment methodology examines the potential dust effects with regards to:

- Annoyance / disturbance due to dust deposition / soiling;
- Harm to ecological receptors; and
- Human health impact due to increase in exposure to particulate matter of les than 10 microns ($PM_{10)}$.

6.4.6 The IAQM Guidance adopts a risk-based approach to air quality associated with construction / demolition and the magnitude of any potential impact is assessed as being within a dust emissions class that is Large, Medium or Small. These are defined based on the type of activity as follows:

- Demolition:
  - i **Large**: Total building volume >50 000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;
  - ii **Medium**: Total building volume 20 000 m^3 – 50 000m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
  - iii **Small**: Total building volume <20 000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.
- Earthworks:
  - i **Large**: Total site area >10 000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100 000 tonnes;
  - ii **Medium**: Total site area 2 500 m^2 – 10 000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20 000 tonnes – 100 000 tonnes; and
  - iii **Small**: Total site area <2 500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10 000 tonnes, earthworks during wetter months.
- Construction:
  - iv **Large**: Total building volume >100 000 m^3, piling, on site concrete batching; sandblasting;
  - v **Medium**: Total building volume 25 000 m^3 – 100 000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and
  - vi **Small**: Total building volume <25 000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
- Laying of access tracks:
  - vii **Large**: >100 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;

viii **Medium**: 25-100 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100 m; and

ix **Small** / **Medium**: <25 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50 m.

6.4.7 The risk-based approach considers the significance of any potential impact with regards to the number / sensitivity of receptors and the distances to the receptors.

6.4.8 The results of the assessments will ultimately produce a risk level for the site / area of assessment which will inform the mitigation and management techniques that should be implemented based on the recommendations of "*The control of dust and emissions from construction and demolition – Best Practice Guidance*" (Greater London Authority, 2006).

Construction Vehicles and Traffic

6.4.9 A preliminary assessment of the impact of the emissions from construction / demolition vehicles (both on- and off-site) is provided in this PEIR and is based on the methodology prescribed in the Department for Transport '*Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3, Part 1: Air Quality*' for the estimation of emissions from vehicles. However, this will be expanded for the final ES and the methodology will explicitly follow this guidance.

Operation

6.4.10 For the purposes of assessing operational impacts this preliminary air quality impact assessment has assessed the worst case scenario, as presented in Table 7.1, that is:

- Operation of five aero-derivative units (each of c.59 MWe)

6.4.11 To assess the air quality impacts that will arise during operation, the assessment looks at the dispersion of the flue gases from the stack(s), being the potentially significant sources of emissions to air.

6.4.12 The impacts of the emissions from the stacks have then been quantitatively assessed using industry standard air dispersion modelling techniques in accordance with the latest EA guidance, particularly such guidance provided by their Air Quality Modelling and Assessment Unit (AQMAU).

Decommissioning

6.4.13 The air quality impacts of decommissioning will be similar to those that arise for construction. The assessment of these potential impacts will therefore be carried out on the same basis as those arising from construction activities.

Ambient Air Quality and the Protection of Human Health

6.4.14 The AQS Regulations specify a series of standards and objectives for air quality in the UK. The objectives are summarised in Table 6.1 and consider pollutants that are the principal products of industrial combustion processes. In the case of the combustion of natural gas in a power station, these are NO_x and CO. Assessment of these pollutants therefore forms the basis for the assessment of emissions for the operation phase of the Project.

6.4.15 Oxides of nitrogen (NO_x) are primarily formed by two reaction routes. 'Thermal' NO_x is formed by the reaction of atmospheric oxygen and nitrogen at the high combustion temperatures within the gas turbine whilst 'prompt' NO_x is formed by the reaction of atmospheric nitrogen with free radicals from the fuel via a complex series or reactions. Assessment of NO_x is important because oxides of nitrogen subsequently convert to NO_2, in the presence of ozone in the atmosphere.

6.4.16 CO is formed by the incomplete combustion of carbon in a fuel. Combustion in gas turbine generators is conducted at high excess air rates, typically 200-300 per cent excess air. Therefore there will be only very low levels of carbon monoxide or unburned hydrocarbons present in the flue gases from the Project (as detailed in Tables 6.6 to 6.7).

Protection of Vegetation and Ecosystems

6.4.17 As set out above, the long-term (annual average) limit for NO_x of 30 $\mu g/m^3$ is the critical level for the protection of vegetation and ecosystems. The location of sampling points in order to demonstrate compliance with this standard (and therefore areas of where this standard should apply) is influenced by the presence of other industrial installations nearby.

6.4.18 The limitations to the applicability of this standard are noted above. Nevertheless, the impact of the Power Generation Plant will be assessed against the above standard in order to demonstrate the potential impact. This is considered particularly important given the

location with respect to the neighbouring areas afforded EU protection for their ecological status.

6.4.19 Ecological receptors (listed below) may also be sensitive to the deposition of nutrient nitrogen and the deposition of acidity due to nitrogen as a result of the process contribution to ground level concentrations of NO_x:

- Special Areas of Conservation:
  - i Coedydd Nedd a Mellte (1.4km west of the Power Generation Plant Site);
  - ii Cwm Cadlan (14km north west of the Power Generation Plant Site); and
  - iii Blaen Cynon (0.4km north of the Power Generation Plant Site).
- Sites of Special Scientific Interest:
  - iv Cors Bryn-y-Gaer (0.4km north of the Power Generation Plant Site);
  - v Dyffrynoedd Nedd a Mellte a Moel Penderyn (1.4km north west of the Power Generation Plant Site); and
  - vi Woodland Park and Pontpren (1.2km north east of the Power Generation Plant Site).

6.4.20 Atmospheric nitrogen is a source of essential nutrients for vegetation and the ambient concentration commonly limits growth in temperate ecosystems. Increased availability of nitrogen in the air (such as through increases in the ambient concentrations of NO_x) can have an effect on species composition of an area, that would favour plants / vegetation with a high nitrogen demand. The increased availability of atmospheric nitrogen can limit the uptake of other essential nutrients from soils such that vegetation may be affected by reduced levels of potassium and magnesium.

6.4.21 The deposition of acidity due to nitrogen (acidification) can lead to the loss of alkali nutrients (such as calcium, magnesium and potassium) in the soils. Increased ground level concentrations of NO_x and the associated deposition effects can increase the rate of acidification that can affect all aspects of the natural environment (i.e. soils, water, flora and fauna).

6.4.22 The deposition of nutrient nitrogen and the acidity due to nitrogen as a result of operation of the Power Generation Plant under all development scenarios will be undertaken in accordance with the EA guidance "*AQTAG 06 - Technical Guidance on detailed modelling*

approach for an appropriate assessment for emissions to air" (2010). Critical loads (to be used as standards for the assessment of significance) will be obtained from the Air Pollution Information Service (APIS).

Air Dispersion Modelling

6.4.23 Air dispersion modelling can predict the ground level concentrations that occur due to the emissions from an elevated stack point source such as the stack(s) to be incorporated as part of the Project. This subsection describes the key aspects of the dispersion modelling process undertaken for the purposes of the EIA for the Project.

6.4.24 The flue gases discharged from a stack have two sources of momentum. One is related to the velocity of discharge. This is usually designed to be in excess of 15 m/s as this value has been found to be sufficient to avoid immediate downwash of the plume. Immediate downwash of a plume would not allow for adequate dispersion of the emissions from the stack and could result in significantly elevated ground level concentrations of pollutants in the immediate vicinity of the stacks. Whilst contributing to the dispersion of stack emissions, the momentum from the velocity of discharge is soon dissipated.

6.4.25 The second source of momentum is much more significant and is related to the discharge temperature of the flue gases. The flue gases, being warmer than the surrounding atmosphere into which they are discharged, have buoyancy and thus rise. This process continues until the flue gases have cooled to the same temperature as the surrounding air.

6.4.26 Mathematical models are used to calculate the effects of these two sources of momentum and determine the height to which the flue gases will rise. This height plus the height of the stack gives an 'effective stack height'.

6.4.27 The mathematical model then determines the dispersion of the flue gases from this effective stack height. Note that the effective height can be many times greater than the actual stack height as constructed due to the large amount of heat present in the flue gases.

6.4.28 Dispersion occurs as a result of turbulence, and turbulence can result from both buoyancy effects and wind shear (also called mechanical) effects.

6.4.29 As an example of buoyancy effects, on a sunny day, solar heating creates turbulence by heating the ground and the air near the ground. The buoyancy of the heated air causes it to rise, creating turbulence.

These are the thermals used by small plane and glider pilots on sunny days. These can also rapidly disperse a plume in the surrounding air. At night, during stable conditions, the buoyancy effect is to suppress rather than cause or enhance turbulence.

6.4.30 Wind shear as a cause of turbulence is well known to pilots as well. Wind shear effects, important to air pollution modelling, result from high (several meters per second) wind speeds near the ground. Since the wind speed at the ground is zero, any high wind speeds result in substantial wind shear. Wind shear dominates over buoyancy effects not only under high wind conditions, but also near the ground under any conditions.

6.4.31 As a result of this, two parameters are used to define the "stability" of the atmosphere. The first is the friction velocity which is a measure wind shear.

6.4.32 The second parameter is a stability term called the Monin-Obukhov length. As mentioned above, shear stress always dominates near the ground. The height above the ground, where buoyancy effects begin to dominate (generating turbulence in convective conditions or suppressing turbulence in stable conditions) is called the Monin-Obukhov length. This can be thought of as a depth of the neutral (i.e. shear-dominated) flow.

Dispersion Model and Inputs

6.4.33 ADMS 5 was used for the modelling of the dispersion being a second generation model developed in the UK and accepted by the EA for the purposes of EIA (in addition to Environmental Permit applications).

Building Downwash

6.4.34 Building downwash is created by structures in the vicinity of an emissions source and subjects the plume from the stack(s) to wake effects. The effect is generally to pull the plume down to the ground at locations closer to the stack(s) thereby restricting the dispersion of the plume and increasing the ground level concentration of pollutants and, potentially, the environmental impact of the Power Generation Plant.

6.4.35 All buildings are assumed to be located as in the indicative layouts shown in Figure 4.1. The downwash effects of buildings are considered to be potentially significant if they are within a distance from the stack(s) equivalent to five times the building height and if the building height is greater than 40 per cent of the stack height. As such, any changes to the layout of the above buildings are not likely to

significantly alter the results of the model however the buildings are included for completeness.

Receptors and Additional Model Data

6.4.36 The ADMS model calculates time averaged ground level concentrations over any set of distances from the source. The study used a 20 km by 20 km Cartesian grid with 200 m spacing to predict the process contributions to ground level concentrations in the immediate vicinity of the proposed stack location. This grid was centred on the proposed centre points of the stacks at approximate grid reference SN 937 063.

6.4.37 The meteorological data used for this modelling exercise was that from the station at Sennybridge (approximate National Grid Reference SN 89 42); it is considered that this data will be representative of the conditions experienced at the Project Site following consultation with the Met Office (who supplied the data). The data period considered was 2008-2012 inclusive as per current guidelines for the consideration of recent meteorological data over five consecutive years. For each year the predominant wind direction was from the south west.

6.4.38 Terrain effects generally occur when ground levels within 1 km of the stack vary by more than a third of the stack height. Given the range of stack heights that have been considered as part of the stack height sensitivity study and the terrain in the vicinity of Hirwaun, Ordnance Survey Landform Panorama DTM terrain data has been included in the dispersion modelling exercise.

Fuel-specific Dispersion Model Inputs

6.4.39 Modelling will assume that the Power Generation Plant operates at full load for 1500 hours per year i.e. the maximum possible operation of the Power Generation Plant. . Given the proposed 'peaking' operating regime of the Project, this provides a factor of safety in that all combinations of meteorological conditions (e.g. wind direction, speed, humidity, ambient temperature, etc.) likely to be experienced at the Project Site have been considered. This is because despite the fact that the plant will not operate year round, it is not possible to predict with certainty when the plant could operate or for how long at any one time.

6.4.40 All emissions from the combustion of the fuel gases will be discharged from the main stack. Based on the available anticipated emissions data, the stack diameter was optimised to ensure that the discharge velocity was at least 25 m/s.

6.4.41 The dispersion modelling inputs are shown in Tables 6.3 below.

Table 6.3: Model Inputs

Parameter	Units	Value (per unit)
Normal flue gas flow rate	Nm^3/s	129.1
NOx emission level	mg/Nm^3	50
NOx flow rate	g/s	6.5
CO emission level	mg/Nm^3	100
CO emission rate	g/s	12.9
Temperature	°C	463
Actual flue gas volume	m^3/s	346.4
Oxygen content	% volume (wet)	13.6
Flue gas velocity	m/s	25
Stack diameter	m	4.2

**Normalised volumes corrected to 273.15 K, 1 atm and 15 per cent oxygen w/w (dry)*

Conversion of Oxides of Nitrogen to Nitrogen Dioxide

6.4.42 NO_x emissions from the Power Generation Plant will consist of the gases NO and NO_2. It is only NO_2 that is of concern in terms of direct health effects; however NO is a source of NO_2 in the atmosphere. The gases are in equilibrium in the air, with NO predominating at the stack exit. The equilibrium changes as the plume disperses and is exposed to oxidants, such as atmospheric ozone. The rate of conversion of NO to NO_2 increases with rising ozone concentration and wind speed (turbulence and mixing effects) whilst the level of solar radiation controls the rate of the reverse dissociation reaction of NO_2 to NO.

6.4.43 For assessing the impacts on air quality of emissions to atmosphere from sources, such as power stations, it is important that realistic estimates are made of how much NO would be oxidised to NO_2 at all receptors considered.

6.4.44 The rate of oxidation of NO to NO_2 depends on both the chemical reaction rates and the dispersion of the plume in the atmosphere. The oxidation rate is dependent on a number of factors that include the prevailing concentration of ozone, the wind speed and the atmospheric stability.

6.4.45 Conversion factors are recommended for a screening / worst case approach by the EA AQMAU and their "*Horizontal Guidance Note H1 – Annex (f)*" (April 2010). The guidance states that an initial air quality assessment should be undertaken based on 50 per cent conversion of

the short-term average NO_x concentrations and 100 per cent conversion of the long-term averages.

6.4.46 However, in order to determine the true impact of operation it is important that a realistic estimate of the actual process contribution to ground level concentrations of NO_2 is made.

6.4.47 Between 1975 and 1985 about 60 sets of measurements were taken of the concentrations of NO and NO_2 in plumes from a variety of power stations. These measurements were carried out under widely varying weather conditions at altitudes between 200 m and 700 m. From the data collected, an empirical relationship for the percentage oxidation in a power station plume based on downwind distance, season of the year, wind speed and ambient ozone concentration may be described by the following equation (which is sometime referred to as Janssen's equation):

$$NO_2 / NO_x = A\left(1 - \exp^{(-\alpha x)}\right)$$

where x is the distance downwind (km) of the emission point and α and A are constants dependent on time of year and derived from the measurements of wind speed and ozone concentrations.

6.4.48 For a typical power station the peak ground level concentration of the oxides of nitrogen will occur within a few kilometres. Table 6.4 shows the minimum, maximum and annual average estimates of NO_2 in the plume for selected distances downwind of the plume, the figure takes into account the ratio of NO to NO_2 in the plume on exit from the stack and assumes that there is sufficient ozone present to achieve equilibrium of the conversion reaction, as a worst case.

Table 6.4: Estimates of the Percentage of NO_2 in NO_x

Downwind Distance (km)	Percentage NO_2		
	Lowest One Hour Average	Highest One Hour Average	Annual Average
1	5.9	16.0	9.3
2	11.4	29.0	17.5
3	16.5	39.7	24.7
5	25.7	55.6	36.5
10	43.8	76.1	56.1

6.4.49 Given the figures in the above table it is considered that the application of the 50 per cent / 100 per cent NO_x conversion factors represents a

significant over-estimation of the actual maximum increments to ground level concentrations of NO_2 as a result of operation of the Power Generation Plant. Therefore the conversion factors from the above Table have been applied.

Stack Height

6.4.50 As set out in Section 4 of this PEIR, a stack height sensitivity study examined differing stack heights in intervals from 20 m upwards. The stack height sensitivity considered long term and short term contributions to ground level concentrations of NO_2.

6.4.51 The stack height modelling results have been compared against the limits prescribed in the AQS Regulations. The modelling results can be considered to be "significant" if the ground level concentrations exceed 10 per cent of the short term objectives / EAL (up to 24 hour averages) and 1 per cent of the long term objectives / EAL (monthly / annual results etc.).

6.4.52 It is assumed that the plant is operating at full load for 1500 hours per annum therefore the worst case scenario has been considered.

6.4.53 The stack height study predicted the 19th highest hourly and annual NO_2 ground level concentrations as a result of the operation of the Power Generation Plant. The 19th highest hourly value is obtained with regard to the compliance requirements of EU and UK legislation and allows for abnormal weather conditions which may only occur for one hour during the year to be disregarded as these weather conditions cannot be mitigated for in any significant way.

Significance Criteria

Construction / Decommissioning

6.4.54 Tables 6.5 to 6.8 outline the matrices defined in the IAQM Guidelines. The matrices are used, for construction / decommissioning, as a proxy for the "magnitude" of the effect (as per the methodology described in Section 6.4).

6.4.55 Table 6.9 provides examples for the determination of the sensitivity of a receptor.

6.4.56 Table 6.10 outlines the significance criteria that have been used to assess the significance of potential air quality impacts during construction which has been taken from the IAQM Guidance. The significance level is then used as a direct link to the mitigation requirements outlined in '*The control of dust and emissions from*

construction and demolition Best Practice Guidance' (Greater London Authority, 2006).

Table 6.5: Risk Category - Demolition

Distance to Receptor (m)		Dust Emissions Class		
Human Health / Disturbance	**Ecological Sites**	**Large**	**Medium**	**Small**
<20	-	High	High	Medium
20-100	<20	High	Medium	Low
100-200	20-40	Medium	Low	Low
200-350	40-100	Medium	Low	Negligible

Table 6.6: Risk Category - Earthworks

Distance to Receptor (m)		Dust Emissions Class		
Human Health / Disturbance	**Ecological Sites**	**Large**	**Medium**	**Small**
<20	-	High	High	Medium
20-50	-	High	Medium	Low
50-100	<20	Medium	Medium	Low
100-200	20-40	Medium	Low	Negligible
200-350	40-100	Medium	Low	Negligible

Table 6.7: Risk Category - Construction

Distance to Receptor (m)		Dust Emissions Class		
Human Health / Disturbance	**Ecological Sites**	**Large**	**Medium**	**Small**
<20	-	High	High	Medium
20-50	-	High	Medium	Low
50-100	<20	Medium	Medium	Low
100-200	20-40	Medium	Low	Negligible
200-350	40-100	Medium	Low	Negligible

Table 6.8: Risk Category - Laying of access roads

Distance to Receptor (m)		Dust Emissions Class		
Human Health / Disturbance	**Ecological Sites**	**Large**	**Medium**	**Small**
<20	-	High	Medium	Medium
20-50	<20	Medium	Medium	Low
50-100	20-100	Low	Low	Negligible

Table 6.9: Sensitivity of a Receptor

Sensitivity	Human Receptor	Ecological Receptor
Very High	Very densely populated area. More than 100 dwellings within 20 m.	European Designated Site
	Local PM_{10} concentrations exceed the objective.	
	Contaminated buildings present.	
	Very sensitive receptors (e.g. oncology units).	
	Works continuing in one area of the site for more than one year.	
High	Densely populated area. 10-100 dwellings within 20 m of site.	National Designated Site
	Local PM_{10} concentrations close to the objective (e.g. annual mean 36-40 µg/m^3).	
	Commercially sensitive horticultural land within 20 m.	
Medium	Suburban or edge of town area.	Local Designated Site
	Less than 10 dwellings within 20 m.	
	Local PM_{10} concentrations below the objective (e.g. annual mean 30-36 µg/m^3).	
Low	Rural area; industrial area	No Designation
	No dwellings within 20 m	
	Local PM_{10} concentrations well below the objectives (less than 75%)	
	Wooded area between site and receptors	

Table 6.10: Significance Criteria for Construction / Demolition / Decommissioning

Sensitivity	Risk Category		
	High	Medium	Low
Very High	Severe	Major	Moderate
High	Major	Moderate	Minor
Medium	Moderate	Minor	Not Significant
Low	Minor	Not Significant	Not Significant

Operation

6.4.57 Whilst noting that the stack height sensitivity studies have been undertaken in accordance with the significance criteria set out in above, more detailed analysis will be undertaken for the resultant impacts as the EIA progresses.

6.4.58 In terms of NO_x, the significance criteria adopted for the operational air quality impacts in this assessment have been derived from the criteria suggested by Environmental Protection UK in their document '*Development Control: Planning for Air Quality*' (2010).

6.4.59 Firstly, the magnitude of potential impact is determined via Table 6.11.

Table 6.11: Establishing the Magnitude of the Potential Impact

Magnitude	Increase in Annual Mean NO_2 ($\mu g/m^3$)	[6]Increase in Days NO_2 >200 $\mu g/m^3$ *
Very Large	n/a	>14 days
Large	>4	8-14 days
Medium	2 – 4	5-8 days
Small	0.4 – 2	3-5 days
Very Small	n/a	1-3 days
Extremely Small	<0.4	<1 day

**Note: 18 days of exceedances are permitted under the NAQS in any one year*

6.4.60 The magnitude of the potential impact is then compared against the absolute concentration relative to AQS Regulations objective to determine the significance via Table 6.12.

[6] Retained from 2006 guidance as no standard is included in 2010 update

6.4.61 These significance criteria are applied for the purposes of this impact assessment. However, the AQS method does not distinguish between processes or the extent of the area of impact. Therefore it is important that the results are interpreted qualitatively as well as quantitatively.

6.4.62 The 'sensitivity' for operational effects is the same as the thresholds shown in Table 6.9 apply to all receptors.

Table 6.12: Establishing the Significance of the Predicted Impact

Absolute Concentration in relation to Standard / Objective	Magnitude					
	Extremely Small	Very Small	Small	Medium	Large	Very Large
Above Standard without Project	Minor	Minor	Major	Major	Severe	Severe
Below Standard without Project and Above with Project	Minor	Moderate	Major	Major	Severe	Severe
Below Standard with Project, but not Well Below*	Not Significant	Minor	Minor	Moderate	Moderate	Major
Well Below Standard with Project	Not Significant	Not Significant	Minor	Minor	Minor	Moderate

* Note: Well below the standard = <75% of the standard level. ''Standard' relates to the specific air quality objective

6.4.63 As explained in Section 3 of this PEIR effects classed as 'moderate' and above have been considered significant in EIA terms.

6.5 Consultation

6.5.1 Table 6 in Appendix A of this PEIR provides a summary of all consultation responses relating to the Air Quality assessment and illustrates how each response has been addressed.

6.6 Baseline Conditions and Receptors

Study Area

Construction

6.6.2 The IAQM Guidelines state that: "An assessment will normally be required where there are sensitive receptors within 350 m of the Project Site and / or within 100 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s)."

Air Dispersion Modelling

6.6.3 The Study Area for the air quality impact assessment is shown in Figure 6.1. This is based on a 20 km by 20 km grid, as explained in Section 6.4. It contains the following receptors:

- The residential settlements nearest to the Project including: Hirwaun, Rhigos, Penderyn and Aberdare. These are especially relevant as local residences or areas where people are present for a large percentage of the time;
- Sensitive ecological receptors within 10 km of the Project Site including European and Nationally Designated Sites, shown on Figure 6.1; and
- Business / industrial occupiers of the Hirwaun Industrial Estate.

Baseline Conditions

6.6.4 The baseline data is dependent on recent monitoring and other currently available information within the Study Area. The Study Area includes land within the jurisdiction of:

- RCTCBC;
- BBNPA;
- Neath Port Talbot County Borough Council;
- Merthr Tydfil County Borough Council; and
- Powys County Council.

6.6.5 As discussed in Section 6.1, the pollutants of concern for the Project are NO_x and CO. None of the above local authorities operate any automated air quality monitors within the Study Area; the closest automatic station is operated by RCTCBC at Tylorstown (approximately 13 km south east of the Project Site).

6.6.6 However, measurements are available from five diffusion tube locations which monitor concentrations of NO_2. The air quality monitoring results from these diffusion tubes are presented in Table 6.13.

Table 6.13: Annual Averages of NO_2 (µg/m^3)

Local Authority	Location	Site/Reference Number	2011
RCTCBC*	Penderyn	RCTCBC/21/N	9.9
	Aberdare	RCTCBC/53	42.4
		RCTCBC/68	33.8
		RCTCBC/69	34.8
		RCTCBC/75	36.7
		RCTCBC/88	40.6
	Ferndale	RCTCBC/93	52.8
		RCTCBC/107	44.8
		RCTCBC/115	33.0
	Blaenllechau	RCTCBC/101	10.0
Neath Port Talbot County Borough Council **	Glyn-neath	-	15.4
Merthyr Tydfil County Borough Council ***	Merthyr Tydfil	WAQF16	13.2
		WAQF31	12.7

Sources:
** Rhondda Cynon Taf County Borough Council Updating and screening Assessment 2012*
*** Neath Port Talbot County Borough Council Air Quality Progress Report – 2011*
**** 2012 Air Quality Updating and Screening Assessment for Merthyr Tydfil County Borough Council*

6.6.7 Table 6.14 shows that there are significant levels of NO_2 within Aberdare and Ferndale. Air quality in the remainder of the study area is generally very good.

6.6.8 RCTCBC published the results of an USA of ambient air quality within its jurisdiction in August 2012. The USA report states that:

"The Local Authority has undertaken regular assessments of local air quality in line with its statutory duties. These continued review and assessments, including the 2012 Updating and Screening Assessment have identified that the vast majority of Rhondda Cynon Taf observes on average good levels of air quality and conforms to health based Air Quality Objectives set nationally by Regulations. However,

comprehensive monitoring and assessment has previously identified some areas of Rhondda Cynon Taf as exceeding the AQOs for Nitrogen Dioxide [NO_2] and has previously led to thirteen Air Quality Management Areas being declared."

6.6.9 It is noted that most of the AQMAs referred to above are outside of the study area, however the Aberdare Town Centre AQMA and Ferndale AQMA fall within the study area. Both of these sites have been designated for continued exceedance of the annual mean objective for ground level concentrations of NO_2.

6.6.10 The Aberdare Town Centre AQMA was declared in 2007, and exceedances of the AQS Regulations are considered to as a result of high volumes of traffic along roads between High Street and Cardiff Street, due to the 'street canyon effect'[7]. The '*Stage 3 Detailed Assessment for Nitrogen Dioxide*' (Rhondda Cynon Taf County Borough Council, 2007) states:

"Due to the specific canyon effect and the nature of the NO_2 it is highly likely that dispersal will occur quickly and the effect on adjoining lightly trafficked streets would be minimal. It is also likely that localised traffic management is a significant factor in the breach of the [AQS Regulations] for NO_2 and therefore the area of the breach will be highly localised."

6.6.11 The Ferndale AQMA was declared in 2009 and encompasses properties along High Street and Duffryn Street. The '*Stage 4 Further Assessment of Nitrogen Dioxide*' ((Rhondda Cynon Taf County Borough Council, 2009) states:

"Due to the close proximity of the building facades to the kerb and a narrow carriageway the road is characteristic of a street canyon located within the Rhondda Fach valley This set of circumstances has created a street canyon at the bottom of a very steep sided valley, which often suffers from meteorological effects such as temperature inversions. Apart from a pelican crossing there are no fixed impediments to traffic. However, the commercial area of High St suffers from severe congestion due to waiting vehicles restricting an already narrow single carriageway."

6.6.12 It is considered that industrial (or other) sources do not significantly contribute to the on-going declaration of the above AQMAs.

[7] A street canyon has been defined in paragraph 6.30 of LAQM.TG(03) as "a relatively narrow street with buildings on both sides, where the height of the buildings is generally greater than the width of the road".

6.7 Preliminary Assessment of Potential Impacts

Construction / Demolition

Power Generation Plant

6.7.2 During construction / demolition works, the main potential impact on air quality will be due to:

- Airborne particulate matter (or dust) emissions from on-site activities; and
- Emissions of NO_x from traffic movements.

Airborne Particulate Matter

6.7.3 Dust could be emitted during several activities associated with the construction / demolition works should preventative measures not be taken. Dust could arise from: earth moving operations for site levelling, demolition of existing buildings, back filling and foundations; removal of spoil, site stripping, blow-off and spillage from vehicles; concreting operations, site reinstatement and road construction and during wind blow over bare dry construction areas.

6.7.4 Only with high wind speeds would long distance transport of dust and the potential for soiling of buildings occur. In these conditions more dust would also be created at source. The extent of any such emissions of dust is very dependent on wind speed, ground conditions, the prevalence of hot, dry conditions and the use of preventative measures.

6.7.5 As per the study area shown in Figure 6.1, there is understood to be only one residential property within the zone of influence of dust emissions, situated approximately 200m south of the Power Generation Plant Site on Rhigos Road. However, this property is separated from the Power Generation Plant Site by the presence of an area of woodland which will reduce the overall sensitivity of this receptor to wind blown dust, as per the IAQM Guidelines.

6.7.6 Aside from this one property, the nearest housing is approximately 600 m west of the Project boundary at Halt Close (off Rhigos Road).

6.7.7 The Power Generation Plant Site forms part of the Hirwaun Industrial Estate. As part of the embedded mitigation measures, which will inform the design of the Project and will comprise of best practice working arrangements on UK construction sites, HPL will continue to consult with the potentially affected neighbours and will require its contractors to implement a comprehensive dust suppression / mitigation and

monitoring programme. This mitigation programme would be detailed in a Construction Environmental Management Plan (CEMP) and adherence to these best practice working methods would be strictly enforced. This will prevent construction / demolition work generating levels of atmospheric dust which would constitute a health hazard or nuisance to local people or industry.

Construction Traffic Emissions

6.7.8 The impacts of atmospheric emissions from road vehicles upon local pollution levels is a function of the number and type of vehicles together with the vehicle speed as it passes any particular receptor. For example, local air quality will be degraded more by a vehicle that is stationary and idling compared with a vehicle travelling passed a receptor at 70 miles per hour (mph).

6.7.9 The potential for the significance of atmospheric emissions from construction traffic is dependent upon the presence of nearby receptors and thus members of the population who may be adversely affected by them. The contribution of vehicle emissions diminishes quickly with distance such that their influence on local pollutant concentrations is considered not significant at distances greater than 200 m (*Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3, Part 1: Air Quality*). The number of potential receptors within this 200 m zone of influence from the proposed routes to the Power Generation Plant Site, as can be seen in Figure 1.1, is limited and it is noted that this is a generic assumption with the zone of influence likely to be reduced following a quantitative analysis of the emissions from road traffic.

6.7.10 Emissions levels from construction traffic at any one location will vary as different combinations of plant machinery are used, and throughout the construction phase of the Project as staffing levels and the construction activities / locations change. A worst case scenario would be for any construction traffic to be idling at the boundary of the Project Site which, as above, could impact on local air quality.

Electrical Connection Route Corridor Options (Options 1 and 2)

6.7.11 Currently there are two potential options for the Electrical Connection; either an overhead line (route corridor option 1) or underground cable (route corridor option 2). The construction of the Electrical Connection is not anticipated to generate significant dust, plant / machinery or traffic emissions due to the small scale of the construction / installation works. In the case of route corridor option 1, there will be a minimal amount of construction work within the Power Generation Plant Site boundary and the impacts would be considered as part of those construction works. In the case of route corridor 2, there will be a

minimal amount of excavation / trenching within the Hirwaun Industrial Estate and adjacent to the Power Generation Plant boundary. The cable would be installed between 1 and 2m below ground and in a corridor of no more than 3 m wide.

6.7.12 For both potential route corridor options there is the potential for generation of dust, however, in reality this can be considered as part of the same potential impacts as the construction of the Power Generation Plant, given their close proximity and that the same receptors will potentially be impacted.

6.7.13 Additionally, given that both Electrical Connection route corridor options will give rise to minimal construction works and they are in close proximity to one another, there are not considered to be differences in the potential impacts of the different routes.

Gas Connection route corridor options

6.7.14 Movement of soils from construction activities is anticipated to lead to the generation of some short-term airborne soil dust however, at any one location, the construction activities will only occur for a short period of time as the active working width moves along the gas pipeline route. In some locations the impact will be no greater than that experienced by existing dust producing agricultural activity and therefore the significance can be considered as minor.

6.7.15 Emissions will also occur due to the use of diesel powered generators for the provision of electricity supplies. Generators will be required to supply a range of essential equipment, including: welding; pumps; lights; and, testing equipment. The generators will be relatively small and not generate sufficient emissions to compromise the AQS objectives and the impact is therefore predicted to be negligible.

6.7.16 Given the similarity of the two gas connection route corridor options, there are not considered to be differences in the potential impacts of the different routes.

Operation

Power Generation Plant

6.7.17 To determine the pollutants that should be considered as part of the more detailed dispersion modelling exercise, calculations have been undertaken using existing guidance based on the anticipated worst case emissions rates during normal operation and additional emissions parameters. The results of these calculations showed that the emissions of most interest from the new plant are those of NO_x. It

should be noted however, that only a proportion of the NO_x released will be converted to the more harmful NO_2 pollutant. The principles behind the NO_x to NO_2 conversion are discussed in more detail in Section 6.4.

6.7.18 Combustion in gas turbine generators is conducted at high excess air rates, typically 200-300 per cent excess air which provides conditions as close to complete combustion as possible. There are, therefore, very low levels of carbon monoxide or unburned hydrocarbons present in the products of combustion when burning natural gas (as shown in Tables 6.3 and 6.4).

6.7.19 The combustion of natural gas therefore results in the emission of flue gases containing carbon dioxide (CO_2), water vapour (H_2O), oxygen (O_2), nitrogen (N_2), CO and NO_x.

6.7.20 A preliminary assessment of the effect of the emissions of CO suggests that they are not anticipated to be significant. However these will be examined further as part of the on-going EIA.

Modelling Results

6.7.21 A conservative view of the operation of the Power Generation Plant has been adopted in the modelling so that a "worst case" is presented. The purpose of using this approach is to ensure that the absolute maximum predicted impact within the potential operating regime of the Project is considered.

6.7.22 Table 6.14 and 6.15 indicates that the process contribution to annual average ground level concentrations for five c.59 MW units, the short-term process contribution will be less than 10 per cent of the relevant AQS objective for any stack height considered within the sensitivity study. However, the long-term process contribution would not be less than 1 per cent of the AQS objective at a stack height of less than 25 m. These thresholds are:

- 1 per cent of the long-term AQS objective (40 µg/m^3); or
- 10 per cent of the short-term AQS objective of (200 µg/Nm^3),

Table 6.14: Short-Term Stack Height Sensitivity for NO_2

Stack Height	19th Highest Hourly Average ($\mu g/m^3$)
20	7.0
30	5.5
40	4.3
50	2.8
60	2.3
70	1.9
80	1.6

Table 6.15: Long-Term Stack Height Sensitivity for NO_2

Stack Height	Annual Average ($\mu g/m^3$)
20	0.10
30	0.09
40	0.07
50	0.06
60	0.05
70	0.05
80	0.04

6.7.23 It should be noted that the above thresholds are not designed to determine the acceptability of any process contribution to ground level concentrations and is provided for screening purposes only, thus determining whether further modelling and assessment is required. It will thus be required to examine the anticipated process contributions together with the baseline data presented in Section 6.6.

6.7.24 The maximum predicted process contribution to ground level concentrations of NO_2 indicated in Table 6.16 can be considered as extremely small based on the criteria outlined in Table 6.12. No historic hourly data is available for the study area however in order for a process contribution of 7.0 ug/m^3 to contribute to an exceedance of the short-term objective of 200 ug/m^3, the ambient concentration would

need to peak at 193 ug/m^3 which is considered unlikely based on the results of the published LAQM USA and Progress Reports.

6.7.25 In addition, the maximum predicted annual average process contribution to ground level concentrations of NO_2 is <0.6 ug/m^3 and the magnitude of this impact is, considered small based on the criteria outlined in Table 6.12.

6.7.26 Therefore, the potential impact on local air quality can considered to be of minor significance based on the preliminary assessments undertaken to date.

6.7.27 It is considered that a stack height of 205 m will provide adequate dispersion of the flue gases (irrespective of the type, and associated number, of gas turbines generators / stacks).

Decommissioning

6.7.28 During decommissioning, temporary air quality impacts are likely to arise. These will be similar to those described above for construction.

6.8 Potential Mitigation / Management Techniques

Construction / Demolition

6.8.2 During construction / demolition, mitigation measures would be covered by the Construction Environmental Management Plan (CEMP) that will apply to each of the key elements of the Project. The CEMP will incorporate appropriate dust mitigation measures (such as covering stockpiles or dowsing with water during dry, windy conditions) that will be approved by the relevant authorities and adopted, such that it would be unlikely (under most weather conditions) that any dust generated at the Project Site has the potential to cause nuisance to any sensitive receptors in the area. The CEMP will be secured by a requirement attached to the DCO.

Operation

6.8.3 During operation of the Project, emissions of NO_x will be limited to less than 50 mg/Nm^3 at outputs above 70 per cent load in accordance with the IED and the BAT AEL for the firing of natural gas in gas turbines. This will be ensured by the use of Dry Low NO_x burners (or better). This is in accordance with the current EA Sector Guidance Note for Combustion and the BREF Notes.

6.9 Preliminary Assessment of Residual Effects

6.9.1 Table 6.17 below sets out the preliminary assessment of residual impacts on air quality remaining after mitigation measures have been put in place.

Table 6.17 – Preliminary Assessment of Residual Air Quality Effects

Description	***Detail***	***Unmitigated Potential Impact***	***Mitigation / Monitoring Measure***	***Residual Impact***
Power Generation Plant				
Construction / Demolition	Dust from construction activities	Moderate	Implementation of a CEMP which will include measures such as damping down of stockpiles in dry and windy conditions.	Minor
Operation	Emissions of NOx and CO	Minor	N/A	Minor
Decommissioning	As for construction			
Gas Connection				
Construction / Decommissioning	As per Power Generation Plant			
Operation	No Impacts Predicted			
Electrical Connection				
Construction / Decommissioning	As per Power Generation Plant			

Description	*Detail*	*Unmitigated Potential Impact*	*Mitigation / Monitoring Measure*	*Residual Impact*
Power Generation Plant				
Operation	No Impacts Predicted			

6.10 Next Steps

6.10.1 Based on the above assessment methodology, significance criteria, and the initial modelling results presented in Section 6.5, a full air quality impact assessment will be undertaken to determine the likely environmental impacts of operation of the Project, both in isolation and in conjunction with other significant emissions sources identified through consultation with the relevant authorities.

6.10.2 The dispersion modelling will consider a study area of up to 20 km by 20 km centred upon the central point of the proposed stacks (i.e. 10 km radius) and will also model all potentially sensitive receptors (ecologically designated sites, etc.) discretely in order to accurately determine the maximum, worst case impact to air quality due to operation of the Project. The receptors to be considered will be supplemented, as appropriate, with any additional receptors highlighted through the consultation process.

6.10.3 When considering the impacts on ecologically sensitive sites within the study area an assessment will also be made of the process contributions to nutrient and acid deposition which have the potential to degrade the quality of an ecological site.

6.10.4 The impact of road traffic generated throughout all Scenarios for the development of the Project will be assessed using the methodology prescribed in the Depart for Transport "*Design Manual for Roads and Bridges*" for the estimation of emissions from vehicles.

6.10.5 The information presented in this Section of the PEIR will be supplemented to allow for preparation and finalisation of the ES.

SECTION 7

NOISE AND VIBRATION

7 NOISE AND VIBRATION

7.1 Introduction

7.1.1 During construction (including demolition), operation and decommissioning, all elements of the Project have the potential to generate noise and vibration, which may impact on sensitive receptors.

7.1.2 This Section presents the current status of the noise and vibration assessment for the Project and includes:

- A description of the relevant legislative and policy context in which the noise and vibration assessment has been undertaken;
- The existing baseline conditions against which the assessment will be made;
- The assessment methodology used including the identification of specific sensitive receptors;
- The significance criteria against which the potential impacts of the Project have been assessed;
- A preliminary assessment of the potential impacts of the Project from noise and vibration;
- Proposals for the mitigation of any anticipated significant environmental impacts, as appropriate;
- An assessment of the residual impacts remaining after mitigation; and
- An outline of the next steps which need to be undertaken to complete the assessment for the ES.

7.2 Legislation and Policy Context

National Policy Statements

7.2.2 As explained in Section 2, NPS EN-1 explains the assessment principles to which the Secretary of State will have regard in the examination of an energy NSIP (such as the proposed Project), and explains the generic noise and vibration impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (EN-2). The NPSs for Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5) provide specific considerations potentially relevant to the Gas Connection and Electrical Connection respectively.

7.2.3 NPS EN-1 sets out the requirements for a noise assessment of an energy NSIP and also outlines the approach that the Secretary of State

should adopt when considering noise assessments. Paragraph 5.11.9 requires the Secretary of State to be satisfied that the proposals will:

- Avoid significant adverse impacts on health and quality of life from noise;
- Mitigate and minimise other adverse impacts on health and quality of life from noise; and
- Where possible, contribute to improvements to health and quality of life through the effective management and control of noise.

7.2.4 NPS EN-2 sets out assessment principles in respect of fossil fuel energy generation NSIPs. It states that the Secretary of State must be satisfied that the principles set out at paragraph 5.11.9 of NPS EN-1 have been satisfied and notes that mitigation for noise for such proposals is likely to be primarily through good design (i.e. enclosures, exhaust attenuation to turbines) and refers to the use of requirements attached to the DCO to secure relevant mitigation.

Other National and Local Policy

7.2.5 Whilst the PA 2008 is clear as to the primacy of the relevant NPS, other national and local planning policy can be considered important and relevant by the Secretary of State in the determination of an energy NSIP.

7.2.1 As described in Section 2 of the PEIR, PPW sets out the land use planning policies of the WG and is supplemented by a series of Technical advice Notes (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.

7.2.2 TAN 11 provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which LPAs should take into account determining planning applications for development which will either generate noise or be exposed to existing noise sources.

7.2.3 The *Rhondda Cynon Taf Local Development Plan 2006-2021* was adopted in 2011. Policy AW10 of the Local Development Plan covers Environmental protection and Public Health and states the following: "Development proposals will not be permitted where they would cause or result in a risk of unacceptable harm to health and / or local amenity

because of: noise pollution..... unless it can be demonstrated that measures can be taken to overcome any significant adverse risk to public health, the environment and / or impact upon local amenity.

Standards and Guidance

7.2.4 British Standard (BS) 7445 *'Description and Measurement of Environmental Noise*' defines and prescribes best practice during recording and reporting of environmental noise. This standard should be applied in all instances when making environmental noise measurements.

7.2.5 BS 4142 '*Method for rating industrial noise affecting mixed residential and industrial areas*' offers guidance on the assessment of industrial and commercial noise affecting residential and industrial areas. It describes a method for assessing whether industrial noise is likely to result in complaints from nearby residents.

7.2.6 *Environment Agency Horizontal Guidance H3 Part 2: Noise assessment and control.* This document provides the principles of noise measurement and prediction and control of noise by design, by operational management techniques and abatement technologies. Horizontal guidance provides information relevant to all sectors regulated under the Environmental Permitting Regulations (EPR).

7.2.7 *World Health Organisation (WHO) Guidelines for Community Noise* - This document provides advice and guideline values for noise in specific environments.

7.2.8 BS 5228 *'Noise and vibration control on construction and open sites'* gives recommendations for basic methods of noise and vibration control relating to construction sites and other open sites where construction activities are carried out. It offers a methodology for predicting noise levels from construction sites and assessing its impact on those exposed to it. BS5228 is the industry approved code of practise and should be used in all cases when assessing noise from construction sites.

7.2.9 BS 6472 (2008) '*Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hertz (Hz) to 80 Hz)*' presents recommended frequency weighted vibration spectra (for continuous vibration) and Vibration Dose Values (VDV) (for intermittent vibration), above which adverse comment is likely to occur in residential properties.

7.2.10 BS 7385 (1993) '*Evaluation and Measurement for Vibration in Buildings*' presents guide values or limits for transient vibration, above which there is a likelihood of cosmetic damage.

7.3 Realistic Worst Case Scenario for Assessment

7.3.1 In respect of noise and vibration, the realistic worst case scenario from within the proposed Project parameters (which are described in Section 4 of this PEIR) is set out in Table 7.1 below.

7.3.2 The reason that the parameters identified in Table 7.1 represent the realistic worst case in relation to noise and vibration impacts are that an increasing number of separate SCGT units, each with their own dedicated stack will produce increasingly more noise. Noise from the gas turbine generator units is attenuated by the turbine casing, and so varies little with higher power output turbines. The main variable noise producing element is exhaust noise through the top of the stack. The stack sound power level for a typical c60MW SCGT unit is 110dB(A), compared to a single 100MW unit, which can have a typical sound power level of around 113dB(A). Therefore, the noise output from five separate low power SCGT units will be higher than that produced by one or two high power units. Similarly, the construction of five separate SCGT units will result in a longer construction lead time, which will increase the noise impact at sensitive receptors. This applies regardless of whether we are assessing aero-derivative or industrial units.

7.3.3 A preliminary assessment of both options for the Gas Connection and the Electrical Connection is presented in this section. A decision on the preferred option for each will be taken following consultation.

Table 7.1 – Realistic Worst Case Scenario for Assessment of Noise Impacts

Parameters	Details
Number of gas turbine units	5 (~ 59 MWe)
Number of stacks	5
Height of Stacks	25m
Unit type	Aero derivative

7.4 Assessment Methodology and Significance Criteria

7.4.1 This preliminary noise and vibration assessment focuses on seven noise sensitive receptor (NSR) locations. The existing baseline conditions at each NSR have been determined by way of an attended noise survey. Discussions were held with RCTCBC to agree a study area, a noise survey methodology, and suitable locations for the NSR measurement positions.

7.4.2 A prediction of the impact during construction / demolition is undertaken following the methodology of BS 5228, and information regarding the noise output of specific items of plant contained therein.

7.4.3 The noise impacts during operation are predicted using CadnaA noise propagation modelling software, using typical values for the proposed plant items, and considering directional and screening effects.

7.4.4 The significance of the predicted operational impact is assessed against the semantics of BS 4142.

Construction (including demolition) / Decommissioning

7.4.4.1 The noise impacts of decommissioning will be similar to those that will be assessed for construction. The assessment will therefore be carried out on the same basis as that for those arising from construction activities.

7.4.5 Table 7.2 sets out the construction noise significance threshold taken from BS 5228:2009 for day, night, evening and weekend periods.

Table 7.2: Construction Noise Significance Threshold

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

7.4.6 The levels are façade value L_{Aeqs} (and include noise from other sources). 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 would produce the same energy as a fluctuating sound, over the same period of time.

7.4.7 Vibration from construction / demolition activities may impact on adjacent buildings. The criteria used in this assessment relate to the potential for cosmetic damage, not structural damage. The principal concern is generally transient 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.

7.4.8 BS7385 establishes the basic principles for carrying out vibration measurements and processing the data with regard to evaluating vibration impacts on buildings. Table 7.3 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 7.3 Peak Particle Velocity (ppv) Limits for Cosmetic Damage[1]

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.

7.4.9 Significance criteria for construction noise and vibration have been derived from BS 5228, and BS 7385. An adapted scale for the description of the significance of construction noise is shown in Table 7.4.

Table 7.4 – Significance of Construction and Decommissioning Noise

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

7.4.10 It is noted that effects classed as 'moderate' and above are considered significant in EIA terms.

Operation

7.4.11 BS 4142 provides a methodology for the assessment of industrial noise in mixed residential and industrial areas. In this case, the standard suggests obtaining an assessment level by comparing the existing background noise levels with the 'rating level', which is the predicted noise output of the Power Generation Plant, corrected to account for any acoustic features such as tonal or impulsive noises. The semantics used for assessing the likelihood of complaints due to the introduction of a new industrial noise source are as follows:

- 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.

- 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.

7.4.12 Therefore the significance criteria presented in Table 7.5 has been adopted for the purposes of the assessment of operational noise from the Power Generation Plant.

Table 7.5 – 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 "*marginal significance*" 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

7.4.13 It is noted here that the operation of the Gas Connection and Electrical Connection could also give rise to noise impacts. The gas AGI will be constantly operational and will give rise to a relatively small amount of noise similar to a low hum. Additionally, if an overhead line is chosen as the preferred Electrical Connection, overhead lines can sometimes be associated with a 'hum' which is noticeable when in very close proximity to them. Neither the gas pipeline nor an underground electrical connection would give rise to any noticeable noise during

operation, A preliminary assessment of these impacts is made in this PEIR, although more detail will be provided in the final ES,

7.5 Consultation

7.5.1 Table 7 in Appendix A of this PEIR provides a summary of all consultation responses relating to the Noise and Vibration assessment and illustrates how each response has been addressed.

7.6 Baseline Conditions and Receptors

Baseline Noise Survey

Monitoring Positions

7.6.2 Discussions were held with RCTCBC in July 2013 to agree a study area, a noise survey methodology, and suitable locations for the NSR measurement positions.

7.6.3 An attended 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 NSRs within the agreed study area. The baseline noise survey was completed over a period of 24 hours.

Table 7.6: NSR Measurement Positions

Location Number	Location	Approximate Distance from Centre of Power Plant Site, m
1	Rhigos Road	262
2	Hoel-Y-Graig	1250
3	Halt Lane	940
4	Castell Farm	730
5	Tai Cwplau	782
6	Willow Farm	540

7.6.4 The locations of the NSRs, in relation to the Power Generation Plant Site are presented in Figure 7.1.

7.6.5 Baseline noise measurements were taken at each of the NSR's between 13th and 14th August 2013. 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.

7.6.6 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-weighed frequency network.

7.6.7 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.

7.6.8 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.

7.6.9 Table 7.7 summarises the lowest L_{A90} measured at each NSR position during the baseline noise survey.

Table 7.7: Summary of Lowest Recorded LA90 at each Measurement Position

Measurement Position	Lowest Measured L_{A90}, dB
1 - Rhigos Road	21
2 - Hoel-Y-Graig	19
3 - Halt Lane	28
4 - Castell Farm	31
5 - Tai Cwplau	27
6 - Willow Farm	30

7.6.10 An energy from waste (EfW) facility is also proposed for development approximately 500m to the north of the Power Generation Plant Site. This facility will be managed by Enviroparks Energy and has received planning consent. A preliminary impact assessment is presented in Section 16 of this PEIR, although a more detailed study will follow as part of the ES .

7.7 Preliminary Assessment of Potential Impacts

Construction (including demolition)

Power Generation Plant

7.7.2 Construction and demolition activity inevitably leads to some degree of noise disturbance at locations in close proximity to these activities. It is however a temporary source of noise. The noise levels generated by construction and demolition activities would have the potential to impact upon nearby noise sensitive receptors. Noise levels at any one location will vary as different combinations of plant machinery are used and throughout construction and demolition activities and as specific locations of these activities locations change.

7.7.3 The likely construction / demolition noise levels have been predicted using the methodology set out in BS 5228 in conjunction with general information regarding proposed activities.

7.7.4 The noise assessment procedure, as set out in BS5228 is described below:

- Stage 1. Obtain an activity LAeq by direct measurement of similar plant in the same mode of operation, or use the indicative plant noise sound pressure values provided in Annexes C and D of BS 5228, these values have been measured at a distance of 10m.
- Stage 2. If the distance R, in metres(m) from the point of interest to the geometric centre of the plant or activity is other than 10m subtract from the LAeq obtained in stage 1 using the following equation:

$$L_2 = L_1 - 20Log_{10}\frac{R}{10}$$

7.7.5 Where:

- L1 = Measured plant noise level at 10m distance
- L2 = Predicted plant noise level at assessment location (NSR)
- R = Distance between geometrical centre of noise source and assessment location (NSR)

7.7.6 The equation identified in stage 2 of the BS5228 noise assessment method has been used to calculate each separate identified plant noise source. This method predicts the total potential sound pressure level at each NSR as a result of construction activities. Each plant noise source has been calculated as being the shortest distance between the Project Site and each NSR.

7.7.7 Table 7.8 presents the noise levels associated with typical construction activities, and predicts the likely noise level contributed by each item of plant at each NSR. The estimated sound pressure levels shown are worst-case estimates based on distance attenuation only.

Distance Attenuation - Discussion

7.7.8 Distance attenuation is the term used to describe the reduction of sound energy in a sound wave as it travels through a medium. When a sound wave travels through air its intensity diminishes due to air pressure (absorption) and scattering. Absorption is the conversion of the sound energy to other forms of energy. Scattering is the reflection of the sound in directions other than its original direction of propagation. The combined effect of absorption and scattering over distance is referred to as distance attenuation.

7.7.9 To address the changing nature of construction and demolition noise sources, such as different plant items being used at different times, a detailed construction program is needed to identify each construction phase. In the absence of a detailed construction program this assessment has been based upon all identified plant items being used simultaneously. It is noted that in reality this scenario is extremely unlikely to occur and hence predicted noise levels are considered worst case.

Table 7.8: Sound Pressure Levels of Typical Construction / Demolition Activities

Construction Activity / Associated Plant	Calculated Sound Pressure Level						
	10m from plant	NSR 1	NSR 2	NSR 3	NSR 4	NSR 5	NSR 6
Site Preparation / Demolition							
Dozer	75	46.7	33.1	35.5	37.7	37.1	40.4
Tracked Excavator	78	49.7	36.1	38.5	40.7	40.1	43.4
Tracked Concrete Crusher	84	55.7	42.1	44.5	46.7	46.1	49.4
Wheeled Backhoe Loader	68	39.7	26.1	28.5	30.7	30.1	33.4
Total	-	57.2	43.5	46.0	48.2	47.6	50.8
Excavation	**10m from plant**	**NSR 1**	**NSR 2**	**NSR 3**	**NSR 4**	**NSR 5**	**NSR 6**
Dozer	81.0	52.7	39.1	41.5	43.7	43.1	46.4
Tracked Excavator	79.0	50.7	37.1	39.5	41.7	41.1	44.4
Loading Lorry	80.0	51.7	38.1	40.5	42.7	42.1	45.4
Articulated Dump Truck	81.0	52.7	39.1	41.5	43.7	43.1	46.4
Total	-	58.0	44.4	46.9	49.1	48.5	51.7

Rolling and Compaction	10m from plant	NSR 1	NSR 2	NSR 3	NSR 4	NSR 5	NSR 6
Roller	79.0	50.7	37.1	39.5	41.7	41.1	44.4
Vibratory Plate	80.0	51.7	38.1	40.5	42.7	42.1	45.4
Total	-	54.2	40.6	43.1	45.3	44.7	47.9

Piling	10m from plant	NSR 1	NSR 2	NSR 3	NSR 4	NSR 5	NSR 6
Hydraulic Hammer Rig	89.0	60.7	47.1	49.5	51.7	51.1	54.4
Rotary Bored Piling Rig	83.0	54.7	41.1	43.5	45.7	45.1	48.4
Total	-	61.7	48.0	50.5	52.7	52.1	55.3
Welding/Cutting Steel	**10m from plant**	**NSR 1**	**NSR 2**	**NSR 3**	**NSR 4**	**NSR 5**	**NSR 6**
Welder (Welding Piles)	73.0	44.7	31.1	33.5	35.7	35.1	38.4
Generator for welder	57.0	28.7	15.1	17.5	19.7	19.1	22.4
Cutter (Cutting Piles)	68.0	39.7	26.1	28.5	30.7	30.1	33.4
Total	-	46.0	32.3	34.8	37.0	36.4	39.6

Other	10m from plant	NSR 1	NSR 2	NSR 3	NSR 4	NSR 5	NSR 6
Lorry Concrete Mixer	77.0	48.7	35.1	37.5	39.7	39.1	42.4
Conc. Pump (Discharging)	67.0	38.7	25.1	27.5	29.7	29.1	32.4
Tower Crane	77.0	48.7	35.1	37.5	39.7	39.1	42.4
Total	-	**51.9**	**38.3**	**40.8**	**43.0**	**42.4**	**45.6**

Total Calculated Sound Pressure Level from All Construction Activities, dB(A)						
Receptor	**NSR 1**	**NSR 2**	**NSR 3**	**NSR 4**	**NSR 5**	**NSR 6**
Total	**64.9**	**51.3**	**53.7**	**55.9**	**55.3**	**58.6**

7.7.10 Table 7.8 provides a construction noise prediction for the construction / demolition phase of the Project. The predicted cumulative construction

level is below the daytime limit of 65 dB(A) at all receptors. Therefore, based on this conservative, worst case assessment, the significance of the overall impact of construction noise during core hours is predicted to be minor at all NSR locations.

Electrical Connection Route Corridor (Options 1 and 2)

7.7.11 Currently there are two potential options for the Electrical Connection, either an overhead line (route corridor option 1) or underground cable (route corridor option 2). The construction of the Electrical Connection is not anticipated to generate significant noise from plant / machinery or traffic due to the small scale of the construction / installation works. In the case of route corridor option 1, there will be a minimal amount of construction work within the Power Generation Plant Site boundary and the impacts would be considered as part of those construction works. In the case of route corridor 2, there will be a minimal amount of excavation / trenching within the Hirwaun Industrial Estate and adjacent to the Power Generation Plant Site. The cable would be installed around 1 m below ground and in a corridor of no more than 3 m wide.

7.7.12 For both potential route corridor options there is the potential for generation of noise during construction, however, in reality this can be considered as part of the same potential impacts as the construction of the Power Generation Plant, given their close proximity and that the same receptors will potentially be impacted.

7.7.13 Additionally, given that both Electrical Connection route corridor options will give rise to minimal construction works and they are in close proximity to one another, there are not considered to be differences in the potential impacts of the different routes.

Gas Connection Route Corridor options

7.7.14 Construction of the Gas Connection is expected to lead to the generation of some short-term construction noise, primarily from the excavation of the trench in which the pipeline will sit. However, at any one location, the construction activities will only occur for a short period of time as the active working width moves along the gas pipeline route. In some locations the impact will be no greater than that experienced currently with the movement of agricultural machinery. Therefore a preliminary assessment of the significance of noise impacts can be considered as minor.

7.7.15 Given the similarity of the two gas connection route corridor options, there are not considered to be differences in the potential impacts of the different routes.

Operation

Power Generation Plant

7.7.16 The computer noise modelling software CadnaA (Version 4.1), which uses the ISO 9613 propagation algorithms has been used to undertake a provisional noise calculation. The model estimates the contribution to noise levels at each NSR location, and has been created using a representative sound power level for the whole Power Generation Plant.

7.7.17 The model is intended to provide an indicative assessment only for the operational phase of the Power Generation Plant. The detailed operational noise modelling will be undertaken as part of the EIA, when full details of all plant items will be available.

7.7.18 As part of the detailed modelling to follow in the full EIA, a number of assumptions with regards to the noise control will be included on major plant items, as embedded mitigation. These are stated below.

- The gas turbine generators and major compressors are to be housed in individual acoustic enclosures specified at 85 dB(A) Sound Pressure Level at 1 m.
- Turbine filter and ventilation apertures are to be fitted with high performance silencers, and designed such that all sensitive receptors benefit from screening and/or directivity corrections.
- 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 generator exhausts.
- Unit transformers and generator transformers will be housed in an appropriate enclosure or three sided pen, to provide full screening to NSRs.
- All plant items shall be controlled to minimise noise of an impulsive or tonal nature, such that the rating level as defined in BS 4142 is equal to the specific noise level.

7.7.19 Table 7.9 presents a summary the predicted noise levels, from the Power Generation Plant, at each of the NSR locations. The measured background noise levels (L_{A90}) are also shown and compared to the BS 4142 rating level.

7.7.20 As part of the operational noise assessment any noise sources that are considered to contain acoustic features, such as being tonal, impulsive

or intermittent in nature should carry a 5 point penalty. If considered appropriate the 5 point penalty is added to the predicted plant noise LAeq to give the 'rating level', (as defined is BS 4142). However, the Power Generation Plant is intended to be used as a peaking plant. As such the operational noise from the plant will be inherently intermittent in nature, so the 5 point acoustic feature penalty has been duly applied.

Table 7.9: BS 4142 Assessment Summary

NSR Location	1	2	3	4	5	6
Predicted Plant Noise Level, L_{Aeq}	38.5	27.3	29.8	31.7	31.3	33.2
Rating Penality, dB	5	5	5	5	5	5
Rating Level, dB(A)	43.5	32.3	34.8	36.7	36.3	38.2
Lowest Night Background Level, L_{A90}	21	19	28	31	27	30
Difference	22.5	13.3	6.8	5.7	9.3	8.2

7.7.21 Figure 7.1 shows a predicted noise contour that shows the predicted spread of noise levels surrounding the Project. It is noted these results should be considered as preliminary only, and are subject to change when the detailed acoustic modelling for the EIA is complete. However, it is considered that any change will not be significant.

7.7.22 Table 7.9 shows that at locations 3, 4, 5 and 6 the predicted noise levels from the proposed plant are minor adverse whilst at locations 1 and 2 predicted noise levels are major adverse

Gas Connection (Options 1 and 2)

7.7.23 During operation, there will be small amounts of noise generated by the gas AGI. This may be a low 'hum' noise or 'hiss' type of noise as the AGI regulates the flow of gas from the NTS to the Power Generation Plant.

7.7.24 This noise is rarely perceptible except when in very close proximity to the AGI. Given that there are no residential properties in close proximity to the proposed location for the AGI, an initial assessment is that the operational noise from the AGI would be negligible.

Electrical Connection (Option 1)

7.7.25 Should an overhead electrical connection be selected (i.e. electrical connection route corridor option 1) then it is possible that it will produce a low 'hum' during operation caused by the flow of electricity through the line. However, this noise is usually imperceptible except when directly under the line. Additionally, the Electrical Connection would be very short and not in close proximity to residential properties. An initial assessment is therefore that the operational noise from the Electrical Connection would be negligible.

Electrical Connection (Option 2)

7.7.26 Electrical Connection route corridor option 2 will be a buried underground cable. It will therefore produce no perceptible operational noise.

Operational Vibration

7.7.27 It is predicted that vibration sources will include the following:

- Balanced rotating equipment, such as turbines;
- Wind induced vibrations in the stacks, to be transmitted to the foundations.

7.7.28 With the distances involved between the Project Site and NSR's it is anticipated that the level of induced vibration will be imperceptible at the nearest sensitive receptor. Operational vibration impacts are thus not assessed further.

Decommissioning

7.7.29 During decommissioning, similar impacts to those described for construction could result from e.g. plant removal or site reinstatement. However, it is likely that these impacts would be less, given that some items would be left in situ (e.g. gas pipeline, electrical cable and buried foundations of the Power Generation Plant). Therefore, based on the very conservative and worst case construction impacts outlined above, a preliminary assessment is that the noise impacts from decommissioning all elements of the Project will not be significant.

7.8 Potential Mitigation / Management Techniques

Construction / Demolition

7.8.2 In order to keep noise impacts from the construction / demolition phase to a minimum, all construction activities relating to the Power Generation Plant, Gas Connection and Electrical Connection would be carried out in accordance with the recommendations of BS 5228. In

addition, HPL will require its appointed contractor to minimise the impact of construction activities through successful implementation of an agreed CEMP and proper communication with local residents.

7.8.3 Core working hours will be agreed with RCTCBC, and are specific to the construction site. For power station construction sites, these are generally Monday to Saturday between: 0700hrs – 1900hrs. Should it be necessary to work outside these core hours for certain activities this would be with the prior written agreement of RCTCBC.

7.8.4 Specific method statements and risk assessments would be required for all working. In order to minimise the likelihood of noise complaints out of typical construction hours, the contractor would be required to inform and agree the works in advance with RCTCBC whilst advising potentially affected residents of the works to be carried out outside normal hours. Furthermore, the residents would be provided with a point of contact for any queries or complaints.

7.8.5 All vehicles and mechanical plant used for construction would be fitted with effective exhaust silencers, and regularly maintained.

7.8.6 Inherently quiet plant would be used where appropriate. All major compressors would be sound-reduced models fitted with properly lined and sealed acoustic covers which would be kept closed whenever the machines are in use and all ancillary pneumatic percussive tools would be fitted with mufflers or silencers of the type recommended by the manufacturers.

7.8.7 All ancillary plant such as generators, compressors and pumps would be positioned so as to cause minimum noise disturbance. If necessary, temporary acoustic barriers or enclosures would be provided.

Operation

7.8.8 While planning noise limits will be agreed with RCTCBC, HPL will aim to reduce noise emissions as far as practicable. The following measures would serve to continually monitor and minimise the impact of noise from the Project.

7.8.9 Detailed design will ensure that noise is mitigated as far as possible, through the Project Site layout and consideration of the orientation of plant items associated with higher sound power levels.

7.8.10 A programme of continual noise monitoring, including a noise survey shortly following the commissioning of the new plant, shall be agreed with RCTCBC and implemented at regular intervals. The aim of these surveys shall be to ensure that plant noise levels as measured at the

agreed NSR locations do not exceed the planning noise limits; noise monitoring shall be undertaken in accordance with BS 4142.

7.8.11 Inherently quiet plant items will be selected wherever practicable. In addition to the noise control measures mentioned above high performance silencers will be fitted to achieve maximum noise attenuation on plant including gas turbine inlets and ductwork. Acoustic lagging and low noise trims will be fitted to all pipe-work and noise generating steam valves.

7.8.12 High performance acoustic enclosures will be considered for all plant items where practicable, not overlooking smaller plant items such as compressors and pumps.

7.8.13 In the interest of maintaining neighbourly relations and residential amenity, HPL will give a reasonable period of notice to residents prior to any non-normal operations that would lead to an increase in noise levels. These would be carried out between 0900 – 1700 hours during weekdays, wherever possible.

7.8.14 If any abnormal operations occur which lead to noise levels in excess of the agreed planning limits (e.g. any equipment malfunction), the operator will inform the local authority andresidents of the reasons for these operations, and the anticipated emergency period.

7.8.15 During decommissioning, similar mitigation measures to those described above for construction will be implemented.

7.9 Preliminary Assessment of Residual Effects

7.9.1 Table 7.10 below sets out the preliminary assessment of residual impacts from noise remining after mitiation measures have been put in place.

Table 7.10 – Preliminary Assessment of Residual Noise Effects

Description	***Detail***	***Unmitigated Potential Impact***	***Mitigation / Monitoring Measure***	***Residual Impact***
Power Generation Plant				
Construction / Demolition	Noise from construction activities and plant	Minor	Implementation of a CEMP which will include measures such as use of quietest possible construction equipment.	Minor
Operation	Noise from plant operation	Minor to Major	High performance acoustic enclosures will be considered for all plant items where practicable, not overlooking smaller plant items such as compressors and pumps.	Minor
Decommissioning	As for construction			
Gas Connection Options 1 and 2)				
Construction / Decommissioning	As per Power Generation Plant			
Operation	Negligible			
Electrical Connection (Option 1)				
Construction / Decommissioning	As per Power Generation Plant			

Electrical Connection (Option 2)	
Operation	Negligible
Construction / Decommissioning	As per Power Generation Plant

7.10 Next Steps

7.10.1 During the full EIA the following steps will be completed:

Construction / Demolition Phase

- Construction traffic noise impact assessment
- Assessment of residual impacts

Operational Phase

- Detailed computer noise model of all plant items using Cadna/A noise propagation modelling software;
- Operational noise assessment to BS4142 using the results of the detailed model;
- Operational traffic noise assessment;
- Assessment of residual impacts; and;
- Further assessment of cumulative impacts.

SECTION 8

ECOLOGY

8 ECOLOGY

8.1 Introduction

8.1.1 The construction (including demolition), operation and decommissioning of the proposed Project has the potential to impact on the local ecology and biodiversity of the Hirwaun Industrial Estate and its environs through the loss or degradation of habitats and the disturbance of protected or notable species. These potential impacts will therefore be assessed within the EIA.

8.1.2 Construction / demolition and decommissioning works associated with the Project have the potential to displace on-site habitats and species that are supported within the Project Site and adjacent areas.

8.1.3 During operation the emissions to air from the Project could impact on the air quality of ecologically sensitive sites via an increase in the ground level concentrations of certain pollutants and the associated nutrient and acid deposition.

8.1.4 This section of the PEIR summarises the findings of the Phase 1 habitat surveys that have been undertaken since publication of the Project Environmental Impact Assessment Scoping Report and provides up to date information relating to the species specific Phase 2 surveys that are ongoing.

8.2 Legislative and Policy Context

8.2.1 Relevant wildlife and countryside legislation have been used along with planning policy guidance and local and national Biodiversity Action Plans (BAP) to inform this assessment.

8.2.2 The key articles of relevance are:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora (Habitats Directive);
- Council Directive 2009/147/EC on the Conservation of Wild Birds (Birds Directive);
- The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention);
- The Conservation of Habitats and Species Regulations 2010, as amended (Habitats Regulations);
- The Wildlife and Countryside Act 1981, as amended (WCA);
- The Countryside and Rights of Way (CRoW) Act 2000;

- The Natural Environment and Rural Communities (NERC) Act 2006;
- National Planning Policy Statements
- Welsh Government, Planning Policy Wales Chapter 5: Conserving and Improving Natural Heritage and The Coast (Edition 5, November 2012);
- Welsh Government Planning Division, Technical Advice Note 5 (TAN 5 Nature Conservation and Planning (2009);
- The Protection of Badgers Act 1992;
- The Hedgerow Regulations 1997;
- The UK Biodiversity Action Plan (UK BAP); and
- Rhondda Cynon Taf Local Biodiversity Action Plan (LBAP).

Legislation

Habitats Directive

8.2.3 In 1992 the then European Community adopted Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, known as the Habitats Directive. The main aim of the EC Habitats Directive is to promote the maintenance of biodiversity by requiring member states to introduce protection for these habitats and species of European importance. The mechanism for protection is through designation of Special Areas of Conservation (SACs), both for habitats and for certain species listed within Annex II, and through specific protection of certain species.

Birds Directive

8.2.4 EC Council Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive) provides a framework for the conservation and management of wild birds in Europe. In this regard, Annex I of the Directive lists habitat types to be protected, and Annex II specifies conditions under which hunting can be undertaken. The Directive additionally provides for the identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex I, and for regularly occurring migratory species. .

Bern Convention

8.2.5 The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) came into force in 1982. The principal aims of the Convention are to ensure conservation and protection of wild plant and animal species and their natural habitats (listed in

Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of species (including migratory species).

Wildlife and Countryside Act 1981 (as amended)

8.2.6 The Wildlife and Countryside Act 1981 (as amended) is the principal mechanism for the legislative protection of wildlife in Great Britain. However it does not extend to Northern Ireland, the Channel Islands or the Isle of Man. This legislation is the means by which the Bern Convention and (partially) the Birds Directive and Habitats Directive are implemented in the UK.

Conservation of Habitats and Species Regulations 2010

8.2.7 In the UK, the Habitats Directive was originally transposed into law by means of the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended). The Regulations came into force on 30 October 1994, and have been amended several times. Subsequently the Conservation of Habitats and Species Regulations 2010 was created which consolidates all the various amendments made to the 1994 Regulations in respect of England and Wales and is commonly known as the 'The Habitats Regulations'. The Regulations contain five Parts and four Schedules, and provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites. This legislation is the principle means by which the Habitats Directive and Birds Directive are implemented in the UK.

Natural Environment and Rural Communities Act 2006

8.2.8 The Natural Environment and Rural Communities Act (NERC Act) provides that any public body or statutory undertaker in England and Wales must have regard to the purpose of conservation of biological diversity in the exercise of their functions. The intention is to help ensure that biodiversity becomes an integral consideration in the development of policies and plans.

The Protection of Badgers Act 1992

8.2.9 The Protection of Badgers Act 1992 makes it an offence to wilfully take, kill, injure or ill-treat a badger, or posses a dead badger or any part of a badger. Under the Act their setts are also protected against obstruction, destruction, or damage in any part.

8.2.10 Sett interference includes damaging or destroying a sett, obstructing access to a sett, and disturbing a badger whilst it is occupying a sett.

The Act defines a badger sett as 'any structure or place, which displays signs indicating the current use by a badger'

8.2.11 Work that may disturb badgers or their setts is illegal without a development licence from the relevant statutory body (i.e. Natural Resources Wales (NRW) in Wales). As a precautionary principle, a buffer distance between a badger sett and the works will be determined, based upon guidance from an appropriately experienced ecologist. This buffer distance should be based upon the size and activity levels at the sett, the topography between the sett and the works and the nature of the works.

8.2.12 The Hedgerow Regulations (1997)

8.2.13 The Hedgerows Regulations (1997) make provision for the protection of important hedgerows in England and Wales. The regulations affect hedgerows which are 20m or more in length, or connected at both ends to another hedgerow of any length.

8.2.14 They relate to hedgerows which are on, or adjoining land used for the following purposes: agriculture or forestry; the breeding or keeping of horses, ponies or donkeys; common land; village greens; Sites of Special Scientific Interest (which include all terrestrial SACs, NNRs, and SPAs) and Local Nature Reserves. They do not include hedges that are attached to, or marking the boundaries of a private house.

8.2.15 It is an offence to intentionally or recklessly remove or cause or permit another person to remove a hedgerow or intentionally or recklessly remove, or cause or permit another person to remove, a hedgerow which is the subject of a hedgerow retention notice.

8.2.16 <u>National Policy Statements</u>

8.2.17 As explained in Section 2, the NPS EN-1 explains the assessment principles to which the SoS will have regard in the examination of an energy NSIP (such as the proposed Project), and explains the generic biodiversity impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (EN-2). The NPSs for Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5) provide specific considerations potentially relevant to the Gas Connection and Electrical Connection Compound and Electrical Connection respectively.

8.2.18 Section 4.3 refers to the Conservation of Habitats and Species Regulations 2010 and the requirement to consider whether a project is

likely to have a significant effect on a European site either alone or in combination with other plans or projects.

8.2.19 Paragraph 5.3.7 states "As a general principle, and subject to the specific policies below, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives; where significant harm cannot be avoided, then appropriate compensation measures should be sought." Paragraph 5.3.8 continues "In taking decisions, the [SoS] should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider environment."

8.2.20 NPS EN-1 goes on to explain the weight to be attached to particular designations and notes for example that (paragraph 5.3.13) "The IPC [Secretary of State] should give due consideration to such regional or local designations. However, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent."

8.2.21 Paragraph 5.3.15 encourages the provision of biodiversity opportunities within developments.

8.2.22 Paragraph 5.3.18 seeks that the applicant demonstrates that appropriate and practicable mitigation measures are incorporated into the proposed development. Where this is not demonstrated, the examining authority and the Secretary of State "should consider what appropriate requirements should be attached to any consent and/or planning obligations entered into".

8.2.23 The National Policy Statement for Fossil Fuel Electricity Generating Infrastructure (EN-2) does not set out specific assessment principles in respect of biodiversity for fossil fuel generating stations, except for the potential for aquatic ecology effects in respect of cooling water intake and exhaust, which is not relevant to the proposed Project due to the proposed use of SCGT technology with a low cooling water requirement which is likely to be supplied by tankering.

8.2.24 The National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (NPS EN-4) notes the relevance of biodiversity in respect of the route of gas pipelines in respect of construction phase impacts and the potential constraint to planting near the route in future, and refers back to the assessment principles contained in NPS EN-1.

8.2.25 The National Policy Statement for Electricity Networks Infrastructure (NPS EN-5) refers back to the assessment principles contained in NPS EN-1 and notes the potential impacts on birds from overhead lines. However as the Electricity Connection is to be an underground cable this is not of relevance to the proposed Project.

Other National and Local Policy

Planning Policy Guidance

8.2.26 Chapter 5 of Planning Policy Wales (2012) sets out the Welsh Governments overarching advice on the conservation of biodiversity and the coast in a planning context. The Policy Statement sets out objectives for conservation that should be delivered via the planning process. It includes guidance on integrating the requirements of development and conservation, and highlights existing measures for biodiversity conservation (legislation and policy) in Wales. The Statement also sets out how development plans should take account of natural heritage conservation when being devised and implemented.

8.2.27 Technical Advice Note 5 of the National Assembly of Wales Planning Division refers to Nature Conservation and Planning TAN 5 (2009). TAN 5 is concerned with the protection of statutorily designated site and habitats, the conservation of protected and priority species and protecting and enhancing biodiversity and nature conservation in the wider countryside within Wales.

The UK Biodiversity Action Plan (UK BAP)

8.2.28 The UK Biodiversity Action Plan (UK BAP) was originally published in 1994, and was the UK Government's response to the Convention on Biological Diversity (CBD), which the UK signed up to in 1992 in Rio de Janeiro. The UK was the first country to produce a national biodiversity action plan, and the UK BAP described the biological resources of the UK and provided detailed plans for conservation of these resources. Action plans for the most threatened species and habitats were set out to aid recovery, and national reports, produced every three- to five-years, show how the UK BAP is contributing to the UK's progress towards the significant reduction of biodiversity loss called for by the CBD.

Rhondda Cynon Taf Local Biodiversity Action Plan (LBAP)

8.2.29 RCTCBC published their Local Biodiversity Action Plan (LBAP) in October 2000, following an 18 month period of development involving an extensive partnership. Part One of the Plan includes actions to; raise awareness of wildlife and its importance in Rhondda Cynon Taff;

record and monitor wildlife; protect sites of wildlife value; and manage land and buildings for wildlife. Part two of the plan details a summary of the specific species and habitats within the Borough which require protection, and their current action plans.

8.3 Realistic Worst Case Scenario for Assessment

8.3.1 In respect of ecology, the realistic worst case scenario from within the proposed Project parameters (which are described in Section 4 of the PEIR) are set out in Table 8.1 below.

8.3.2 The reason that the parameters identified in Table 8.1 represent the realistic worst case in relation to ecological impacts are primarily because 5 smaller stacks will have a potentially greater impact on air quality (and therefore sensitive ecological receptors). Further discussion is provided in Section 6.3 of this PEIR.

8.3.3 A preliminary assessment of both options for the Gas Connection and the Electrical Connection is presented in this section. A decision on the preferred option for each will be taken following consultation.

Table 8.1 – Realistic Worst Case Scenario for Assessment of Ecology Impacts

Parameters	Details
Number of gas turbine units	5 (~ 59 MWe)
Number of stacks	5
Height of Stacks	25m
Unit type	Aero derivative

8.4 Assessment Methodology and Significance Criteria

8.4.1 The ecological features of the Project Site are being evaluated in accordance with guidelines provided within IEEM[8] "*Guidelines for Ecological Impact Assessment"* (2006). This involves five key stages:

- Stage 1: Consultations;
- Stage 2: Baseline Studies and Evaluation of Ecological Receptors;
- Stage 3: Identification of Valued Ecological Receptors;

[8] Institute of Ecology and Environmental Management (2006). Guidelines for Ecological Impact Assessment in the United Kingdom (version 7 July 2006). http://www.ieem.org.uk/ecia/index.html

- Stage 4: Identification and Characterisation of Potential Impacts;
- Stage 5: Assessment of Significant Effects.

8.4.2 The guidance provides a framework for the evaluation of ecological features. It takes into account the direct biodiversity value of habitats and species, the indirect value of features which help support the ecological integrity of key features, legal protection for sites and species and evaluation against national and local planning guidance and objectives.

8.4.3 It should be noted that whilst the evaluation considers the presence of protected species that receive both legal and non-statutory protection, the simple presence of a species does not necessarily infer value at the level of protection it receives. Therefore, the value of a site for a protected species is assessed taking into account the recorded level and type of activity, the significance of the legal protection it receives and the geographical context.

Consultations

8.4.4 Section 8.5 details how consultations have been undertaken to date.

Baseline Studies and Evaluation of Ecological Receptors

8.4.5 Baseline information regarding ecological features relevant to the Project Site, including all statutory and non-statutory designated sites, species populations, species assemblages and habitats were obtained from several key sources. These included desk studies and ecological field surveys. Details of these studies and surveys are given below.

8.4.6 Extended Phase 1 Habitat Surveys

Desk Study

8.4.7 A desk study was undertaken to collect records of protected and notable species, and habitats within the vicinity of the Project Site. This desk study was undertaken as part of the AMEC Extended Phase 1 Habitat Survey in July 2012[9]. The desk study involved collation of records of protected species, statutory designated sites and important habitat features within a radius of 2 km of the Project Site.

8.4.8 The following organisations and web-based databases were consulted:

[9] Watt Power Limited - Hirwaun Industrial Estate - Extended Phase 1 Habitat Survey Report – July 2012 – AMEC Environment & Infrastructure UK Ltd

- South East Wales Biodiversity Records Centre (SEWBRC);
- Natural Resources Wales interactive mapping service;
- RCTCBC Ecologist – Richard Wistow; and
- Ordnance Survey and satellite mapping service – http://wtp2.appspot.com/wheresthepath.htm.

8.4.9 At the time of the 2012 Amec study, HPL was undertaking its optioneering for the Gas Connection and Electrical Connection route corridor options. Accordingly, now that HPL has identified indicative route corridor options a separate desk study covering these options has been undertaken. This desk study has used a 15 km search area for statutorily designated sites, 10 km for non-statutorily designated sites and 5 km for protected or notable species. The results of this desk study have determined the species specific phase 2 surveys undertaken for the route corridor options.

Field Survey

8.4.10 Two extended Phase One Habitat Surveys have been undertaken for the Project. The first was completed by AMEC in July 2012 and formed an appendix to the Scoping Report. This first report considered the Power Generation Plant Site, but did not consider the possible Gas or Electrical Connection, as the potential locations of these had not yet been developed at that time.

8.4.11 The second Phase One study was carried out in May 2013, and surveyed the Gas Connection and Electrical connection route corridor options being considered at that time. Three Gas Connection routes were originally considered; one has subsequently been excluded leaving two potential options (as identified in Section 4.6).

8.4.12 The extended Phase 1 habitat surveys were undertaken to assess the ecological value of the Project Site and record any protected or rare habitats. Evidence of and potential for any notable or protected species on the Project Site or within the relevant surrounding area (up to 50 m outside the survey area boundary where visibility allowed) was also recorded.

8.4.13 The surveys followed standard methodology published by the Joint Nature Conservation Committee (JNCC)[10], with habitat types present

[10] Joint Nature Conservation Committee (2007) Handbook for Phase 1 Habitat Survey - A Technique for Environmental Audit, Joint Nature Conservation Committee, Peterborough.

recorded on a Phase 1 habitat map. Dominant plant species observed within each habitat type were recorded in accordance with plant species nomenclature in Stace (1997)[11].

8.4.14 Phase 2 Protected Species Surveys

8.4.15 The phase 1 habitat surveys and existing desk study information have been used to inform the scope and extent of further surveys for protected or otherwise notable species.

Field Surveys

8.4.16 Detailed and specific Phase 2 species surveys are underway or have been completed for great crested newts and other amphibians, badgers, bats, breeding birds, reptiles, otters and water voles. Each survey has been/is being undertaken in 2013 using standard methodologies as published in best practice guidance. All surveys have been designed to confirm the presence or likely absence of the relevant species, and population estimates where relevant to the assessment.

Badgers

8.4.17 The badger surveys were based on the standard approach detailed in Surveying Badgers (Harris et al., 1989)[12] and used during the National Badger Survey (Cresswell et al., 1990)[13]. Particular emphasis was placed on locating badger setts and signs of territorial activity.

Bats

8.4.18 All surveys were carried out using standard methodologies as recommended by the Bat Conservation Trust (2012) in Bat Surveys – Good Practice Guidelines 2nd Edition[14], and Joint Nature Conservation Committee (2004) Bat Workers' Manual[15].

Breeding birds

[11] Stace, C. (1997) New Flora of the British Isles; Second Edition. Cambridge University Press, Cambridge.

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

1.1.1 [13] Cresswell, P., Harris, S. and Jefferies, D.J. (1990). *The History, Distribution, Status and Habitat Requirements of the Badger in Britain*. Nature Conservancy Council, Peterborough

[14] Bat Surveys, Good Practice Guidelines – 2012 2nd Edition - Bat Conservation Trust.

[15] Bat workers Manual, 3rd Edition – 2004 Joint Nature Conservation Committee.

8.4.19 The breeding bird surveys were designed to follow the 'Common Bird Census' (CBC)[16,17] methodology and were adapted to suit the Project Site. A predetermined transect route was designed to take into account all habitats present in the vicinity of the proposals.

Water vole

8.4.20 The water vole surveys are being undertaken using standard methodologies as recommended in the Water Vole Conservation Handbook[18].

Otters

8.4.21 The otter survey is being undertaken using standard methodologies as recommended in the English Nature Otter Ecology [19] guide.

Reptiles

8.4.22 The reptile surveys are being carried out following standard methodologies as recommended in the Herpetofauna Workers' Manual[20] and Froglife Advice Sheet 9[21].

Great crested newts

8.4.23 The great crested newt and other amphibian surveys were carried out using standard methodologies as recommended in the Herpetofauna Workers' Manual[22] and the great crested newt mitigation guidelines[23], by NRW licensed ecologists.

Identification of Valued Ecological Receptors

8.4.24 It is neither practical nor appropriate for an assessment of the ecological effects of a proposed development to consider every species and habitat that may be affected equally and consistently. Instead, it is sensible to focus on 'valued ecological receptors' (VER). VERs are sites, species and habitats present within the 'zone of influence' that

16 Marchant, J.H. (1983). *Common Birds Census instructions*. BTO, Tring. 12pp.

17 Gilbert, G., Gibbons, D. W., & Evans, J. (1998). *Bird Monitoring Methods*. RSPB, Bedfordshire.

18 Strachan and Moorhouse (2006), Water Vole Conservation Handbook [second edition].

19 Chanin and Smith (2003) Monitoring the otter *Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No 10. Peterborough, English Nature

20 Gent & Gibson (2003) Herpetofauna Workers' Manual

21 Froglife (1999) Advice Sheet 9: Reptile Survey

22 Gent, A.H. & Gibson, S.D. eds. (2003) Herpetofauna workers' manual. Peterborough, Joint Nature Conservation Committee

23 English Nature (2001). Great Crested Newt Mitigation Guidelines.

are of sufficiently high value that an effect upon them could be considered significant.

8.4.25 The ES will identify VER's and report any identified likely significant environmental impacts upon them. Non-significant impacts on VER's will be summarised in a separate report, in accordance with DCO Application requirements.

8.4.26 There is also the potential that the Project will have an impact on species which have not been deemed VERs, but receive legal protection requiring action to be taken to conserve them. In such cases, the impacts will be considered and mitigation proposed alongside VERs.

8.4.27 The value of sites, populations of species, species assemblages and habitats will be evaluated with reference to their:

- Importance in terms of 'Biodiversity Conservation Value' (which relates to the need to conserve representatives areas of different habitats and the genetic diversity of species populations, rarity, sensitivity and resilience);
- Delivery of eco-system services
- Legal status; and
- Local and national conservation status (taken from local and national policies such as UK Biodiversity Action Plan (UKBAP), and the RCT Local Biodiversity Action Plan (LBAP).

8.4.28 For the purposes of this assessment, sites, species populations, species assemblages and habitats are 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 judgement has been used to attribute value to receptors considered to be of district value or below.

TABLE 8.2: EXAMPLE OF CRITERIA USED TO EVALUATE ECOLOGICAL RECEPTORS

Level of Value	Examples of Definitions
International	An Internationally Important Site, e.g. SPA, SAC or Ramsar site (or a site considered worthy of such designation); a regularly occurring population of an internationally important species (listed on Annex IV of the Habitats Directive) comprising more than 1% of the International/European population.

Level of Value	Examples of Definitions
National (UK)	A Nationally Designated Site, e.g. Site of Special Scientific Interest (SSSI), or a site considered worthy of such designation; a viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat which are essential to maintain the viability of a larger whole.
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 site designated as a Site of Importance for Nature Conservation (SINC) or a Local Wildlife Site (LWS); a regularly occurring, locally significant proportion of the county population of a rare or otherwise notable species.
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.
Local	A good example of a common or widespread habitat in the local area. Rare or otherwise notable species comprising a very small proportion of the overall population and with limited functional 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.

8.4.29 The valuation of species populations, assemblages of species, and habitat uses a range of significance criteria. Examples of these criteria are described below.

Species Population

8.4.30 The importance of populations is evaluated on the basis of their size, recognised status (e.g. published lists of species of conservation concern and Biodiversity Action Plan (BAP) status) and legal protection status where related to conservation attributes.

8.4.31 For example, bird populations exceeding 1 per cent of published bio-geographic populations are considered to be of international importance, and those exceeding 1 per cent of published national populations are considered to be of national importance (where the former does not also apply).

Species Assemblage

8.4.32 In some instances, it is species assemblages that are of importance. Criteria used to evaluate the importance of assemblages include SSSI selection criteria, as published by the Joint Nature Conservation Committee.

Habitats

8.4.33 Criteria for the evaluation of habitats and plant communities include: Annex III of the EC Habitats Directive, Guidelines for the Selection of Biological SSSIs; and, where available, Local Authority and Wildlife Trust criteria for the selection of Local Sites (e.g. County Wildlife Sites). Legal protection status is also a consideration for certain habitats. Delivery of eco-system services and buffering of other sensitive habitats or species are also taken into account.

8.4.34 Within the ES, sites, species populations, species assemblages and habitats will be considered to be VERs if they are valued as being of local importance or higher. It is considered that no significant effect can occur to features considered to be below local importance, except where a feature has high social, economic, supporting or secondary value. Non-significant effects will be reported separately in accordance with the DCO Application process.

8.4.35 The description and valuation of ecological features will take account of any likely future changes in the absence of the proposed development. For example, these include: trends in the population size or distribution of species; likely changes to the extent of habitats; and, the effects of other proposed developments or land-use changes.

Identification and Characterisation of Potential Impacts

8.4.36 A preliminary assessment of the potential likely ecological impacts from the Project during construction (including demolition), operation and decommissioning has been undertaken in this PEIR. A further characterisation of potential impacts will be provided in the ES. In identifying these impacts, a number of parameters are taken into account.

The parameters used to determine the nature of the impact include:

- Magnitude - The size or intensity of the effect 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 an impact is further discussed below.
- Negative or Positive Effect - Whether the effect of the impact would result in net loss or degradation of a VER or whether it would enhance or improve it.
- Extent - The spatial scope of the effect; for example: the physical area affected or the geographical pattern of the effect.
- Duration - The length of time over which the effect will occur.
- Reversibility - The extent to which effects are reversible, either spontaneously or through active mitigation.
- Timing and Frequency - Consideration of the timing of events in relation to ecological change. Some effects may be of greater significance if they take place at certain times of year such as during the breeding bird season. The extent to which an effect is repeated may also be of importance.

8.4.37 Establishing the Magnitude of Impact - Impacts can be permanent or temporary, direct or indirect and can be cumulative. 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, as defined in Table 8.3.

TABLE 8.3: DEFINITION OF MAGNITUDE

Magnitude	Definition
Severe	A permanent or long-term impact on the extent, 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.
Major	A permanent or long-term impact on the extent or size or integrity of a site, habitat, species assemblage or community, population or group. 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.
Moderate	A permanent or long-term reversible impact on a site, habitat, species assemblage or community, population or group whose magnitude is detectable but would not threaten its integrity.
Minor	A short-term, reversible impact on the extent or size or integrity of a site, habitat, species assemblage or community, population or group that is within the normal range.
Not significant	No impact or an impact which is beneath the level of perception, within normal bounds of variation or within the margin of error of the ecological assessments.

8.4.38 It should be noted that although the assessment of an impacts' magnitude is an integral part of the methodology set out within the IEEM Guidelines, these guidelines do not provide the definitions set out in Table 8.3. These definitions are included to provide additional clarity and to allow transparency over how the decision of whether an impact is significant have been reached. These definitions complement the IEEM guidelines approach, and do not replace it.

8.4.39 Potential impacts are characterised initially in the absence of any mitigation, except where this is integral to, and embedded within the design of the Project, such as the inclusion of technology to reduce the emission of airborne pollutants from the stacks.

8.4.40 Any additional measures specifically proposed to mitigate or compensate an identified impact are identified separately after the preliminary Impact Assessment.

Assessment of Significant Effects

8.4.41 An initial assessment of the significance of the predicted effects on VERs arising from the proposed Project impacts, including designed-in and additional mitigation measures, has been presented in this PEIR.

8.4.42 Effects can be either negative, positive or not significant. Positive or negative effects may be either significant or non-significant depending on the degree of predicted impact.

Negative

8.4.43 For habitat and species, a negative effect is considered to be significant if the favourable conservation status of a VER is compromised by the final design of the Project. Conservation status is defined by IEEM (2006) as being, for Habitats:

8.4.44 "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."

8.4.45 The IEEM (2006) definition of conservation status, for Species, is:

8.4.46 "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."

8.4.47 The decision as to whether the favourable 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).

8.4.48 A similar procedure is used by IEEM for designated sites that could be affected, except that the focus is on the effects on the integrity of each site. This is 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."

8.4.49 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.

Positive

8.4.50 A positive effect is considered to be significant if development activities cause:

- A non-valued ecological receptor to become valued;
- A VER to increase in value such that it would be considered important at a higher geographic scale, e.g. from Local to County Importance;
- Restoration of favourable conservation status for a habitat / species population; and / or
- Restoration/maintenance of the integrity of a site (where this has been undermined or is likely to be in the absence of the proposed Project intervention).

8.4.51 The complete significance assessment will be undertaken following full analysis of data (several ecological surveys are still ongoing) and will be presented in the forthcoming ES. The assessment will consider the potential impacts from all aspects of the Project on each individually identified VER.

8.4.52 An assessment of the residual impacts, post-mitigation, will also be included in the ES. This will identify proposed mitigation/compensation measures, and the predicted effects on VERs resulting from their implementation. When assessing residual impacts, the assessment will consider the likelihood of mitigation being successful, the steps required to implement it, and any ecological or other post-development monitoring considered necessary to confirm mitigation is effective.

8.4.53 This PEIR sets out a preliminary assessment of the likely significant environmental effects of teh proposed Project on ecology.

8.5 Consultation

8.5.1 Consultation responses received to date relating to ecology, and how these responses have been considered in this assessment are summarised in Table 9 presented in Appendix A

8.6 Baseline Conditions and Receptors

8.6.1 <u>Internationally Designated Sites</u>

8.6.2 There are no SPA or Ramsar sites within 15 km of the Project Site.

8.6.3 There are 5 SAC sites within 15 km of the Project Site.

8.6.4 Blaen Cynon SAC is situated 0.4 km to the north of the Project Site. The primary reason for selection is the Annex II species Marsh Fritillary (*Eurodryas aurinia*) butterfly. The SAC covers a total of 66ha and also includes Woodland Park and Pontpren SSSIs.

8.6.5 The Coedydd Nedd a Melte SAC is situated 1.4 km to the north west of the Project Site. The SAC covers an area of 378ha. The primary reason for designation is the presence of the Annex I habitat of *Tilio-Acerion* forests of slopes, screes and ravines. The secondary designating feature is the presence of Annex I habitat of Old sessile oak with *Ilex* and *Blechnum* in the UK which is western acidic oak woodland.

8.6.6 Cwm Cadlan SAC is situated approximately 14 km from the Project Site. Cwm Cadlan has the largest recorded example of *Molinia* meadows in Wales, which is an Annex I habitat and the primary reason for designation of the site. The secondary designating feature is the presence of another Annex I habitat, Alkaline Fen.

8.6.7 River Usk / afon wysg SAC is situated approximately 14 km from the Project Site. It is a major water course for which the primary reason for designation is the presence of several Annex II species, these are Sea lamprey (*Petromyzon marinus*), Brook lamprey (*Lampetra planeri*), River lamprey (*Lampetra fluviatilis*), Twaite shad (*Alosa fallax*), Atlantic salmon (*Salmo salar*), Bullhead (*Cottus gobio*) and Otter (*Lutra lutra*).

8.6.8 Brecon Beacons SAC is situated approximately 14km from the Project Site. Brecon Beacons SAC is designated for the presence of two Annex I habitats, including plant communities that colonise cracks and fissures on calcareous rocky slopes, and also siliceous rocky slopes.

8.6.9 <u>Sites of Special Scientific Interest (SSSI)</u>

8.6.10 There are 24 ecological SSSI sites within 15 km of the Project Site.

- Cors Bryn-y-Gaer SSSI – is approximately 0.4 km north of the Power Generation Plant Site and is of special interest for lowland bog areas and the diversity of grassland habitats across a complex with wet heath and swamp;
- Woodland Park and Pontpren SSSI – is divided into three blocks with the nearest being 1.2 km northeast of the Power Generation Plant Site and is designated for Marsh Fritillary butterfly;
- Dyffrynoedd Nedd a Mellte Moel Penderyn SSSI – is approximately 1.4 km north west of the Power Generation Plant Site and is of special interest for its extensive and diverse semi-natural woodland, important populations of several flowering plants and

supporting outstanding assemblages of mosses, liverworts and lichens.

- Cwm Cadlan SSSI – is approximately 3 km from the Power Generation Plant Site (refer to SAC designation).

8.6.11 The remainder of the SSSI identified are over 4 km from the proposed Power Generation Plant Site and will be considered in depth within the ES, where appropriate.

- Bryn-bwch SSSI - 4 km
- Tir Mawr a Dderi Hir, Llwydcoed SSSI - 4 km
- Gweunydd Dyffryn Nedd SSSI - 5km
- Caeau Nant y Llechau SSSI - 5 km
- Bryncarnau Grasslands, Llwydcoed SSSI - 6km
- Blaen Nedd SSSI - 6.5 km
- Ogof Ffynnon Ddu-Pant Mawr SSSI - 7.5 km
- Mynydd Ty-Isaf, Rhondda SSSI - 8km
- Caeau Ton-y-Fildre SSSI - 8 km
- Penmoelallt SSSI - 8.5 km
- Cwm Glo a Glyndyrys SSSI - 9 km
- Darren Fach SSSI - 9 km
- Gorsllwyn, Onllwyn SSSI - 9 km
- Waun Ton-y-Spyddaden SSSI - 9 km
- Plas-y-Gors SSSI - 9 km
- Cwm Taf Fechan Woodlands SSSI - 10 km
- Nant Llech SSSI - 10 km
- Ogof Ffynnon Ddu SSSI - 10 km
- Nant Glais Caves SSSI - 11 km
- Craig y Rhiwarth SSSI - 12 km
- Craig Pont Rhondda SSSI - 13 km

8.6.12 For the purpose of this ecological assessment, any geological designated SSSI's have not been included.

8.6.13 <u>National Parks</u>

8.6.14 The BBNPA is located approximately 0.4 km to the north of the proposed Power Generation Plant Site at its closest point. Some habitats within the BBNPA may be sensitive to changes in air quality resulting from the construction, operational, and decommissioning stages of the Project.

8.6.15 Non Statutory Sites

8.6.16 The original desk study completed in 2012 had a search radius of 2 km from the proposed Power Generation Plant Site. This identified eight Sites of Importance for Nature Conservation (SINCs). The additional extended desk study includes a radius of search of 10km and is currently in progress, full details will be included within the ES. The eight sites identified to date are listed below

- Coed Wernhir SINC
- Werfa Farm SINC
- Rhigos Tramway SINC
- Hirwaun Industrial Estate SINC
- Hirwaun Pond SINC
- Hirwaun Common SINC
- Hirwaun Ponds (North) SINC
- Hirwaun Iron Works SINC

8.6.17 None of the SINCs listed are within the Project Site. However, Hirwaun Industrial Estate SINC is located immediately adjacent to the north of the Power Generation Plant. Hirwaun Industrial Estate SINC supports a large mosaic of habitat centred around an ancient lowland peat bog, and provides high quality habitat for a diversity of invertebrate, reptiles, amphibians and bird species. Consideration of dust, air quality and hydrological considerations will be important for this site, with potential for impacts to arise during construction / demolition, operation and decommissioning of the Project. Potential effects upon this site and other SINC's will be fully considered within the ES. A specific construction stage Method Statement will be produced with the ES that will set out measures to protect the SINC during this phase of the Project.

Extended Phase 1 Habitat Survey Results

8.6.18 The Phase 1 habitat surveys determined that the survey area contained a mosaic of habitats including: broadleaved semi-natural woodland, mixed semi-natural woodland, scrub, broadleaved scattered trees, semi-improved acid grassland, semi-improved neutral grassland,

Improved grassland, marshy grassland, ruderal herbs, swamp, introduced shrub, amenity grassland, species poor intact hedgerow, dry ditches, standing water, running water, wall, buildings, hard standing and dry shrub heath.

8.6.19 The majority of the Power Generation Plant and all of Electrical Connection route corridor option 1 comprises existing buildings and hardstanding, and direct loss or disturbance of semi-natural habitats will therefore be minimal.

8.6.20 Both options under consideration for the Gas Connection will result in some temporary disturbance of semi-natural habitats, although option 2 passes through significant areas of hard-standing (existing roads) and option 2 crosses intensively grazed agricultural land.

8.6.21 Electrical Connection route corridor option 1 crosses over the waterlogged / marshy area of grassland to the north and west of the Power Generation Plant Site. However, as it is an overhead line there will be no loss of or disturbance to habitats.

8.6.22 Likewise, as Electrical Connection route corridor option 2 crosses through the Hirwaun Industrial Estate and will be buried beneath an area currently covered in hardstanding, there will be no loss of or disturbance to habitats.

8.6.23 The extended phase 1 habitats identified habitats that had potential to support a variety of protected or otherwise notable species, including:

- Badgers;
- Bats;
- Breeding birds
- Water voles
- Otters
- Reptiles
- Great crested newts
- Invertebrates

Phase 2 Species Specific Surveys to date

8.6.24 As part of the Phase 2 survey effort for the proposed Project the following surveys have been commissioned: badger, bats, breeding bird, great crested newt and other amphibians, otters, water voles and reptile.

8.6.25 In line with the desk study and field results from the Phase 1 Habitat Survey, further Phase 2 survey work for invertebrates and habitats (NVC) were scoped out due to the Project Site changing to avoid direct impacts on the Hirwaun Industrial Estate SINC. Additionally, invertebrate survey data was available from surveys undertaken in 2008 and 2009 by National Grid as part of the planning application for the Rhigos Substation. The Phase 1 Habitat survey undertaken in 2013 indicated that significant changes in habitats or invertebrate communities were unlikely to have occurred since those surveys and therefore the data was considered fit for purpose.

8.6.26 All phase 2 surveys were carried out by suitably qualified and experienced ecologists following current best practice at the appropriate time of year. Further details of these methodologies are provided in Section 8.4.

8.6.27 With respect to the Phase 2 surveys that have already been commissioned and are either complete or underway, a summary of the results to-date is provided in Table 8.4 below. These and the final results will be used to inform the detailed design of the Project and any mitigation measures needed, with the aim of minimising impacts on the ecological receptors identified as far as possible, and allowing appropriate targeting of any enhancement measures.

TABLE 8.4: PHASE 2 SPECIES SURVEY REQUIREMENTS AND PROGRESS TO DATE

Species	Survey Requirement and Timing	Survey Results
Badger survey	One survey visit (depending on the site size and complexity) carried out at anytime of the year. Autumn and early spring however represent the optimal times of survey.	A badger survey of the Power Generation Plant Site and Electrical Connection route corridor options was undertaken in April 2013. No signs of badger were noted. No ecological constraints are therefore anticipated with regards to badgers although precautionary mitigation should be employed due to the risk, albeit low, of occasional through passage by the species. A badger survey of the proposed Gas Connection routes was undertaken during the phase 1 habitat survey carried out in May 2013. No evidence

		of badgers was observed.
Building assessment for bats	Four buildings within close proximity or within the proposed footprint of works were surveyed internally and externally for evidence of bats in spring 2013.	Evidence of bats, in the form of bat droppings, was recorded in all four buildings surveyed.
Bats (Transect Surveys) and Static bat recorders	Activity transect surveys of the proposed Power Generation Plant Site, Electrical Connection route corridor options and Gas Connection route corridor options are currently being undertaken. Transect surveys are being undertaken in accordance with current guidance[24] for Major Infrastructure projects, with monthly visits between May and September. Static bat detectors have been and will be deployed monthly over the same period to gather additional survey data.	A total of four bat transect surveys have been completed so far. The final bat transect survey will be carried out in September 2013 To date very low levels of bat activity have been recorded across the Project Site. The majority of the bat activity has been recorded from common pipistrelle (*Pipistrellus pipistrellus*) and soprano pipistrelle (*Pipistrellus pygmaeus*) bats. A *Myotis* species of bat was record during the August survey. Bat activity within the Project Site has been either commuting or foraging activity. Slightly higher levels of bat activity were recorded during the August transect in comparison to the other months surveyed. Static bat detectors have been deployed on four occasions. The data for this is yet to be analysed.
Bat roost surveys (emergence and re-entry surveys)	Four buildings on the Power Generation Plant Site that could be affected by the Project had evidence of	All four buildings have been discovered to contain bat roosts for common pipistrelle, soprano pipistrelle and brown long eared bats. The demolition or disturbance of the

[24] Bat Surveys–Good Practice Guidelines (BCT 2012)

	roosting bats. These buildings therefore required targeted dusk emergence/dawn re-entry surveys, with three surveys per building. All surveys were and will be carried out following best practice guidance during the optimal survey period (May to September).	buildings will require a European Protected Species (EPS) licence from NRW, although it is unlikely that every building will be significantly affected on the basis of the current proposals. Bats are considered likely to be a VER, although it is likely they will be valued as locally important, on the basis of the small (non-maternity) roosts present.
Breeding bird survey	Three surveys undertaken spring - early summer covering the Power Generation Plant Site and Gas and Electrical route corridor options.	All three surveys have been completed between May to July 2013. Relatively common species of birds were recorded within the survey area, with a less diverse avifauna recorded within the Hirwaun Industrial Estate SINC than was anticipated on the basis of the habitats present. Swifts were observed nesting within two of the buildings likely to be demolished within the proposed footprint of the Power Generation Plant Site.
Great crested newt survey	Four surveys to determine presence, two additional surveys to complete population assessment if GCN are found. Surveys carried out in spring / early summer, with half completed between mid-April and mid-May.	The great crested newt (GCN) (*Triturus cristatus*) presence / absence surveys have been completed, with four surveys having been completed within accessible ponds across the proposed Project Site. No GCN were recorded during any of the surveys, although small numbers of palmate newts, common toad and common frogs were found.
Reptiles	Seven survey visits carried out over the course of spring – early summer and early autumn.	Two surveys have been completed to date at the end of August 2013. No reptiles have so far been discovered during the surveys Following completion of the reptile surveys in September 2013, a full assessment of impacts on this species

		group and determination of mitigation requirements can be provided. If reptiles are found present specific measures will be incorporated into the ES, if no reptiles are recorded there may still be a need for precautionary mitigation based on the assumed presence of reptiles at the Hirwaun Industrial Estate Sinc (as recorded during survey work completed by National Grid in 2008/2009).
Otter and water voles	Otter and water vole survey to be undertaken, to search for evidence of these species in the vicinity of the proposed Power Generation Plant and potential Gas and Electrical Connection routes	Not yet completed. The habitats present appear to be of low to moderate suitability for these species. Should either species be detected, they would be fully considered in the ES and mitigation measures incorporated if required.

8.7 Preliminary Assessment of Potential Impacts

8.7.1 Based on the current status of the Ecological Impact Assessment (EcIA), Table 8.5 describes the main potential impacts, their sources, pathways and the relevant ecological receptors. These are the elements that are anticipated to be fully assessed as part of the EIA for the Project, although due to the iterative nature of EcIA, this is unlikely to comprise the final list.

TABLE 8.5: POTENTIAL ECOLOGICAL AND BIODIVERSITY IMPACTS

Source	Potential Impact(s)	Potential Effect(s)	Receptor(s)
Construction / Demolition / Decommissioning (all elements of the Project)			
Site preparation (demolition, vegetation clearance and levelling)	Habitat loss	Destruction of feeding sites Fragmentation Loss of roosting locations	Bats Breeding Birds Otters Water voles Reptiles

	Increased noise and vibration	Increased plant and vehicular activities	Hirwaun Industrial Estate SINC Bats Birds Otters Water voles
	Increased dust deposition/water-borne pollutants	Wind blow carrying airborne particulate matter: smothering of vegetation, increased nutrient status.	Brecon Beacons National Park Blaen Cynon SAC, SSSI Coedydd Nedd a Melte SAC SAC and SSSI in wider landscape. Hirwaun Industrial Estate SINC Local habitats Otters and Water voles
	Habitat disturbance	Short term changes in habitat composition / use	Bats Badgers Breeding Birds Otters Water voles Reptiles
On-site construction works (construction of	Increased dust deposition/water-borne pollutants	Wind blow carrying airborne particulate matter:	Brecon Beacons National Park Blaen Cynon

buildings, excavations / piling for foundations / excavation of trenches for gas and electrical connection route corridors)		smothering of vegetation, increased nutrient status in nearby habitats.	SAC, SSSI Hirwaun Industrial Estate SINC Local water bodies Otters and water voles
	Increased noise and vibration	Increased plant and vehicular activities	Hirwaun Industrial Estate SINC Badgers Bats Birds Reptiles Otter
	Increased light spill	Localised, short term light pollution from security/plant lighting	Bats Badgers Birds invertebrates
Increased works traffic	Species mortality	Increased plant and vehicular activities	Hirwaun Industrial Estate SINC Badgers Bats Birds Otters
	Habitat contamination	Increases in surface water run off pollutants/air quality effects	Water voles Otters Hirwaun Industrial Estate SINC Brecon Beacons National Park Blaen Cynon SAC, SSSI Coedydd

			Nedd a Melte SAC SAC and SSSI in wider landscape.
Operation			
Power Generation Plant	Increased light spill	Long term security lighting	Bats Badgers Birds
	Increased noise and vibration	Long term increase in site traffic Site machinery	Hirwaun Industrial Estate SINC Badgers Bats Birds Otters
	Oxides of nitrogen, carbon monoxide and dioxide. Water-borne pollutants.	Emissions of pollutants	Brecon Beacons National Park Blaen Cynon SAC, SSSI Coedydd Nedd a Melte SAC SAC and SSSI in wider landscape. Hirwaun Industrial Estate SINC Local habitats
Gas Connection (Options 1 and 2)	No Impacts Predicted		
Electrical Connection (Options 1 and 2)	No Impacts Predicted		

Power Generation Plant

Construction / Demolition

8.7.2 Due to the mobility and range of the protected and notable species within the local area and due to the sensitivity of designated sites and habitats in the local area, elements of the proposed construction / demolition are considered likely to impact on one or more VERs. The impacts will be a mix of permanent and short term impacts and related to habitat disturbance and increase in construction related disturbances. Elements anticipated to require the greatest consideration are potential air/water-borne pollutants on the adjacent Hirwaun Industrial Estate SINC and the demolition of buildings known to be used by nesting birds and roosting bats.

Operation

8.7.3 The operational phase of the Project will see some elements potentially impact upon local ecology, as summarised in Table 8.5. However, certain elements are expected to have little impact, especially following the application of mitigation. Elements anticipated to require greatest consideration are the permanent loss of small amounts of neutral grassland habitats from the Power Generation Plant Site, and air quality effects on habitats resulting from emissions from the Power Generation Plant.

Decommissioning

8.7.4 It is possible that during the decommissioning stage of the Project, there could be impacts to VERS. However, the mitigation measures designed to offset construction and demolition impacts would be designed not to attract VERS back to the operational Project Site. Therefore, a preliminary assessment is that the impacts experienced during decommissioning would be less than those for construction.

Gas Connection (Options 1 and 2)*Construction*

8.7.5 The majority of the potential impacts associated with the proposed Gas Connection will be temporary in nature and related to habitat disturbance and increases in construction related disturbances whilst the pipeline is being excavated and laid. Habitats present would be reinstated following installation of the pipelines, and would be restored to as closely match pre-existing habitats as possible (subject to any options for habitat enhancement that may be available and which will not be identified until the ES is produced).

Operation

8.7.6 The operational phase of the Gas Connection is anticipated to have negligible impact on ecological receptors.

Decommissioning

8.7.7 During decommissioning of the Gas Connection (either option), no impacts are predicted given that it is assumed at this stage that the pipeline will be left in situ and no further ground disturbance will take place.

Electrical Connection (Option 1)

Construction

8.7.8 Electrical Connection route corridor option 1 would be an overhead line running approximately 250m from the Power Generation Plant into the Rhigos Substation. Due to the short distance of the line and close proximity to the Power Generation Plant, the impacts of the connection could be considered as part of the construction of the Power Generation Plant.

Operation

8.7.9 The operation of the overhead line is not anticipated to have any impacts on ecological habitats.

Decommissioning

8.7.10 As per construction, the decommissioning of Electrical Connection option 1 would be considered as part of the decommissioning of the Power Generation Plant. Therefore, only minor impacts are predicted,

Electrical Connection (Option 2)

Construction

8.7.11 Electrical Connection route corridor option 2 would be a buried underground cable which would be sited entirely in hardstanding on the Hirwaun Industrial Estate. Although there would be increases in disturbance to the area during construction, due to the nature of the location of the electrical connection, it is not anticipated to have any impacts on ecological receptors.

Operation

8.7.12 The operation of Electrical Connection Option 2 is not anticipated to have any impacts on ecological habitats.

Decommissioning

8.7.13 During decommissioning of Electrical Connection Option 2, no impacts are predicted given that it is assumed at this stage that the cable will be left in situ and no further ground disturbance will take place.

8.8 Potential Mitigation Measures

8.8.1 Mitigation measures to limit impacts on ecology and biodiversity will be fully considered within the ES. Measures that are likely to be required are listed below:

- Production and implementation of a construction-phase Method Statement to minimise impacts on the Hirwaun Industrial Estate SINC;
- Timing of demolition/vegetation clearance activities to avoid nesting bird season and minimise impacts on roosting bats;
- Provision of replacement nesting/roosting sites for bird and bat species;
- Sensitive clearance of habitats with potential to support reptiles and other protected species;
- Dust-suppression measures and pollution prevention strategy during demolition and construction works;
- A Construction Environmental Management Plan;
- Pre-construction surveys to reconfirm status of key habitats and species;
- Design and implementation of a sensitive lighting strategy for the Project Site that avoids light-spill onto adjacent habitats;
- A programme on ecological monitoring to confirm the effectiveness of mitigation measures.

8.8.2 These specific mitigation measures will be determined once all of the phase 2 protected species surveys have been completed and a fuller picture of the potential impacts has been obtained. Potential impacts on designated sites and sensitive habitats relating to air quality effects will be informed by the emerging results from the air quality assessment, as will any requirements for mitigation/monitoring in relation to potential air quality effects.

8.9 Preliminary Assessment of Residual Effects

8.9.1 On the basis of the preliminary environmental information and assessment described above, taking into account potential mitigation measures, potential residual impacts are detailed in Table 8.7 below.

Table 8.7: Preliminary Assessment of Residual Ecology Effects

Description	***Detail***	***Unmitigated Potential Impact***	***Mitigation / Monitoring Measure***	***Residual Impact***
Power Generation Plant				
Construction / Demolition / decommissioning	Habitat loss / destruction of feeding sites etc.	Moderate	Provision of compensatory habitat / timing of construction / demolition works	Minor
	Increased dust / airborne particles, smothering of vegetation	Minor	Nothing specific above and beyond the confirmed mitigation measures, as set out in Section 6 of this PEIR.	Minor
	Increase in light spill causing disturbance to nocturnal animals	Moderate	Careful lighting design included in detailed design of Project	Minor

Operation	Pollution from increased nitrogen oxides, carbon monoxide and carbon dioxide	Minor	Nothing specific above and beyond the confirmed mitigation measures, as set out in Section 6 of this PEIR.	Minor
	Increase in light spill disturbing nocturnal animals	Moderate	Careful lighting design included in detailed design of Project	Minor
Gas Connection (Options 1 and 2)				
Construction	As for Power Generation Plant			
Operation	No Impacts			
Decommissioning	No Impacts			
Electrical Connection (Options 1 and 2)				
Construction	As for Power Generation Plant			
Operation	No Impacts			
Decommissioning	No impacts			

8.10 Next Steps

8.10.1 As the EcIA progresses, specific ecological consultation will include further detailed correspondence with Natural Resources Wales (NRW) and Rhondda Cynon Taf County Borough Council (RCTCBC).

8.10.2 The potential requirements for, and content of any assessment required under the Habitats Regulations in relation to the Blaen Cynon SAC and Coedydd Nedd a Melte SAC (and other Natura 2000 sites) will be included in this consultation. A formal screening report is being produced which will identify whether Likely Significant Effects (LSE) are anticipated. This will be provided to NRW and RCTCBC in due course..

8.10.3 Based on the above assessment methodology and the initial data / survey results presented in this Section, significance criteria will be defined for the Project Site and its surroundings and a full ecological impact assessment will be undertaken to determine the likely impacts of construction / demolition, operation and decommissioning of the Project. This will in turn inform a more accurate determination of the mitigation required to ensure the structure and function of the area's nature conservation value is maintained.

8.10.4 The general and species-specific mitigation proposed above, together with on-going consultation with key stakeholders, including NRW and RCTCBC and others as appropriate, will be used to inform the final Project layout in order to minimise impacts to ecology and biodiversity, as far as is practicable, and to ensure suitable and sufficient mitigation/compensation where impacts cannot be avoided.

8.10.5 The EcIA will also address the potential impacts of the Gas Connection on VERs. By the time the EcIA is finalised a preferred option for the Gas Connection route will have been selected, and the bulk of the assessment will focus on the selected option. A summary of the ecological considerations given to the other option would however be included to allow comparison with the least preferred option.

8.10.6 The results of the Extended Phase 1 habitat survey and the Phase 2 surveys undertaken along the selected option would be included, as would any mitigation measure considered necessary to limit identified impacts on ecological receptors.

8.10.7 When a greater understanding of the ecological baseline and exact nature of project impacts is understood, it will also be possible to consider opportunities for ecological enhancement as part of the final project design.

SECTION 9

WATER QUALITY AND RESOURCES

9 WATER QUALITY AND RESOURCES

9.1 Introduction

9.1.1 During construction (including demolition), operation and decommissioning of the Project, there is limited potential to generate discharges to local water courses and thus impact on local water quality. There will be minimal water usage requirements at the Project Site, particularly during operation as the Power Generation Plant will operate with air cooling. Neither the Gas / Electrical Connection will require any water to operate. Both water quality and water usage will be assessed in this section and a full assessment will be carried out and presented in the final ES to be submitted with the proposed DCO Application

9.1.2 This section will also provide a brief summary of the main issues and risks posed to and from flooding. However these will be assessed in detail through a separate Flood Risk Assessment (FRA) submitted as a separate document as part of the proposed DCO Application.

9.2 Legislative and Policy Context

Water Framework Directive

9.2.2 EU Directive 2000/60/EC established a framework for Community action in the field of water policy (the Water Framework Directive (WFD)). The overarching goal of the WFD is for relevant waters to reach "good" chemical and ecological status by 2015. Member states then have to maintain this standard. Provided that certain conditions are satisfied, in some cases the achievement of good status may be delayed until 2021 or 2027.

9.2.3 The WFD also sets goals for the progressive reduction of emissions, discharges and losses of Priority Substances and the cessation of Priority Hazardous Substances. As part of the WFD's aim to improve water quality by reducing specific Priority Substances, the first priority substances list (Decision 2455/2001/EC) was issued by the European Commission identifying 33 priority substances.

9.2.4 The Priority Substances Directive, a daughter directive of the WFD was introduced in 2008 and it replaced the first priority substances list. In 2012, the European Commission put forward a proposal for a directive amending the WFD and the Priority Substances Directive regarding Priority Substances. In July 2013, the European Parliament adopted a legislative resolution on the proposal. As such, a new Directive may emerge but is not currently in force.

9.2.5 In the UK, a technical advisory group (WFDTAG) consisting of the UK environment and conservation agencies has been established to support the implementation of the WFD. The WFDTAG has established standards for certain substances that they consider are concentration of a pollutant below which no harmful effects on aquatic organisms would be expected.

National Policy Statements

9.2.6 As explained in Section 2, the Overarching NPS for Energy (EN-1) explains the assessment principles to which the Secretary of State will have regard in the examination of an energy NSIP (such as the proposed Project), and explains the generic water quality and resources impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (EN-2). The NPSs for Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5) provide specific considerations potentially relevant to the Gas Connection and Electrical Connection respectively.

9.2.7 NPS EN-1 states, in Section 5.15, that "Infrastructure development can have adverse effects on the water environment including groundwater, inland surface water, transitional waters and coastal waters." An assessment of the existing conditions regarding water quality, water resources and physical characteristics of the water environment and the impacts of a proposed project is required, by paragraph 5.15.2.

9.2.8 EN-1 notes that activities that discharge to the water environment are subject to additional pollution controls and recommends that the Secretary of State gives increased weight to impacts on the water environment that would have an adverse affect on the achievement of the objectives of the WFD in its decision making. Paragraph 5.15.7 states that: "The [Secretary of State] should consider whether appropriate requirements should be attached to any development consent ... to mitigate adverse effects on the water environment."

9.2.9 EN-2 Part 2 Section 2.10 states that; 'Water quality and resource' recognises that some fossil fuel generating stations such as coal-fired stations and CCGTs have very high water demands, whilst others such as open cycle gas turbines (OCGTs) have very little water demand.

9.2.10 EN-4 Part 2 Section 2.22 recognises that "constructing pipelines creates corridors of surface clearance and excavation that can potentially affect watercourses, aquifers, water abstraction and discharge points, areas prone to flooding and ecological receptors. Pipeline impacts could include inadequate or excessive drainage, interference with groundwater flow pathways, mobilisation of

contaminants already in the ground, the introduction of new pollutants, flooding, disturbance to water ecology, pollution due to silt from construction / demolition and disturbance to species and their habitats".

9.2.11 EN-4 states that where the project is likely to have effects on water resources or water quality an assessment of the impacts should be provided in line with Section 5.15 as part of the ES. The Secretary of State should be satisfied that the impacts on water quality and resources are acceptable in accordance with Section 5.15 of EN-1.

Environmental Permitting Regulations 2010

9.2.12 The Environmental Permitting (England and Wales) Regulations 2007 sought to establish an integrated approach to Waste Management Licensing and Pollution Prevention and Control. In April 2010, the Environmental Permitting (England and Wales) Regulations 2010 increased the scope of the Environmental Permit to include water discharges and groundwater activities. NRW will control and regulate the Project with respect to the discharge of any effluent from the Project Site via an Environmental Permit. The permit will include specific limits for a range of pollutants that could be present in any effluent proposed to be discharged to surface waters. These limits will be set to ensure that the process contribution of any pollutant within the scope of the WFD and the EQS Directive does not detrimentally affect the potential for the receiving water body to achieve good status.

Other National and Local Policy

9.2.13 The Rhondda Cynon Taf Local Development Plan 2006-2021 was adopted in March 2011. It sets out how the county borough will be developed over 15 years. The policy sets out several Welsh Strategies that were considered in the development of the plan.

9.2.14 The Rhondda Cynon Taf Local Development Plan contains policies which should be considered when making a planning application. Those policies relevant to water resources include the following.

Policy AW 8 – Protection and enhancement of the Natural Environment

9.2.15 This policy aims to preserve Rhondda Cynon Taf's distinctive natural heritage by enhancing and protecting its features.

Policy AW 10 – Environmental Protection and Public Health

9.2.16 This policy states that proposals will not be permitted where they would cause or result in a risk of unacceptable harm to health and /or local

amenity because of contamination, landfill gas, land instability, water pollution and flooding etc. unless it can be demonstrated that measures can be taken to overcome any significant adverse risk to public health, the environment and/or any impact upon local amenity.

Standards and Guidance

9.2.17 The primary guidance which has been used in compiling this Section is the EA Horizontal Guidance Note H1 – Annexes D and E, which has been described in more detail below.

9.2.18 Additionally, the CIRIA Publication C532 – 'Control of Water Pollution from Construction Sites' has also been considered.

9.3 Realistic Worst Case Scenario for Assessment

9.3.1 In respect of potential impacts on water quality and resources, the realistic worst case scenario from within the proposed Project parameters (described in Section 4 of the PEIR) is set out in Table 9.1 below.

Table 9.1 – Realistic Worst Case Scenario for Assessment of Water Quality Impacts

Parameters	Details
Number of gas turbine units	5 (~ 59 MWe)
Number of stacks	5
Unit type	Aero derivative

9.3.2 A larger number of smaller gas turbine generator units is considered to be the worst case scenario for water resources at the Power Generation Plant Site. To generate the same power output at the Power Generation Plant Site the water requirement will be increasingly higher as the number of units increases. This is because there are more plant items for NOx abatement. There is also the requirement for marginally more water to wash turbine blades of five separate units rather than washing blades of a lower number of units.

9.3.3 A preliminary assessment of both options for the Gas Connection and the Electrical Connection is presented in this section. A decision on the preferred option for each will be taken following consultation.

9.4 Assessment Methodology and Significance Criteria

Water Resources

9.4.2 This preliminary assessment of water resources covers all major water use activities for the Project. The sources of raw water are identified and the appropriate processing and storage methods are defined, based on the intended uses. The reason for use and the amounts of water required are specified and, where appropriate, the anticipated effluent compositions established.

Water Quality

9.4.3 The EA Horizontal Guidance Note H1 – Annex (d): Surface Water Discharges (basic) and Horizontal Guidance Note H1 – Annex (e): Surface Water Discharges (complex) outline methodologies for the quantification of the impacts of discharges to surface waters where the concentrations of the various parameters within the effluents are known.

9.4.4 The EA Horizontal Guidance Note H1 – Annex (d) details the target ambient river quality benchmarks for a range of pollutants, of which those relevant to the Project are summarised in Table 9.2.

Table 9.2: Environmental Quality Standards (µg/l)

Parameter	Comments	Short-Term Maximum Allowable Concentration	Long-Term (Annual) Average Concentration
Priority Substances			
Cadmium	and its compounds	1.5	0.2
Mercury	and its compounds	0.07	0.05
Lead	and its compounds		7.2
Nickel	and its compounds		20
Specific Pollutants			
Cyanide, (as CN-)	Standards for HCN only	5	1
Chlorine	Total residual Oxidants	10	

	(TRO)		
Arsenic	Dissolved		25
Chromium	(VI) – Dissolved	32	0.6
Copper	Dissolved		5
Zinc	Dissolved		40
Iron	Dissolved		1000
Physico-Chemical Standards			
Ammonia (as NH4-)	Total ammonia as Nitrogen	300	
N-Total	Dissolved inorganic nitrogen (µ mol/l)		30
EA Non-Statutory EQS			
Hydrogen Sulphide	-	10	
Fluoride	-	15000	5000

9.4.5 A 'basic' effluent is one where all the components have been identified and where the toxicity of the effluent can be explained by the chemical properties of the components. The effluents anticipated to be discharged to surface water bodies will be described with reference to the Priority Substances prescribed in the WFD and EQS Directive, together with the additional relevant pollutants as per Appendix A and Appendix B of the EA *Horizontal Guidance Note H1 – Annex (d)*.

9.4.6 This Section also presents high level discussions of the likely mitigation measures to be employed as the exact nature of all effluents, including drainage systems, which will be finalised during the design phase of the Project. The Project will be engineered to adhere to the standards and limits for effluent discharge from the Power Generation Plant Area as prescribed in the Project's Environmental Permit.

Significance Criteria

9.4.7 The significance criteria of the potential/likely impacts of the Project on water quality are defined in Table 9.3. These criteria are based on guidance for the assessment of the impacts of discharges to surface waters as outlined in the EA Horizontal Guidance Note H1 – Annex (d).

Table 9.3: Significance Criteria for Individual Pollutants

Significance	Short-Term Criteria	Long-Term Process Contribution	
	Process Contribution as a percentage of Maximum Allowable Concentration	Process Contribution as a percentage of relevant EQS	Predicted Environmental Concentration as percentage of relevant EQS
Not significant	< 100%	< 1%	-
Minor	< 100%	> 1%	< 70%
Moderate	< 100%	> 1%	70% < x < 100%
Major	> 100%	-	-
Severe	-	> 1%	> 100%

9.4.8 Effects of 'moderate' or above are considered to be significant for the purposes of the EIA Regulations.

9.5 Consultation

9.5.1 Consultation responses received to date relating to water quality and resources, and how these responses have been considered in this assessment are summarised in Table 9 presented in Appendix A

9.6 Baseline

Surface Water Bodies

9.6.2 Based on the preliminary assessment to date, the main water bodies identified within the vicinity of the Project Site are:

- Penderyn Reservoir which is around 800m north of the Power Generation Plant Site;
- River Camnant which is culverted underneath the Power Generation Plant Site;
- Fishing pond approximately 200m south of the Power Generation Plant Site;
- Numerous drainage ditches and several small ponds on agricultural land to the south of Rhigos Road; and

- Hirwaun Ponds approximately 1 km east of the Power Generation Plant Site.

9.6.3 The location of these watercourses are shown on Figure 9.1.

9.6.4 At this stage of the EIA process the exact path of the River Camnant underneath the Power Generation Plant Site is not known. This will be investigated further and confirmed within the ES . A Water Framework Directive (WFD) Assessment will be carried out for this watercourse and will form an appendix to the full ES.

9.6.5 The river quality for the Camnant is classified as general quality assessment (GQA) Grade C (year 2000). The GQA chemical classification system grades are defined by the level of biochemical oxygen demand, ammonia and dissolved oxygen in the water; grade C is given in Table 9.4 below.

Table 9.4: GQA classification system grade C

Dissolved Oxygen (% saturation) 10-percentile	Biochemical oxygen demand (mg/l) 90-percentile	Ammonia (mgN/l) 90-percentile
60	6	1.3

9.6.6 The likely uses and characteristics of grade C water courses are as follows:

- Potable supply after advanced treatment;
- Other abstractions;
- Good Cyprinid fisheries; and
- Natural ecosystems, or those corresponding to good cyprinid fisheries.

9.6.7 An Envirocheck Report, which covers the Project Site detailed three discharge consents; two have expired and one has been revoked. All three consents were granted for the same operator: British Coal Opencast (likely relating to the former Tower Colliery). In all three cases the discharge type was trade effluent and the receiving water the Nant Yr Ochain.

9.6.8 Seven pollution incidents to controlled water have also been recorded within the Project Site. None of these incidents occurred within the last ten years. Further details are provided in Table 9.5

Table 9.5: pollution incidents to controlled waters within the Project Site

No.	Incident Date	Pollutant	Receiving Water	Category	NGR
1	30th August 1997	Mud/clay/soil	Not given	Category 3 – minor incident	293800 206000
2	30th August 1997	Mud/clay/soil	Not given	Category 3 – minor incident	293800 205995
3	30th August 1997	Mud/clay/soil	Not given	Category 3 – minor incident	293805 209995
4	28th August 1997	Mud/clay/soil	Not given	Category 3 –minor incident	293700 206000
5	13th February 1996	Crude sewage	Not given	Category 2 – significant incident	293500 206695
6	11th January 1995	Farm effluent/slurry	Not given	Category 3 – minor incident	293900 205800
7	2nd May 1991	Farm effluent/slurry	Not given	Category 3 – minor incident	293500 206700

9.6.9 No water abstractions are recorded within the proposed Project Site however there are two approximately 660 m south east at Tower Colliery Ltd. The abstraction end dates for both records are not supplied therefore it is assumed that abstraction continues at this location.

Hydrogeology

9.6.10 The bedrock of the Power Generation Plant Site is classified as a Secondary A Aquifer. This means the bedrock has 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.

9.6.11 The groundwater vulnerability across the majority of the Project Site is classified as low, this is due to the fact that the overlying soils have a low leaching potential in which pollutants are unlikely to penetrate the soil layer because water movement is largely horizontal or they have a large ability to attenuate diffuse pollutants. Lateral flow from these soils contribute to groundwater recharge elsewhere in the catchment. However in the south west corner of the Power Generation Plant Site it is classified as unknown therefore a worst case scenario of high is assumed until proven otherwise.

9.6.12 The hydrogeology of the Project Site will be explored in more detail in Section 10 Geology, Ground Contamination and Hydrogeology.

9.6.13 There is a source protection zone 1 2 km to the north east of the Power Generation Plant Site. A source protection zone 1 is an inner protection zone defined as the 50 day travel time from any point below the water table to the source. This zone has a minimum radius of 50 m. Groundwater source protection zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity the greater the risk.

Utilities

9.6.14 There is a water treatment plant located to the north of the Power Generation Plant Site between Fifth Avenue and the A465. Combined sewers, foul sewers and existing water mains are found throughout the Project Site. These utilities are mainly located along roads. For example, an existing main runs along both Main Avenue and Rhigos Road, a combined sewer runs along the A465 and a foul sewer runs along Fourth Avenue and Main Avenue with a connection to Willows Farm.

9.6.15 The Penderyn Reservoir 800 m north of the Project Site is a public water supply reservoir under the ownership of Welsh Water.

Flood Risk

9.6.16 In its response to PINS' consultation on the Scoping Report, NRW states that the Project Site is in Flood Zone A. A flood zone A is considered to be an area at little or no risk of fluvial or tidal / coastal flooding. It is used within the precautionary framework to indicate that there is no need to consider flood risk further.

9.6.17 Nevertheless due to the size of the Project, flood risk will be explored in more detail within a standalone FRA which will be presented as an Appendix to the proposed DCO Application.

Gas Connection –water crossings

9.6.18 Neither of the proposed Gas Connection route corridor options require a crossing under a large watercourse. Route corridor 1 requires crossing three field drains. These field drains are all located on agricultural land to the south and east of the Power Generation Plant Site. Gas Connection route corridor option 2 requires the crossing of one filed drain,

Electrical Connection –water crossings

9.6.19 Neither of the Electrical Connection route corridor options would cross any watercourses.

9.6.20 Route corridor option 1 would cross over a waterlogged area to the north and west of the Power Generation Plant Site. However, this would be via an overhead line and hence there would be no direct impact on the waterlogged area.

9.6.21 Route corridor 2 runs alongside existing roads in the Hirwaun Industrial Estate. Although direct ground disturbance would be required to excavate the trench for the underground cable, the route corridor is not in close proximity to any watercourses.

Conceptual Site Model

9.6.22 Table 9.6 below, is a tabular representation of a conceptual site model (CSM). The CSM is a representation of the potential pollutant linkages for the construction / demolition, operation and decommissioning phases of the Project. It is noted here that this CSM is based on the preliminary assessment presented in this PEIR and will be updated as part of the ongoing EIA studies.

9.6.23 The CSM shows that potential impacts on watercourses in the vicinity of the Project could arise from unknown contaminants which are already present within the soil and the accidental spillage of liquids including diesel and oil. Potential pathways of these pollutants from the source to the receptor include surface water runoff and the pipeline crossing. Potential receptors at the Project Site include local surface water courses, the secondary A aquifer, water treatment plant and site workers.

Table 9.6: Conceptual Site Model

Source	Potential Contaminants	Potential Pathways	Potential Receptors
Construction / demolition / decommissioning activities could lead to the mobilisation of contaminants already within the topsoil.	Potential contaminants within the topsoil are unknown at this stage.	Drilling /piling for foundations provide pathway to groundwater.	Local surface water courses. Source Protection Zone 1
Accidental spillages via vehicles.	Diesel / oil.	Surface water runoff.	Secondary Aquifer A Water treatment plant Site workers.

9.6.24 The table above is useful to show the potential pollutant linkages however it does not predict the likelihood of their occurrence. It is anticipated that there is a very minimal risk that any of the pathways listed in the table above will be created. At this stage, it appears unlikely that piling would be required for foundation preparation. However, even if it was, due to the depth of the overlying unproductive strata, piling for foundations is very unlikely to reach the principal aquifer. Even if piling to these depths was required, mitigation measures, such as those set out by "*Piling and penetrative ground improvement methods on land affected by contamination Guidance on pollution prevention - NGWCLC Report NC/99/73"* would mean that no pathway for pollutants will be created. On-site the surface water runoff will be captured by the surface water drainage system thus no contaminated runoff will be created. These can be considered as embedded mitigation measures.

9.6.25 Other embedded mitigation measures will include the industry standard methods and procedures to ensure impacts from construction / demolition, operation and decommissioning are minimised. These include:

- Any surface water contaminated by hydrocarbons to be passed through oil/grit interceptors prior to discharge;

- 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 incidence of accidental impacts;
- Refuelling of construction vehicles and equipment will be restricted to a designated area with properly 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;
- 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; and
- During operation, NRW will set limits on the quality of water that is discharged from the Project Site under the Environmental Permit. The need, or otherwise for further, specific mitigation measures will be determined through the EIA process.

9.6.26 The British Standard Code of Practice for Earthworks BS 6031:2009 contains detailed methods that should be considered for the general control of drainage on construction sites. Further advice is also available in the British Standard Code of Practice for Foundations BS 8004: 1986. These will be taken into account.

9.7 Preliminary Assessment of Potential Impacts

Power Generation Plant

Construction / Demolition

9.7.2 During construction and demolition, potential impacts on water resources could be due to:

- Water use for construction / demolition activities / hygiene; and

- Creation of pathways to receptors including the Secondary A Aquifer and the Source Protection Zone 1.

9.7.3 A small amount of water will be required each day for the construction and demolition works (e.g. wheel washing and dust suppression) and hygiene. This water will likely be brought in by tanker or the existing mains water supply which already serves the International Greetings Warehouse will be used, and therefore no surface water or groundwater abstraction will be required. There will therefore be no impact on these resources as a result of water requirement during construction or demolition.

9.7.4 Construction or demolition activities could require the disposal of water from the Power Generation Plant Site. Therefore all construction contractors will be required, in conjunction with HPL, to reach an agreement with NRW with regard to detailed methods of disposal.

9.7.5 Based on preliminary information and similar construction sites, it is likely that this water will either be treated and discharged to existing site drainage (as used currently by the existing industrial units at the Power Generation Plant Site) or it will be collected and tankered away.

9.7.6 Construction / demolition activities, if uncontrolled, could potentially cause leaching to surface waters due to the creation of soil piles formed during excavation, levelling and other such on-site works. Impacts could include the potential pollution or silting up of surrounding watercourses. Despite this, working to best practice construction methods and embedded mitigation measures, (as outlined in Section 9.4) will mean that these impacts would not occur from construction activities. Their impacts would therefore be negligible.

9.7.7 During construction or demolition, if it is necessary to install a temporary diesel storage tank for onsite construction machinery, generators etc. on-site this will be double-skinned and/or contained with an impermeable bund sized to hold 110 per cent of the total tank contents for the prevention of releases to the environment. Maintenance of construction machinery, on-site, will be forbidden outside suitably kerbed or bunded areas to prevent the accidental leakage of lubricating and hydraulic fluids. Therefore the impact of accidental spillages during construction will be negligible.

9.7.8 The River Camnant is thought to be culverted under the Power Generation Plant Site. However, at this stage in the Project, given the level of assessment undertaken to date, the potential impacts on this river cannot be assessed with any certainty. A Water Framework Directive report will be carried out on this water course and will predict any potential impacts.

9.7.9 There is a peat bog / waterlogged marsh area to the north west of the Power Generation Plant Site, close to the location of the Rhigos substation. The area is known to support a wide range of floral and faunal species, which depend on its sensitive hydrology. No impacts on the hydrology of this area are anticipated as no works will take place within this area.

9.7.10 Given the above, and the lack of any surface water bodies within the vicinity of the Power Generation Plant Site, the preliminary findings are that the impacts from construction of the Power Generation Plant and demolition of existing buildings would be negligible.

Operation

9.7.11 The largest operational demand for water in the majority of UK power stations is cooling. However the Power Generation Plant will be air cooled therefore minimal quantities of water will be required for operational purposes.

9.7.12 Water use at the Power Generation Plant Site will be limited to potable water for drinking and sanitation purposes. Domestic/sanitary water use will be approximately 200 litres per person per day (c. 30 m^3/day). An existing mains water supply already provides the International Greetings storage and distribution warehouse with mains water for toilets, kitchens etc. It is therefore envisaged that this water supply will continue to be used during operation of the Power Generation Plant for the same purposes. It is likely that a similar number of construction workers would be employed at the Power Generation Plant Site to the number employed at the International Greetings facility. Therefore the water requirement should be similar.

9.7.13 The Power Generation Plant Site will be equipped with a surface water drainage system and a sewerage system. The intricacies of these systems will be confirmed within the detailed design stage. It is anticipated at this stage that the on-site sewerage system will connect to the main sewerage network and that the surface water drainage system will also drain into this network. The surface water drainage system will discharge into the existing drainage network at the Power Generation Plant Site. It is not anticipated that an attenuation pond will be required as the Power Generation Plant Site will not change greatly in composition compared to its current condition (e.g. covered in hard standing and buildings) and therefore there will be very little change to the surface water run-off rate. Despite this, an attenuation pond is shown on Figure 4.1 as the final drainage requirements are still being assessed, and in order to show the maximum likely extent of the Power Generation Plant. It is not anticipated that surface water drainage will require specialist treatment for oils etc. Surface water drainage will be

uncontaminated and typical of surface water runoff from areas of hard standing and roads. Before reaching the main sewerage network the runoff will pass through oil interceptors / filters.

9.7.14 Along with the existing drainage systems on the Power Generation Plant Site, an assessment of the potential for the application of sustainable urban drainage system (SUDS) at the Project will be investigated to improve on the current drainage regime. SUDS would, if feasible, be used to retain non-contaminated surface water on-site and released at a controlled and sustainable rate to the existing local drainage ditches or soakaways. The feasibility and design of any SuDS will be agreed in advance with NRW.

9.7.15 For NOx control it is anticipated that the Power Generation plant will require a worst case scenario of 69 m^3 per hour. Assuming a water tank on the Power Generation Plant Site capable of storing 6000 m^3, there is enough capacity for up to 3.6 days continuously running the plant, 24 hrs per day. However, as the plant will operate in 'peaking mode' (anticipated at <1500 hrs per year) the maximum potential water use required for NOx control will be approximately 103,000m^3 per year.

9.7.16 The water used for NOx control will all be used up during the process, and therefore no residual water will be discharged.

9.7.17 Due to the intermittent water demand of the Power Generation Plant, all water will be tankered to the Power Generation Plant Site and stored in water storage tanks adjacent to the administration buildings.

9.7.18 Occasionally (approximately monthly) it will be necessary to wash the blades of the air compressor section of the gas turbine to remove debris that has penetrated the air inlet filters and become lodged on the compressor blades. This will be done at times when the performance of the gas turbine has degraded and will depend on the air quality in the vicinity of the proposed Project Site.

9.7.19 Washing can be done in two ways, either:

- On-line washing where a fine spray of water is allowed to pass through the gas turbine; or,
- Off-line washing where the compressor blades are rotated slowly through a detergent solution.

9.7.20 Any water generated during washing will be retained on the Power Generation Plant Site in a storage tank and subsequently tanked off-site by a licensed contractor for disposal at an appropriately licensed disposal facility.

9.7.21 The anticipated water requirement for washing will be of the order of 11.5 m^3 per week.

Decommissioning

9.7.22 During decommissioning, temporary impacts to water quality are likely to arise. These will be similar to those described above for construction.

Gas Connection Route Corridor Option 1

Construction

9.7.23 Gas Connection Route Corridor option 1 requires the crossing of three minor field drains. The exact construction methods used to cross these drains has not yet been determined and it is likely that this will need to be done in consultation with the landowner. It could be that these fields drains are re-routed or it could be that the pipeline is laid under these drains. However, no matter what construction method is used, due care and attention will be paid so that no potential pollutant pathways are opened up which could impact on the field drains. As for construction of the Power Generation Plant, best practice will be followed including the implementation of a CEMP.

9.7.24 Prior to operation, the gas pipeline will be hydrostatically tested by closing off the ends, filling it with water and increasing the pressure to a pre-determined level higher than the pressure at which it is designed to operate.

9.7.25 The water used during hydrostatic testing would likely be tankered in and will subsequently be discharged in accordance with approved method statements and discussions with NRW following hydrostatic testing the water may be slightly contaminated with particles such as small metal fragments, dust or welding deposits.

9.7.26 Based on the above it is considered that construction of Gas Connection option 1 will have a negligible impact on water quality.

Operation

9.7.27 As the Gas connection would be a buried pipeline, once operational, the pipeline will have no impacts on any surrounding waterbodies or ground water. Furthermore, there is no operational water requirement for this element of the Project.

9.7.28 As such, the findings of this preliminary assessment are that Gas Conection Route Corridor Option 1 would have negligible impacts on the Water Resources of the area.

Decommissioning

9.7.29 Following the decommissioning of the Power Generation Plant, it is anticipated that the gas connection pipe will be left in-situ, as removal of the pipe would cause more environmental disruption than leavingit in place.

9.7.30 As such, there are no decommissioning acivitise for this element of the Project which would require water and as such the impacts on Water Resources are negligible.

Gas Connection Route Corridor Option 2

Construction, operation and decommissioning

9.7.31 Gas Connection Route Corridor Option 2 requires crossing of one minor field drain. There are not anticipated to be any significant differences between the impacts of the Gas Connection for construction, operation or decommissioning.

Electrical Connection Route Corridor option 1

9.7.32 Electrical Connection route corridor option 1 does not cross any water bodies. It does cross over a waterlogged and marshy area to the north and west of the Power Generation Plant. However, route corridor option 1 will be an overhead line and therefore no direct impacts to watercourses are anticipated. Neither the operational nor decommissioning phases require water.

9.7.33 Therefore there will be no impacts on wtare quality or resources resulting from Electrical Connection route corridor option 1.

Electrical Connection Route Corridor option 2

9.7.34 Electrical Connection route corridor option 2 does not cross any water bodies. Therefore there will be no impacts on water resources as a result of this Electrical Connection option.

9.8 Potential Mitigation / Management Techniques

Power Generation Plant

9.8.2 During construction / demolition mitigation measures would be covered by the Construction Environmental Management Plan (CEMP).

9.8.3 No further mitigation measures, above and beyond those outlined in Section 9.6 are considered necessary at this stage, although this will be re-assessed as part of the ES.

Gas Connection (Options 1 and 2)

9.8.4 All proposed mitigation measures identified for the Power Generation Plant will be considered for the construction and decommissioning periods of the Gas Connection depending on the findings of the impact assessment.

Electrical Connection (Options 1 and 2)

9.8.5 All proposed mitigation measures identified for the Power Generation Plant will also be considered for the construction and decommissioning periods of the Electrical Connection depending on the findings of the impact assessment.

9.9 Preliminary Assessment of Residual Effects

9.9.1 On the basis of the preliminary environmental information and assessment described above, taking into account potential mitigation measures, potential residual impacts are detailed in Table 9.7 below.

Table 9.7: Preliminary Assessment of Residual Water Quality Effects

Description	***Detail***	***Unmitigated Potential Impact***	***Mitigation / Monitoring Measure***	***Residual Impact***
Power Generation Plant				
Construction / Demolition	Disposal of construction water.	Negligible	No additional mitigation above and beyond confirmed mitigation measures. (e.g. effectively managing site drainage)	Negligible

Description	*Detail*	*Unmitigated Potential Impact*	*Mitigation / Monitoring Measure*	*Residual Impact*
Power Generation Plant				
	Leaching from stock piles or compacted ground.	Negligible	No additional mitigation above and beyond confirmed mitigation measures. (e.g. effectively managing site drainage)	Negligible
Operation	Disposal of operational water from blade washing.	Negligible	No additional mitigation above and beyond confirmed mitigation measures. (e.g. effectively managing site drainage)	Negligible
Decommissioning	As for construction.			
Gas Connection				
Construction	As for Power Generation Plant			
Operation	No Impacts			
Decommissioning	As for construction			

Description	*Detail*	*Unmitigated Potential Impact*	*Mitigation / Monitoring Measure*	*Residual Impact*
Power Generation Plant				
Electrical Connection				
Construction	As for Power Generation Plant			
Operation	No Impacts			
Decommissioning	As for construction			

9.10 Next Steps

9.10.1 The following next steps will be undertaken in order to complete the assessment of potential impacts on water quality from the Project Site:

- More detailed survey of water bodies in the vicinity of the Project Site;
- Further consultation with NRW on potential impacts on water quality;
- Full FRA completed; and
- Further assessment of plant drainage design.

SECTION 10

GEOLOGY, GROUND CONDITIONS AND HYDROGEOLOGY

10 GEOLOGY, GROUND CONDITIONS AND HYDROGEOLOGY

10.1 Introduction

10.1.1 This section of the PEIR details the baseline geological and hydrogeological conditions at the Project Site and outlines the preliminary potential environmental impacts of the Project on these resources. It also details the status of the Project Site in terms of contamination and the risks posed to human health (particularly future site users). Where potentially significant impacts have been identified, mitigation measures have been proposed to reduce the severity of such impacts to an acceptable level.

10.2 Legislative and Policy Context

National Policy Statements (NPS)

10.2.2 As explained in Section 2, the NPS EN-1 explains the assessment principles to which the SoS will have regard in the examination of an energy NSIP (such as the proposed Project), and explains the generic impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (EN-2). The NPSs for Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5) provide specific considerations potentially relevant to the Gas Connection and Electrical Connection Compound and Electrical Connection respectively.

10.2.3 The relevant assessment principles in terms of generic impacts ('Biodiversity and Geological Conservation' and 'Land Use including Open Space, Green Infrastructure and Green Belt' and 'Waste Management') from Part 5 of NPS EN-1 (Generic Impacts) are set out below:

NPS EN-1: Generic Impacts – Biodiversity and Geological Conservation

10.2.4 Under Applicant's Assessment (Paragraphs 5.3.3 to 5.3.4):

"Where the development is subject to an EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological and geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.....

10.2.5 The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests".

NPS EN-1: Generic Impacts – Land Use including Open Space, Green Infrastructure and Green Belt

10.2.6 Under Applicant's Assessment (Paragraphs 5.10.8 to 5.10.9):

10.2.7 Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as Grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in area of poorer quality (Grades 3b, 4 and 5) except where this would be inconsistent with other sustainability considerations. Applicants should also identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures propose. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination.

10.2.8 Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place.

NPS EN – 2 Fossil Fuel Electricity Generating Infrastructure

10.2.9 Paragraph 1.7.2 of NPS EN-2 states that "effects on geology and soils are likely to be localised and limited".

NPS EN-4: Gas Supply Infrastructure and Gas and Oil Pipelines

10.2.10 Section 2.23 of EN-4 discusses the potential impacts on soil and geology and recognises the importance of understanding the underlying soil conditions and geology. This section states that applicants should assess the stability of ground conditions via a desktop study and if necessary new borehole data. It also states that the assessment should cover options considered for installing pipelines and weigh up impacts of means of installation.

NPS EN-5 Electricity Supply Infrastructure

10.2.11 NPS EN-5 includes limited information regarding impacts on geology, although Paragraph 2.8.9 recognises that an underground line is likely to have more potential impacts on geology and soils than an overhead line.

Environmental Protection Act 1990

10.2.12 Part 2A of the Environmental Protection act (EPA) 1990 deals with contaminated land. The contaminated land regime within Part 2A was first introduced in Wales on the 15th September 2001 and was inserted into the EPA 1990 by Section 57 of the Environment Act 1995.

10.2.13 The EPA 1990 defines contaminated land as "any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substance in, on or under the land, that –

a) Significant harm is being caused or there is a significant possibility of such harm being caused; or

b) Pollution of controlled waters is being or is likely to be caused."

10.2.14 The contaminated land scheme provides guidance on what is considered to be contaminated land. Furthermore it requires the local enforcing authority to require remediation of this land and to identify the appropriate person to bear the responsibility for this.

Regional and Local Planning Policy

10.2.15 The Rhondda Cynon Taf Local Development Plan 2006-2021 was adopted in March 2011. It sets out how the county borough will be developed over 15 years. The policy sets out several Welsh Strategies that were considered in the development of the plan:

10.2.16 The Rhondda Cynon Taf Local Development Plan contains policies which should be considered when making a planning application. Those policies relevant to geology, ground contamination and hydrogeology include the following.

Policy CS10 – Minerals

10.2.17 This policy states that the council will seek to protect resources without compromising environmental and social issues. Techniques it will employ to ensure this are:

- Maintaining a minimum 10 year landbank of permitted rock aggregate reserves;
- Defining safeguarding areas for mineral resources;
- Where proven resources are under threat from sterilisation by necessary development, the pre-working of the mineral will be encouraged; and

- Promoting efficient usage, minimising production of waste and promoting alternatives, amongst others.

Policy AW 8 – Protection and enhancement of the Natural Environment

10.2.18 This policy aims to preserve Rhondda Cynon Taf's distinctive natural heritage by enhancing and protecting its features.

Policy AW 10 – Environmental Protection and Public Health

10.2.19 This policy states that proposals will not be permitted where they would cause or result in a risk of unacceptable harm to health and /or local amenity because of contamination, landfill gas, land instability, water pollution and flooding etc. unless it can be demonstrated that measures can be taken to overcome any significant adverse risk to public health, the environment and/or any impact upon local amenity.

Policy AW12 – Renewable & Non-Renewable Energy

10.2.20 This policy states that proposals which promote the provision of energy will be permitted where it can be demonstrated that there is no unacceptable effect upon the interests of soil conservation, agriculture, nature conservation, wildlife, natural and cultural heritage, landscape importance, public health and residential amenity. Development proposals should be designed to minimise resource use during construction, operation and maintenance.

Policy AW14 – Safeguarding of Minerals

10.2.21 The policy states that the following mineral resources shall be safeguarded from any development which would unnecessarily sterilise them or hinder their extraction: sand and gravel, coal and limestone. Those resources protected are detailed in a resources map contained within the Local Development Plan documentation.

10.3 Realistic Worst Case Scenario for Assessment

10.3.1 In respect of geology, ground conditions and hydrogeology, the realistic worst case scenario from within the proposed Project parameters (which are described in Section 4 of the PEIR) are set out in Table 10.1 below.

Table 10.1 - Worst case parameters for the proposed Project considered within this assessment

Parameters	Details
Power Generation Plant	

Number of gas turbine units	5 (~ 59 MWe)
Number of stacks	5
Unit type	Aero derivative

10.3.2 The different options for the configuration of the Power Generation Plant have little bearing on the impact to geology, ground conditions and hydrogeology. Five separate units will have marginally more land take than a smaller number of units. However, as the Power Generation Plant Site will need to be covered in hard standing and the existing buildings demolished regardless of the number of units, the impacts arising from the Power Generation Plant on geology, ground conditions and hydrogeology are similar for each potential configuration.

10.3.3 A preliminary assessment of both options for the Gas Connection and the Electrical Connection is presented in this section. A decision on the preferred option for each will be taken following consultation.

10.4 Assessment Methodology and Significance Criteria

10.4.1 The assessment undertaken considered both an Inner Study Area and an Outer Study Area. The Inner Study Area refers to the likely Power Generation Plant Site footprint and "working width" of the Electrical and Gas Connection. The Outer Study Area refers to a boundary of up to 1 km from the centre of the Project Site in which potentially polluting activities could impact on the Project Site.

10.4.2 The assessment has been undertaken with a clear understanding of the following:

- Previous land uses;
- Underlying ground conditions;
- Existing physical baseline conditions;
- Proposals for the Project;
- Importance of receptors and their sensitivity to change;
- The magnitude of change likely to result from the Project; and
- Potential to mitigate any impacts resulting from the Project

10.4.3 The previous land uses / underlying ground conditions / existing physical baseline conditions have been assessed with reference to the following:

- An Envirocheck Report, ordered from Landmark Information Group Ltd. dated 25/06/13 which included the following:
  - Historical Maps from 1884 to 2013;
  - Geological and Mining Hazards;
  - Groundwater Vulnerability maps;
  - Records of landfills and hazardous installations in the vicinity of the Project; and
  - Sensitive land uses in the vicinity of the Project.
- Soilscape Website (Cranfield University) via http://landis.org.uk/soilscapes;
- Previous site investigations undertaken as part of the development of the Rhigos Substation;
- MAGIC (Multi Agency Geographic Information for the Countryside) Website http://maps.environment-agency.gov.uk/wiyby/wibyController#x=451924&y=424770&lg=1,&scale=8; and
- Coal Authority Report dated 13/08/13.

Standards and Guidance

10.4.4 The following Standards and guidance have been consulted to provide advice on best practice mitigation measures which will be employed during the construction / demolition phase of the Project and the correct methods of assessment of potentially contaminated sites.

10.4.5 BS 6031 (2009) provides best practice guidance on geotechnical aspects of earthworks and on working practices. The standard also includes recommendations and guidance for un-reinforced earthworks forming part of general civil engineering construction, together with provisions for temporary excavations such as trenches and pits.

10.4.6 Technical guidance relating to land contamination is presented in a series of documents known as the Contaminated Land Report (CLRs 1 to 6 and 11) published by the EA. The guidance promotes a tiered approach to the assessment of contamination and associated risks. The baseline conditions of the Project Site have been assessed with specific reference to CLR 11: Model Procedures for the Management of Land Contamination (2004).

10.4.7 British Drilling Association document 'Guidance for Safe Intrusive Activities on Contaminated or Potentially Contaminated Land' (BDA, 2008).

Significance Criteria

10.4.8 To determine the significance of impact, Tables 10.2 and 10.3 are first used to (respectively) define the importance (sensitivity) of the receptor and the magnitude of change. Table 10.4 is then used to determine the significance of the impact, taking into account the importance of the receptor and the magnitude of change.

10.4.9 In addition, a 'Conceptual Site Model' approach has been used to assess the potential risks posed by contaminants to human health using a 'Source → Pathway → Receptor' model based on the following:

- Source (which describes the potential source of contamination);
- Pathway (which describes the means by which contamination can reach and impact upon a receptor); and
- Receptor (which describes the receptors who may be adversely affected by the presence of contamination).

TABLE 10.2: DEFINING THE IMPORTANCE OF THE RECEPTOR

Receptor Importance	*Type of Receptor*					
	Geology / Soils	***End Users***	***Construction Workers***	***Surrounding Land Uses***	***Controlled Waters***	***Ecological Systems***
High	Designated SSSI or SPZ for geology or soils / Grade 1 Agricultural Land / Land supports nationally rare plant species	Residential / allotments / play areas	Extensive earthworks and demolition of buildings	Greenfield site / residential area	Principal aquifer or surface main water in close proximity to 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	Landscaping or public open space	Limited earthworks	Open space / commercial area	Minor aquifer	Locally designated ecological sites
Low	Brownfield or industrial site / Site of little or no agricultural value	'Hard' end use (e.g. industrial, car parking)	Minimal ground disturbance	Industrial area	No surface water bodies or aquifers close to the site	No sites of ecological importance close by
Negligible	Brownfield or industrial site / Site of little or no	'Hard' end use (e.g. industrial, car	No ground disturbance	Industrial area	No surface water bodies or aquifers	No sites of ecological importance

	agricultural value	parking)			close to the site	close by

TABLE 10.3: 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 would 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 would be detectable, either positive or negative.

TABLE 10.4: Significance Criteria

		Magnitude of Change			
		Major	**Moderate**	**Minor**	**Negligible**
Importance of Receptor	**High**	Major	Major	Moderate	Minor
	Medium	Major	Moderate	Minor	Minor
	Low	Moderate	Minor	Minor	Minor
	Negligible	Minor	Minor	Negligible	Negligible

10.4.10 Effects of moderate significance or above are considered to be significant for the purposes of the EIA Regulations.

10.5 Consultation

10.5.1 A summary of the consultation responses received to date in relation to geology, ground conditions and hydrogeology, and how these responses have been considered is provided in Table 10 in Appendix A of this PEIR.

10.6 Baseline Conditions and Receptors

Site History

10.6.2 A series of historical maps have been analysed, dating between 1884 and 2013, to assess the historical development of the Project Site.

10.6.3 The earliest map from 1884-1885 shows the entire proposed redline boundary of the Project as undeveloped open fields, surrounded by waterlogged, marshy ground. A railway line runs approximately 100m north of the Power Generation Plant Site boundary / Electrical Connection route corridor 1. A road runs to the south of the Power Generation Plant and through the northerly area of Gas Connection route corridors 1 and 2. It is not named on the map, but is in the current location of Main Avenue. The area in the north western part of the Power Generation Plant Site, close to the Electrical Connection route corridor options is labelled as the 'Site of a Battle'. Approximately 150m west of Gas Connection route corridor option 1 is an air shaft (presumably linked to a deep coal mine). Two expanses of water, Hirwaun Pond and New Pond are shown approximately 100m east of Gas Connection route corridor option 2 and an engine house is named adjacent to Gas Connection route corridor option 2.

10.6.4 The next maps from 1900-1905 show the route of an 'old tramway' which runs east to west across the northern part of the Gas Connection route corridor options, just to the south of the Power Generation Plant

Site boundary. It is shown on previous maps, but not named. A tramway is also shown running north to south through the eastern most part of Gas Connection route corridor option 2. The engine house shown on previous maps is now re-named as a disused brick works. Several springs are also shown in the vicinity of the Project Site . A series of small buildings are shown approximately 500m north east of the Power Generation Plant Site boundary and are named as Ty-Newydd.

10.6.5 Maps from 1921 show the development of Penderyn Reservoir approximately 250m north of the Power Generation Plant Site boundary and a cemetery approximately 300m north west of Gas Connection route corridor 2.

10.6.6 Maps from 1951-1953 show an extensive amount of development in the vicinity of the Project compared with previous maps. Within the southern part of the Power Generation Plant Site boundary are several industrial buildings, although they are not named. It is highly likely that these buildings relate to the former use of the Power Generation Plant Site as a Royal Naval Armaments Storage depot (as outlined in Section 4 of the PEIR). Typically, sensitive military sites such as these are not named on OS maps for security reasons. The previously unnamed road running through the northern part of the Gas Connection route corridors is now named as the A465. Within the north eastern part of the Gas Connection route corridor option 2 are several large industrial buildings, however, these are not named. There are also a number of small buildings present to the west of the Power Generation Plant Site boundary which are not named either.

10.6.7 By 1964, the industrial buildings are now named as Hirwaun Industrial Estate and are labelled as ‘works’. By 1981 the majority of the buildings are labelled as factories.

10.6.8 Maps from 2006 and 2013 show the Project Site as it currently exists.

Landscape and Topography

10.6.9 The Power Generation Plant Site is predominantly flat and is currently occupied by a large industrial warehouse building surrounded by hardstanding and scrub grassland. The proposed route corridors of both Gas Connection options are also predominantly flat. Route corridor 1 is sited predominantly on agricultural land, although it is likely that a total of three minor field drains would need to be crossed. Route Corridor 2 mainly runs alongside roads (Main Avenue and Rhigos Road) and requires one field drain crossing at the southern end of the route.

10.6.10 Electrical Connection route corridor 1 would be an overhead line, which would pass above an area of waterlogged / marshy grassland to the north west of the Power Generation Plant Site. Route corridor option 2 would run alongside roads and between buildings on the Hirwaun Industrial Estate.

10.6.11 As shown on Ordnance Survey Maps of the area, the boundary of the Project Site lies between approximately 200 - 230 m Above Ordnance Datum (AOD) and land rises slightly from north to south across the redline boundary.

Geology and Soils

10.6.12 At this stage, a desk based assessment using BGS 1:50,000 scale maps of the area has been undertaken to assess the nature and extent of the geological deposits underlying the Power Generation Plant Site and Gas and Electrical Connection route corridor options.

10.6.13 Previous Site investigations undertaken at the Rhigos Substation – adjacent to the Power generation Plant and Electrical Connection route corridor options have also been studied.

Bedrock Geology

10.6.14 The Power Generation Plant Site, Gas Connection route corridors and Electrical Connection route corridor options are all underlain by the 'South Wales Lower Coal Measures' formation. This formation is described as Grey, (productive) coal-bearing mudstones/siltstones, with seatearths and minor sandstones.

10.6.15 In addition to the above it is noted that the bedrock underlying the Project Site is scattered with geological faults. A fault is a discontinuity along which rock units are displaced. The majority of these faults are orientated in an approximately north west to south easterly direction.

10.6.16 However, it is noted that geological faults are found all over the UK, and the presence of geological faults within these bedrock formations at this location is not unusual. Due to the depth of these faults they are unlikely to cause subsidence within the superficial deposits.

10.6.17 The bedrock aquifer is classified by the Environment Agency as a Secondary Aquifer A. This means the bedrock has 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.

10.6.18 The groundwater vulnerability across the majority of the Project Site is classified as low, this is due to the fact that the overlying soils have a low leaching potential in which pollutants are unlikely to penetrate the soil layer because water movement is largely horizontal or they have a large ability to attenuate diffuse pollutants. Lateral flow from these soils contribute to groundwater recharge elsewhere in the catchment. However in the south west corner of the Project Site it is classified as unknown therefore a worst case scenario of high is assumed until proven otherwise.

10.6.19 The soils at the Project Site are described below in more detail.

Superficial Geology

10.6.20 Superficial deposits are the most recent, unconsolidated geological deposits of the Quaternary age. The superficial deposits covering a small area in the centre of the Power Generation Plant Site and the majority of the Gas Connection route corridor options is Devensian Till – a diamicton which includes a mixture of clay, sands and gravels.

10.6.21 The majority of the Power Generation Plant Site and Electrical Connection route corridor options are covered by Peat deposits (waterlogged organic material).

10.6.22 Additionally, an area immediately south west of the Power Generation Plant Site is classed as made ground, as is an area immediately east of Gas Connection route corridor option 2. It is likely that these areas of made ground result from previous landfilling activities, which are discussed in more detail below.

10.6.23 The superficial aquifer designation across the Project Site is classed as 'unproductive strata'.

Soils

10.6.24 The Soilscape website identifies that the soil across the majority of the Project Site is a slowly permeable wet and very acid upland soil with a peaty surface. It has impeded drainage and low fertility.

10.6.25 The south west corner of the Project Site is dominated by a soil comprising of restored soils mostly from quarry and opencast spoil. This soil has variable drainage and low to moderate fertility. The presence of this soil has lead to the adoption of the worst case scenario of high groundwater vulnerability being attributed to this area of the Project Site as the leaching potential of this soil is relatively unknown.

Summary

10.6.26 The importance of the geology and soils within the Power Generation Plant Site have been assessed as being of low / negligible importance given that the land is brownfield / hardstanding. Along Gas Connection Route corridor option 1 and Route corridor option 2, the soils / geology have been assessed as Medium for both, given that although some of the route may pass through greenfield land, it is not the best quality, most fertile agricultural land based on soils descriptions.

10.6.27 For Electrical Connection route corridor option 1, geology and soils are not considered, as this will be an overhead line and there will be no direct impacts outside of the Power Generation Plant Site boundary,

10.6.28 The geology and soils of Electrical Connection route corridor option 2 have been assessed as being of low / negligible importance given that the land is brownfield / hardstanding.

Mining and Ground Stability

10.6.29 A Coal Authority Report for the proposed Project Site was acquired.

10.6.30 No BGS mineral sites were recorded within the Project Site. Within the outer study area four mineral sites were recorded within 400 m of the Project Site. All of the sites have now ceased operation. The commodities at these sites include opencast sandstone, underground coal and two sites of underground iron ore.

10.6.31 Two radon affected areas are highlighted within the Project Site. The first area is directly to the east of the Power Generation Plant. This area is classified as a radon affected area where between 1 and 3% of homes are above the action level[25]. The second area is directly to the south of the Power Generation Plant and is classified as a lower probability radon area where less than 1% of homes are above the action level.

10.6.32 The Envirocheck report contains some details of historical extractive activities. A summary of these activities is as follows:

[25] Public Health England recommends that radon levels should be reduced in homes where the average is more than 200 becquerels per metre cubed (200 Bq m^{-3}). This recommendation has been endorsed by the Government.

This Action Level refers to the annual average concentration in a home, so radon measurements are carried out with two detectors (in a bedroom and living room) over three months, to average out short-term fluctuations.

http://www.ukradon.org/article.php?key=actionlevel

- Extractive industries activities from 1950-1960 are marked in the south of the Project Site.
- Extractive industries activities 1855-1909 are marked in the south western corner of the Project boundary.
- Extractive industries activities from 1906-1937 and 1855-1909 in the eastern tip of the Project boundary.

10.6.33 These extractive activities include, but are not limited to: unspecified pit, unspecified deposit material, Tir-herbert Brick Works, Well etc.

10.6.34 Along the western edge of the Project Site, general quarrying is marked on the map. This land is also marked as potentially infilled (made ground).

10.6.35 As indicated in the consultation response Table, (Table 10 in Appendix A), the response provided by the Coal Authority to the Scoping Report stated that the Project was to be located within the development high risk area. More details of coal mining in the area, taken from a Coal Authority Report are given below.

Underground Coal Mining

10.6.36 The Coal Authority report identifies three disused mineshafts within the southern tip of the Project Site. Nevertheless it states that according to their records the property is not within a zone of likely physical influence on the surface from past underground workings. It is within an area where the Coal Authority believes there is coal at or close to the surface. The area is in the likely zone of influence from workings in 1 seam of fireclay at shallow depth last worked in 1856. Fireclay was traditionally used for making bricks. At present the area is not within the likely zone of influence of any underground coal workings. The Coal Authority states that the area is not one for which the Authority is determining whether to grant a licence or where a licence has been granted to remove coal using underground methods. Nevertheless, reserves of coal exist in the local area which could be worked sometime in the future.

Opencast Coal Mining

10.6.37 The Coal Authority report states that in the past the area was within the boundary of an opencast site from which coal has been removed. Currently, the Project Site lies within 200m of the boundary of the Tower Colliery Reclamation Site from which coal is being removed by opencast methods.

Ground Stability / Subsidence

10.6.38 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. Furthermore the Coal Authority has not received a damage notice or claim for the area or any property within 50 m of the Project Site since 31st October 1994.

10.6.39 The Coal Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

10.6.40 The area has been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out Procedure. The nature or location of these remedial works are not known.

10.6.41 A large proportion of the Project Site, including the Power Generation Plant Site has a high potential for compressible ground stability hazards.

Landfill History / Contamination

10.6.42 Historical landfill sites, licensed waste management facilities, local authority recorded landfill sites, registered waste transfer sites, registered treatment or disposal sites, control of major accident hazards sites, notifications of installations handling hazardous substances and planning hazardous substance consents etc. are noted within the Envirocheck report.

10.6.43 Those which appear within the Project Site are detailed below in Table 10.5.

10.6.44 In addition to these potential sources of contamination, it is also recognised that former site uses (e.g. Royal Naval armaments storage depot and industrial units) also have the potential to have caused historic contamination at the Project Site. All potential sources of contamination have been considered together in the CSM in Table 10.6.

Table 10.5: Potential sources of contamination within the Study Area (sourced from Envirocheck Report)

Number	Category	Details
1	Local Authority Pollution Prevention and Controls	Name: Eftec Ltd Description: Part B – General Coating Process (No specific reference)

		Dated: 7th February 2005
2	Local Authority Pollution Prevention and Control	Name: Eftec Ltd Description: PG6/10 Coating manufacturing Dated: 11th May 1994
3	Local Authority Pollution Prevention and Control	Name: Hitachi Home Electronics UK Ltd Description: PG6/23 Coating of metal and plastic Dated: not supplied
4	Prosecutions relating to authorised processes	Location: Unit 10 Hirwaun Industrial Estate, Merthyr Tydfil, CF44 Prosecution: Storing and treating waste without a WML Hearing date: 19 October 2005 Verdict: Guilty
5	Registered waste treatment or disposal sites	Licence holder: E.M.S. Togo Ltd Location: Factory 1 Treherbert Road, Rhigos, Aberdare. Site category: Recycling/reclamation Authorised waste: polyurethane & associated packaging, PVC & associated packaging
6	Historic landfill site	Licence Holder: Not supplied Location: Hirwaun Industrial Estate Last input date: Not supplied Specified waste: Deposited waste included liquid sludge

Conceptual Site Model

10.6.45 Table 10.6 below, is a tabular representation of a conceptual site model (CSM). The CSM is a representation of the potential pollutant linkages for the construction / demolition, operation and decommissioning of this Project.

10.6.46 The table details that the potential sources of onsite contamination include: historic mining / extractive industries activities, onsite contaminants of unknown composition and contaminants from existing surrounding installations. Potential receptors include soils, construction workers, and the underlying Secondary Aquifer A with potential pathways to these receptors including leaching to surface water, dermal contact and inhalation of airborne contaminants due to disturbance of the soil.

Table 10.6: Conceptual Site Model

Source	Potential Contaminants	Potential Pathways	Potential Receptors
Mining / Extractive Industries Activities (historic)	Accidental fuel spillages / mobilisation of unknown contaminants in the geology / soils	Leaching in surface water Dermal contact with contaminated soils Inhalation of airborne contaminated soil Piling providing a preferential pathway to groundwater	Soils Construction workers Secondary Aquifer A
Construction / Demolition / decommissioning could lead to the mobilisation of unknown contaminants in the soil onsite	Unknown at this stage		
Installations listed within Table 10.5 Rocks	Polyurethane, PVC etc. See Table10.5. Radon		

10.6.47 The table above is useful to show the potential pollutant linkages however it does not predict the likelihood of their occurrence. It is anticipated that there is a very minimal risk that any of the pathways listed in the table above will be created. The Project is anticipated to incorporate Best Available Techniques (BAT) with regards to contaminant containment therefore they are unlikely to be leached into the soils. Existing unknown contaminants are unlikely to reach the Secondary aquifer A via a preferential pathway provided by piled foundations as overlying the bedrock is unproductive strata of over 10m in depth.

10.7 Preliminary Assessment of Potential Impacts

Construction and Demolition

Power Generation Plant

10.7.2 During construction / demolition works the main potential impacts on geology, ground conditions and hydrogeology will be due to:

- Disturbance of existing contamination and the creation of pathways to receptors;
- Ground instability from previous mining activities;
- Creation of pollution incidents (e.g. through improperly maintained equipment); and
- Disturbance to or loss of important deposits of geology and soils.

10.7.3 The Power Generation Plant Site is an existing industrial site covered in buildings and hardstanding. The construction of the Power Generation Plant is likely to require site remediation in the form of removal of existing potentially contaminative materials during demolition (e.g. asbestos in existing buildings) upgrading of drainage systems and removal / covering of any ground contamination. Construction of the Power Generation Plant would not require the removal of any land currently used for agriculture. Therefore, based on the preliminary assessment undertaken to date (following the assessment criteria outlined in Tables 10.2-10.4), there is considered to be a moderate beneficial impact on a receptor of low sensitivity, giving an overall minor beneficial significance of effect.

10.7.4 The depth of the overlying unproductive strata at the site means that based on the preliminary assessment undertaken to date, it is very unlikely that foundations would be required to be sited within the secondary aquifer A. Impacts at this stage are therefore considered negligible, although further work will be undertaken as part of the final ES.

10.7.5 Similarly, the distance from the source protection zone of any construction / demolition activities (e.g. over 1.5 km away) means that any impacts at this stage are considered to be negligible although further work will be undertaken as part of the final ES.

Electrical connection (Options 1 and 2)

10.7.6 The construction of Electrical Connection route corridor 1 is not considered to have any impact on geology, soils or hydrogeology asthe connection will be an overhead line. . Although some above ground

infrastructure would be required, this would be sited within the Power Generation Plant Site boundary and no construction would take place outside of this, other than at the Rhigos substation.

10.7.7 Electrical Connection route corridor option 2 would involve the excavation of a narrow trench (of the order of 3m wide) alongside roads and in hard standing on the Hirwaun Industrial Estate. This excavation will have a minor adverse impact on a receptor of negligible sensitivity. Thereby giving rise to an overall negligible significance of effect.

Gas Connection (Options 1 and 2)

10.7.8 The construction of Gas Connection route corridor option 1 will result in the temporary sterilisation of agricultural land. However, this will be a relatively narrow corridor (maximum of 30m working width) and any impacts would be temporary. There is therefore considered to be a minor impact on a receptor of medium sensitivity, thereby giving rise to an overall minor significance of effect.

10.7.9 The construction of Gas Connection route corridor option 2 would be alongside roads and would therefore not result in the sterilisation of any agricultural land. Therefore any impacts would be negligible.

Operation

10.7.10 There will be no further disturbance to the underlying soils or geology during operation of any elements of the Project, therefore no impacts are predicted during operation.

10.7.11 Additionally, any necessary land remediation will be undertaken as part of the construction phase. Hazardous materials (e.g. asbestos) will be removed and the Power Generation Plant Site covered in hardstanding. Therefore there are not anticipated to be any remaining pollutant linkages remaining during operation.

10.7.12 The biggest potential impacts during operation are the risk of ground stability issues (e.g. subsidence from previous mining activities and chemical attack of foundations). However, in order to mitigate these impacts, a full intrusive ground investigation will be undertaken prior to construction which will, inform foundation design.

Decommissioning

Power Generation Plant

10.7.13 The impacts during decommissioning will be temporary and similar to those described above for construction.

10.7.14 The concrete foundations will likely be left in the ground after decommissioning of the Power Generation Plant. It is common for concrete foundations to remain in-situ for many years following decommissioning of sites since it creates less disturbance and they may be capable of reuse. The environmental impact of this is predicted to be negligible as the foundations will be constructed of an appropriate grade of concrete to resist degradation from the soils and groundwater. The remaining ground will be reinstated to a condition deemed suitable to RCTCBC and HPL at the time and in line with any planning requirements imposed as part of the DCO. Therefore no significant impacts are anticipated.

Gas and Electrical Connection

10.7.15 Upon cessation of operation, the Gas and Electrical Connection will be disconnected from the NTS / Rhigos substation. It is currently proposed that the Gas Pipeline / Electrical Connection option 2 would be left buried underground. They will be constructed of material to withstand degradation from the soil environment. Therefore, their decommissioning is considered to have a negligible impact the on geology and soils. Electrical Connection option 1 would be taken down, and there would be no direct impact on geology and soils.

10.7.16 Upon cessation of operation, the AGI will likely be decommissioned and removed.

10.7.17 Impacts on geology and soils are considered to be as for construction.

10.8 Potential Mitigation and Monitoring Measures

Construction / Demolition

10.8.2 The construction of the Project and demolition of existing buildings has the potential to create impacts relating to human health and groundwater quality. However, providing that the confirmed mitigation measures are adhered to, as well as more specific measures, as set out below, no significant impacts are anticipated.

10.8.3 When assessing the potential impacts relating to the construction of the Project, it has been assumed that several confirmed mitigation measures will be applied. These include: working in accordance with best practises, maintaining safe working practises and the use of correct and appropriate personal protective equipment (PPE).

10.8.4 The confirmed mitigation measures will adhere to the following documents:

- Protection of Workers and the General Public during the Development of Contaminated Land (HSE, 1991); and
- A Guide to Safe Working on Contaminated Sites, R132 (CIRIA, 1996).

10.8.5 During construction / demolition mitigation measures would be covered by the Construction Environmental Management Plan (CEMP) which will apply to each of the key elements of the Project. The CEMP will incorporate appropriate mitigation measures that will be approved by the relevant authorities and adopted, such that it would be unlikely that any impacts would arise during construction. The CEMP will be secured by a requirement attached to the DCO.

10.8.6 Specific mitigation measures could include, for example, remediation of the Power Generation Plant Site, removal of contamination hotspots or further site characterisation and will be determined during further EIA works.

Operation

10.8.7 There will be no impacts on geology, ground contamination or hydrogeology during operation therefore no mitigation measures are deemed necessary.

10.8.8 There is the potential that the soil could impact upon the operation of the pipeline through chemical attack. To mitigate against this impact a detailed soils assessment will be carried out as part of the pipeline design process to ensure the grade of pipe selected is appropriate to resist attack.

10.8.9 To prevent any impacts resulting from subsidence (e.g. due to underground coal mining), the design of the Gas Pipeline will embrace additional Performance Limits further to those included in the Pipeline Design Standard IGE/TD/1 for calculation of the allowable Pipeline Stress.

Decommissioning

10.8.10 Mitigation measures implemented during decommissioning will be similar to those implemented during construction.

10.9 Preliminary Assessment of Residual Effects

10.9.1 On the basis of the preliminary environmental information and assessment described above, taking into account potential mitigation measures, potential residual impacts are detailed in Table 10.7 below.

Table 10.7: preliminary summary of residual impacts

Description	*Detail*	*Unmitigated Potential Impact*	*Mitigation / Monitoring Measure*	*Residual Impact*
Power Generation Plant				
Construction / Demolition	Impacts on soils and Geology (disturbance or loss of)	Negligible	N / A	N / A
	Impacts on Human Health (due to disturbance of existing contamination)	Negligible	Consideration of possibility of encountering unexpected hotspots of contamination will continually be addressed through the design. Detailed Risk Assessment of ground conditions by Construction Contractor to comply with requirements of Construction Design and Management Regulations 2007.	Negligible.
Operation	Impacts on Geology and Soils	Negligible as no further disturbance	N/A	N/A
	Impacts on Operation	Negligible	Full ground	Negligible

	due to Mining and Ground Stability		investigation undertaken to inform foundation siting and design	
Decommissioning	Impacts due to Decommissioning	As for Construction	As for Construction	As for Construction
Gas Connection (Options 1 and 2)				
Construction	Impacts on soil / geology (due to disturbance or loss)	Minor	Try to time construction works outside of crop growing season.	Negligible
Operation	Impacts on Operation due to Mining and Ground Stability	Negligible	The use of additional Performance Limits further to those included in the Pipeline Design Standard IGE/TD/1 for the calculation of allowable Pipeline Stress.	Negligible
Decommissioning	As for construction	As for construction	As for construction	As for construction
Electrical Connection (Option 1)				
Construction	n/a	n/a	n/a	n/a
Operation	n/a	n/a	n/a	n/a
Decommissioning	As for construction	As for construction	As for construction	As for construction
Electrical Connection (Option 2)				

Construction	Impacts on soil / geology (due to disturbance or loss)	Negligible	n/a (minimal / temporary disturbance of land not of good agricultural quality)	n/a
Operation	n/a	n/a	n/a	n/a
Decommissioning	As for construction	As for construction	As for construction	As for construction

10.10 Next Steps

10.10.1 The following next steps will be undertaken in order to complete the assessment of potential impacts on ground conditions from the Project:

- Further, more in depth assessment of potential contamination at the Project Site from previous land uses;
- Further consultation with NRW and RCTCBC to determine the nature, scope and timing of any intrusive ground investigation works considered necessary;
- Further risk assessment of ground instability issues;

SECTION 11

LANDSCAPE AND VISUAL IMPACTS

11 LANDSCAPE AND VISUAL IMPACTS

11.1 Introduction

11.1.1 This Section of the PEIR presents the baseline and methodology for the preliminary assessment of potential landscape and visual impacts arising from the development of the proposed Project.

11.1.2 The location of the Project Site and the study area for the landscape and visual impact assessment (LVIA) is shown on Figure 11.1. Areas within the study area (a 15km radius from the Project Site) with minimum predicted visibility, i.e. where there is no likelihood of significant effects, including effects on landscape character types, designations, viewpoints, settlements or routes have been 'scoped out' of the assessment.

11.1.3 Some aspects of the proposed Project are likely to have the potential to produce both direct and indirect impacts on the landscape resource (i.e. landscape elements and character) and on visual receptors during construction, operation and decommissioning. This Section will record the current baseline data, identify and describe the potential effects, assess their significance and consider measures to reduce or offset any significant negative effects.

11.1.4 Landscape character and resources are considered to be of importance in their own right and are valued for their intrinsic qualities irrespective of whether they are seen by people. Effects on the landscape include physical changes to the landscape as well as changes to landscape character. It may also include effects on areas designated for their scenic or landscape qualities at a national, regional or local policy level. Effects on visual amenity relate to changes in views and the appearance and prominence of a development in those views. Visual amenity effects are perceived by people and are therefore clearly distinguished from, although closely linked to, effects on landscape character. The assessments are considered separate, although linked, processes.

11.1.5 Effects on the landscape can include physical changes to the landscape as well as changes to landscape character. They may also include effects on areas designated for their scenic or landscape qualities at a national, regional or local policy level. Effects on visual amenity relate to changes to views, and the appearance and prominence of the Project in those views.

11.1.6 This preliminary assessment has been prepared on the basis of an exploratory site visit covering the immediate surroundings and extending to approximately 10km from the Project Site. Further site

surveys for the full landscape and visual impact assessment (LVIA) are being undertaken and will cover the study area as defined below.

11.1.7 This Section of the PEIR presents the status of the landscape and visual impact assessment for the Project and includes:

- Relevant landscape planning policy and guidance;
- The assessment methodology proposed for the LVIA including the identification of specific sensitive receptors;
- Significance criteria;
- The existing baseline conditions against which the assessment will be made;
- An outline of potential impacts from the Project;
- Possible mitigation of potential significant landscape and visual impacts; and
- The identification of further data-gathering and consultations required to complete this aspect of the ES.

11.1.8 A preliminary cumulative assessment is presented in Section 16 of this PEIR. A more detailed cumulative assessment will be undertaken following further site surveys and will be presented in the ES.

11.2 Legislative and Policy Context

European Landscape Convention

11.2.1 The European Landscape Convention (ELC) came into force in 2007 and is the first international convention to focus specifically on landscape issues in order to protect, manage and plan landscapes in Europe. The ELC defines landscape as:

"An area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors."

11.2.2 The ELC applies to natural, rural, urban and peri-urban areas including land, inland water and marine areas. Its purpose is to promote landscape protection, management and planning in relation to all landscapes regardless of whether their quality and condition is considered outstanding, ordinary or degraded.

Countryside and Rights of Way Act 2000

11.2.3 The Countryside and Rights of Way Act 2000 provides a statutory framework for protected landscapes and introduced an additional right of access requiring the identification of Open Access Land.

National Policy Statements

11.2.4 As explained in Section 2, the NPS EN-1 explains the assessment principles to which the SoS will have regard in the examination of an energy NSIP (such as the proposed Project), and explains the generic landscape and visual impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (EN-2). The NPSs for Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5) provide specific considerations potentially relevant to the Gas Connection and Electrical Connection Compound and Electrical Connection respectively.

11.2.5 National policy seeks to protect and enhance environmental quality specifically for new energy infrastructure through NPS EN-1. It recognises that nationally significant infrastructure projects will have effects on the landscape and that the scale of such projects means they will be visible within many miles of the site of the proposed infrastructure.

11.2.6 Section 5.9 of NPS EN-1 requires, "The applicant's assessment should include the effects during construction of the project and the effects of the completed development and its operation on landscape components and character. The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include light pollution effects, including on local amenity, and nature conservation".

11.2.7 With regard to landscape impacts, NPS EN-1 states, "Landscape effects depend on the existing character of the local landscape, its current quality, how highly it is valued and its capacity to accommodate change. All of these factors need to be considered in judging the impact of a project on landscape. Virtually all nationally significant infrastructure projects will have effects on landscape. Projects need to be designed carefully, taking account of the potential impact on the landscape. Having regard to siting, operational and other relevant constraints the aim should be to minimise harm to the landscape, providing reasonable mitigation where possible and appropriate."

11.2.8 With reference to visual impact NPS EN-1 states, "All proposed energy infrastructure is likely to have visual effects for many receptors around proposed sites. The [Secretary of State] will have to judge whether the visual effects on sensitive receptors ….. outweigh the benefits of the project. The [Secretary of State] should ensure applicants have taken into account the landscape and visual impacts of visible plumes from chimney stacks and / or cooling assembly".

11.2.9 The following guidance is given in relation to mitigation, "Within a defined site, adverse landscape and visual effects may be minimised through appropriate siting of infrastructure within that site, design including colours and materials, and landscaping schemes, depending on the size and type of proposed project. Materials and designs of buildings should always be given careful consideration."

11.2.10 At Section 4.5 of NPS EN1 and paragraph 2.3.16 of NPS EN2 the importance of good design is set out in relation to landscape and visual (as well as other) impacts.

11.2.11 Section 2.8 of NPS EN-5 provides detail on the potential landscape and visual impacts specific to electricity supply infrastructure. Paragraph 2.8.2 states that:

"In practice new above ground electricity lines, whether supported by lattice steel towers/pylons or wooden poles, can give rise to adverse landscape and visual impacts, dependent upon their scale, siting, degree of screening and the nature of the landscape and local environment through which they are routed". But that "these impacts can usually be mitigated".

11.2.12 Paragraph 2.8.4 goes on to state that the following should be followed when considering the route of an overhead line (based on the Holford Rules):

- avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the line in the first place, even if total mileage is increased in consequence;
- avoid smaller areas of high amenity value or scientific interest by deviation, provided this can be done without using too many angle towers, i.e. the bigger structures which are used when lines change direction;
- other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers;
- choose tree and hill backgrounds in preference to sky backgrounds wherever possible. When a line has to cross a ridge, secure this opaque background as long as possible, cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees;
- prefer moderately open valleys with woods where the apparent height of towers will be reduced, and views of the line will be broken by trees;

- where country is flat and sparsely planted, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concentration of lines or "wirescape"; and
- approach urban areas through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach line and the substation, carefully assess the comparative costs of undergrounding.

11.2.13 Planning Policy Wales (PPW) sets out the land use planning policies of the WG and is supplemented by topic based Technical Advice Notes (TANs). The relevant PPW & TAN policies are:

PPW: Chapter 6: Conserving the Historic Environment (2012)

11.2.14 The objective of chapter 6 is to protect the historic environment, encompassing archaeology and ancient monuments, listed buildings, conservation areas and historic parks, gardens and landscapes.

Local planning authorities should take the 'Register of Landscapes, Parks and Gardens of Special Historic Interest in Wales' into account in preparing their development plans.

Technical Advice Note (TAN) 5: Nature Conservation and Planning (2009)

11.2.15 Provides advice about how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation. Sensitive landscaping and planting, the creation, maintenance and management of landscape features important to wildlife, and the skilled adaption of derelict areas can provide extended habitats.

Technical Advice Note (TAN) 8: Renewable Energy (2005)

11.2.16 Local planning authorities should seek to maximise the potential of renewable energy by linking the development plan with other local authority strategies including the community strategy. They should also develop generic development control policies, which might include housing, employment, and rural development proposals and consider the implications for landscape protection, the re-use of previously developed land and waste management.

Technical Advice Note (TAN) 10: Tree Preservation Orders (1997)

11.2.17 Development plan policies should include, where appropriate, measures to protect trees and provide for tree planting and landscaping.

Technical Advice Note (TAN) 12: Design (2009)

11.2.18 Tan 12 sets out the objectives of good design and aims to encourage good design in all aspects of development, stating that: 'The way which development relates to its urban or rural landscape context is critical to its success'. The aim should be to achieve good design solutions, which maximise the natural landscape assets and minimise environmental impact on the landscape. It is particularly important that proposals to amend or create new landscape are not considered as an afterthought and that the long term impact of development on the landscape is fully understood.

11.2.19 Landscape design - the way in which the land will be treated (other than buildings) for the purpose of enhancing or protecting amenities of the site and the area in which it is situated;

- Scale - of development in relation to surroundings, including height, width and length of each building proposed within the development; how the massing of the proposal contributes to the existing hierarchy of development to reinforce character; how the mass and height impacts on privacy, sunlight and microclimate; and how height impacts on the attractiveness and safety of neighbouring public space;

- Layout of development - how the layout makes the development integrate with its surroundings whilst taking into consideration the orientation of the building to maximise energy efficiency and connectivity (the ways in which routes and open spaces within the development are provided, situated and orientated in relation to each other and to buildings and spaces outside the development); how the external area contributes towards the development and is used to make the development a more sustainable development; how is the chosen site the best location and how it links into adjacent uses; and

- Appearance - (exterior design, including materials) means the aspects of a building or place within the development, which determine the visual impression of the building or place makes, including external built form of the development, its architecture, materials, decoration, lighting, colour and texture.

Rhondda Cynon Taf Local Development Plan up to 2021 (2011)

11.2.20 The Rhondda Cynon Taf Local Development Plan (LDP) provides the development strategy and spatial policy framework over a fifteen-year period to 2021. The Plan is used by the Council to guide and control development, providing a basis for consistent and appropriate decision-making.

Area Wide (AW) Policies

11.2.21 Area Wide Policies, in conjunction with LDP Core Policies, LDP Strategy Specific Policies and National Planning Policies are the basis for the determination of planning applications for the development and use of land and buildings. They are intended to ensure that development accords with the visual and spatial objectives of the plan.

11.2.22 Policy AW5 – New Development: Development proposals will be supported where the scale, form and design of the development would have no unacceptable effect on the character and appearance of the site and the surrounding area.

11.2.23 Policy AW6 – Design and Placemaking: Development Proposals will be supported when there is a high standard of design, which reinforces attractive qualities and local distinctiveness and improves areas of poor design and layout. New or improved open spaces and more accessible natural green spaces will serve as valuable recreational assets to local communities and may encourage people from outside the community to visit the area.

11.2.24 Policy AW8 – Protection and Enhancement of the Natural Environment: Rhondda Cynon Taf's distinctive natural heritage will be preserved and enhanced by protecting it from inappropriate development. Where development is permitted, planning conditions and/or obligations will be used to protect or enhance the natural heritage. Where the benefits of development outweigh the conservation interest, mitigation will be required to offset adverse effects (including negative effects on adjacent land). Development proposals will only be permitted where there would be no unacceptable impact upon features of importance to landscape or nature conservation.

Core Policies

11.2.25 The Local Development Plan for Rhondda Cynon Taf is divided in two and advocates a different approach for development in the north and in the south of the borough. Hirwaun is located in the Northern Strategy Area, bordering the Brecon Beacons National Park. The emphasis in the northern area is on building sustainable communities and halting the process of depopulation and decline.

11.2.26 Hirwaun has been identified as a Key Settlement area meaning it is geographically smaller and less strategically significant than a Principal Town. Nevertheless it provides important services and acts as a centre for commercial and community activity. These key settlements will act as focal points for growth in Rhondda Cynon Taf over the plan period. (RCT-LDP, 2011)

11.2.27 Policy Northern Strategy Area 8 – Land South of Hirwaun. The Councils vision for the Strategic Site is the enhancement of Hirwaun as a key settlement in Rhondda Cynon Taf, through residential, employment and community development, and restoration and enhancement of the landscape and habitats. This is relevant to the Hirwaun Power Project in terms of providing a context to proposed development in the area and the potential cumulative effects. In order to ensure that the various site constraints can be appropriately addressed at the masterplanning stage by leaving some areas undeveloped, the areas indicated for development on the indicative concept plan are significantly larger than the land area needed for the developments which are identified in the policy.

11.2.28 Policy NE 4: Protection of Features of Natural Amenity, Landscapes and Biodiversity states, “Development will be permitted if it does not unacceptably affect features of importance to landscape or nature conservation, including; Trees, woodland, hedgerows, river corridors, ponds, wetlands, stone walls, and species rich grassland. This policy would apply to a range of natural environment features that although not formally designated, have been identified at the County Borough level for their intrinsic merits and need of protection. Such features have been identified in Council documents and strategies such as the LBAP and ‘Our Living Space’. Any conditions attached to permissions should consist of mitigation measures to minimise the harm associated with any development (including negative effects on adjacent land). Alternatively, compensation and/ or enhancement measures will be required from the development.

11.2.29 Northern Strategy Area Policies; The LDP Northern Strategy Area has an emphasis on building sustainable communities and halting the process of depopulation and decline. The natural environment has a major role to play in this Strategy. It is essential to conserve and enhance the unique and outstanding features of natural landscapes, habitats and other biodiversity that exist in the area. In turn, this will help to create communities, which have a natural environment that will be attractive for people to live, work and spend their recreational time. Furthermore, these natural features, if correctly managed, will be able to draw in people from outside the area, which can only help the economy of the area.

11.2.30 Although there has not been major development pressure in majority of the Northern Strategy Area, apart from in the northern Cynon Valley in recent years, there will be increasing pressure in the future. Moreover, it is essential that the character of the area and the biodiversity that lives within it is not compromised in any way by piecemeal developments."

11.2.31 Policy N-NE 1/ Policy NSA 25: Special Landscape Areas: the County Borough Council have designated those areas, which it considers to be the most important areas of high quality landscape within the Plan area as Special Landscape Areas (SLA). SLA is a non-statutory designation, and the purpose of this policy is threefold:

- To protect designated areas against inappropriate development where it is likely that there will be particular pressures for development or change;
- The need to conserve and enhance distinctive and valued qualities and features of the landscape to avoid unacceptable deterioration, change or development; and
- The need to raise awareness of this distinctive landscape and thereby raise standards of design to bring about positive change.

11.2.32 Policy NSA 25 identifies the location of nine SLAs where development will be expected to conform to the highest standards of design, siting, layout and materials appropriate to the character of the area. Two SLAs lie within the LVIA study area:

- Hirwaun Common, Cwm Dare & Cwm Aman; and,
- Brecon Beacons Edge at Llwydcoed

11.2.33 The policy states, "Special Landscape Areas (SLAs) have been designated to protect areas of fine landscape quality within Rhondda Cynon Taf. The designation of these landscape areas has been undertaken at local level using a regionally agreed methodology. The methodology used to identify the SLAs in Rhondda Cynon Taf builds on the Countryside Council for Wales (now Natural resources Wales) LANDMAP methodology and considers factors such as:

- Prominence; Spectacle – dramatic topography and views;
- Unspoilt areas - Pre-industrial patterns of land use;
- Remoteness and Tranquillity;

- Vulnerability and sensitivity to change;
- Locally rare landscape.

11.2.34 In the Northern Strategy Area, SLAs have been identified to protect the distinctive upland / valley landscape of the area. Particular consideration has been given to the protection of the unspoilt valley slopes and ridges which form a visual backdrop to the settlements of the area."

11.2.35 Document No. EB49, Proposals for Designation of Special Landscape Areas in Rhondda Cynon Taf (2008) provides the evidence base for SLA policies and proposals within the Local Development Plan. It provides an evaluation of the landscape qualities and features within each SLA and guidance for their protection through policies and management.

Brecon Beacons National Park

11.2.36 The Brecon Beacons National Park is a Category V protected area as defined by the World Conservation Union (IUCN) in the Guidelines of Protected Area Management Categories. IUCN Category V protected areas are living and working landscapes with characteristic qualities, features and services that have been moulded by the interplay of natural forces and human activities over the course of time.

11.2.37 NPS EN-1 states that National Parks, together with the Broads and Areas of Outstanding Natural Beauty (AONBs), have been confirmed by the Government as having the highest status of protection in relation to landscape and scenic beauty. Where decisions may directly affect such areas, paragraph 5.9.9 requires the SoS to have regard to the statutory purposes of the potentially affected area/s. The statutory duties are provided for in Section 11A(2) of the National Parks and Access to the Countryside Act 1949 (National Parks), Section 17A of the Norfolk and Suffolk Broads Act 1988 (The Broads) and Section 85 of the Countryside and Rights of Way Act 2000 (AONBs).

11.2.38 NPS EN-1 confirms that the duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries of these areas, which may have impacts within them. EN-1 confirms "That the aim should be to avoid compromising the purposes of designation and such projects should be designed sensitively given the various siting, operational, and other relevant constraints" (paragraph 5.9.12).

11.2.39 The National Park Management Plan (NPMP) 2010 – 2015 lays out 20 year strategies and 5 year actions by and for everyone delivering its purposes and duty, or concerned about the Parks future. A number of

Special Qualities have been set out in the Management Plan for the Park and a few of these are directly relevant to landscape and visual amenity:

- A National Park offering peace and tranquillity with opportunities for quiet enjoyment, inspiration relaxation and spiritual renewal.
- The Parks sweeping grandeur and outstanding natural beauty observed across a variety of harmoniously connected landscapes.
- A working, living 'patchwork' of contrasting patterns, colours and textures comprising well maintained farmed landscapes, open uplands, lakes and meandering rivers punctuated by small scale woodlands, country lanes, hedgerows and stone walls and scattered settlements.

Dark Sky Policy

11.2.40 The Brecon Beacons National Park Authority has adopted a set of external lighting recommendations to ensure that there will be no further degradation in the quality of the night sky due to future developments. The landscape within the park to the north of the Project Site is within the Critical Buffer Zone.

11.2.41 The Brecon Beacons have developed external lighting guidelines for use by their Planning Department (and by Developers). Application of these guidelines to all future development applications will ensure there is no further light pollution.

Turning Heads – A Strategy for the Heads of the Valleys (2006)

11.2.42 Turning Heads is a regeneration strategy for the area called the 'Heads of the Valleys' and includes Hirwaun at the western end. A key environmental objective for the programme is an attractive and well used natural, historic and built environment setting the context for regeneration.

11.2.43 Strategic Programme No. 2 seeks to implement a number of key landscape scale environmental enhancements, concentrating on key corridors and gateways such as the A465 Heads of Valleys Road and approaches to the former Ebbw Vale Steelworks and Hirwaun. The focus is on areas that are visually unattractive or derelict, acquiring sites if necessary to ensure the early removal of eyesores. The plan aims to protect, enhance and manage the natural and semi natural environment, its resources and its biodiversity. Along with this a comprehensive design code to encourage consistent standards of urban and landscape design is being implemented.

Cynon Valley River Park

11.2.44 The River Park runs along the Cynon Valley between Abercynon to Hirwaun and has connections / links with Mountain Ash, Aberaman, Cwmdare and Aberdare. The Park works to the following vision. '..the value of the floodplain as a natural feature to be recognised, the positive use and management of the floodplain to be encouraged and reflect its value for natural processes, for wildlife, for heritage and for people.

11.3 Realistic Worst Case Scenario for Assessment

11.3.1 In respect of landscape and visual effects, the realistic worst case scenario from within the proposed Project parameters (which are described in Section 4 of the PEIR) are set out in Table 11.1 below.

11.3.2 The reason that the parameters identified in Table 11.1 represent the realistic worst case in relation to landscape and visual effects are:

- Larger stack heights increase the likelihood of visual impact; and
- Higher number of stacks increases the likelihood of visual impact.

11.3.3 A preliminary assessment of both options for the Gas Connection and the Electrical Connection is presented in this section. A decision on the preferred option for each will be taken following consultation.

Table 11.1 - Worst case parameters for the proposed Project considered within this assessment

Parameters	Details
Power Generation Plant	
Number of gas turbine units	5 (~ 59 MWe)
Number of stacks	5
Height of Stack	35m
Unit type	Aero derivative

11.4 Assessment Methodology and Significance Criteria

The Scope of the Assessment

11.4.1 The purpose of the LVIA is to describe and evaluate separately potential landscape and visual effects that would arise from the Project. It is an iterative process. For the purpose of this assessment, impacts that are assessed on a preliminary basis as being either moderately adverse or beneficial or above will be considered significant in terms of

the Environmental Impact Assessment (England & Wales) Regulations 2011. Although slight adverse or beneficial and neutral impacts would not be considered significant, they remain worthy of consideration throughout both the design and the decision making process.

11.4.2 Landscape character and associated resources are considered to be of importance in their own right and are valued for their intrinsic qualities irrespective of whether they are seen by people. Impacts on visual amenity as perceived by people, are therefore clearly distinguished from, although closely linked to, impacts on landscape character. Landscape and visual assessments are therefore separate although linked processes.

11.4.3 The sequence of the LVIA is as follows:

Baseline Studies

Landscape context

Landscape receptors and sensitivity

Visual composition, receptors and sensitivity

↓

Landscape and Visual Impact Assessment

Potential impacts arising from the development

Mitigation

Evaluation of significance of landscape effects

Evaluation of significance of visual effects

Appraisal of compliance with planning policy

Assessment of cumulative effects

Conclusions

11.4.4 The aim of the final assessment is to establish the following:

- A clear understanding of the Project Site and its wider landscape setting, identifying its landscape character, resources, value and sensitivity to the proposed development;
- An assessment of the composition, character and aesthetic value of views from visual receptors including occupiers of residential properties and people using amenity landscapes, and the sensitivity of views;
- The nature of the different development scenarios and mitigation measures; and
- The potential direct and indirect effects of the proposal on the landscape resource (i.e. landscape elements and character) and on visual receptors.

- This preliminary assessment has also covered these points, although, being a preliminary assessment, the ES will present the assessment in more detail.

11.4.5 This preliminary assessment includes:

- A review of all relevant documents and landscape planning policy and guidance; field survey to assess baseline landscape character and views;
- A description of the key features associated with each development scenario that would alter the characteristics of the landscape and visual baseline;
- Generic and site specific mitigation; and
- Separate assessment of the predicted significance of residual effects on the landscape resource / character and visual amenity in relation to each development scenario, and compliance with landscape policy.

11.4.6 The assessment looks at potential effects arising during the construction (including demolition), operation and decommissioning stages and considers:

- Landscape character and resources, including effects on the aesthetic values of the landscape caused by changes in the elements, characteristics, character and qualities of the landscape;
- Designated landscapes, registered parks and gardens, and recreational interests;
- Visual amenity, including effects upon potential viewers and viewing groups caused by changes in the appearance of the landscape as a result of the Project; and
- Cumulative effects arising in combination with those developments with planning permission but not yet constructed and those developments submitted for planning permission but which have not yet been granted planning permission, and those developments which are committed to come forward (i.e. supported in a development plan.

Spatial Scope

11.4.7 The Project Site and Study Area are shown on Figure 11.1. The Study Area for visual effects has been determined by a Zone of Theoretical Visibility (ZTV) within a 15km radius of the centre of the Project Site, to identify approximately where the Project could have an adverse effect on visual amenity.

11.4.8 The Study Area is broken down and landscape impacts addressed as follows:

- 0 to 3km radius area (inner study area) selected for assessment of impacts on landscape character at a local level, designated landscapes, landscape features and visual amenity.
- 0 to 15km study area (outer study area) selected for broader assessment of impacts on landscape character with reference to National Character Areas and the Brecon Beacons National Park. Relevant long distance effects on visual amenity will also be addressed.

Temporal Scope

11.4.9 Although no detailed site studies have been undertaken to date for assessment of landscape and visual impacts, an initial site visit has been made to the Study Area. Further, detailed studies are being undertaken to establish the landscape and visual baseline. Landscape and visual impacts will be assessed for the construction / demolition phase, at operation, and at decommissioning. Visual impacts will be assessed for the winter situation when the screening effect of vegetation will be least effective.

Standards & Guidelines

11.4.10 The methodology for the assessment is based on current best practice and 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;
- *Landscape Character Assessment Guidance for England and Scotland*, 2002, published by Scottish Natural Heritage and the Countryside Agency;
- *LANDMAP Information Guidance Master Document, 2003,* Countryside Council for Wales; and
- *Advice Note 01/11: Photography and Photomontage in Landscape and Visual Impact Assessment,* Landscape Institute (2011)

Illustrative Tools

11.4.11 The following graphic information will be produced to illustrate visual aspects of the Project

Visibility Maps (ZTV)

11.4.12 Separate computer generated Zone of Theoretical Visibility (ZTV) maps will be produced for the main structures and the stacks to assist in viewpoint selection and to appreciate the potential influence of the development in the wider landscape.

11.4.13 The ZTVs will indicate areas from which it might be possible to secure views to part or parts of the Project. However, 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 proposal, but which comprise land where 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.

11.4.14 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 structures from a particular viewpoint.

11.4.15 The use of this type of ZTV map is considered good practice and should be considered as a tool to assist in assessing the visibility of the Project. A ZTV map does not present an absolute measure of visibility and do not represent the “visual impact” of the Project.

11.4.16 The ZTVs will be compiled using Ordnance Survey Landform Profile data comprising spot heights and contours (within a 10m resolution) to produce a Digital Terrain Model (DTM). The DTM will be overlaid on a 1:50,000 Ordnance Survey base maps to provide details of locations and landmark features, which may affect the extent of visibility or provide screening in the landscape.

11.4.17 The ZTVs will be calculated using landform data, the proposed layout of the development, height options (buildings or stack), the centre of the ZTV, the radius from the Project Site centre, the resolution of the final output, the view height of the receptor, and the resolution of the landform data. For greater accuracy a calculation was built into the model to make corrections for the curvature of the earth.

Photographs and Panoramas

11.4.18 Photograph and photomontage images will be produced to illustrate an observer's view of the existing site and Project from each of the viewpoint locations agreed with RCTCBC and BBNPA.

11.4.19 All photographs will be taken with a digital equivalent of a 35mm SLR camera, with 50mm 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 proposals within the local landscape that would be experienced at each viewpoint. The photographs will be merged to create a panorama and the resulting digital photographic data will also be used to produce the photomontages.

Wireframes

11.4.20 The proposal will be shown from the selected viewpoints in wireframe format. Ordnance Survey Landform Profile data with a 50m resolution will be used to construct the landform seen in the wireframe view. Proposed structures, other nearby built development / structures and viewpoint location coordinates will be added to the DTM. Since the LVIA will assess the maximum case scenario, the wireframes will be constructed to show stacks up to a height of 35m. The wireframe views will be taken from a set viewer height of 2m above the terrain model (the terrain model has an accuracy of 3m at grid points).

Photomontages

11.4.21 Once the pre-prepared images had been imported and the wireframe views overlaid onto the photographs, photomontages of the proposed structures will be rendered (white) and blended using Adobe Photoshop software to produce a realistic view. Other large scale development, such as the existing wind turbines, 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 that are presented in this PEIR chapter.

Nature of Receptor

Gathering Baseline Data

11.4.22 Baseline data, alongside the description of the Project, forms the basis for the identification and description of the changes that will result in the landscape and visual amenity of the area. The landscape resource needs to be understood in terms of its constituent elements, its character and the way this varies spatially, geographic extent, history, condition, the way the landscape is experienced, and the value

attached to it. A landscape receptor is a defined aspect of the landscape resource that has the potential to be affected by a proposal.

11.4.23 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.

11.4.24 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. 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.

11.4.25 As explained in Section 3.2 of this PEIR, the "Rochdale Envelope Approach" has been used, whereby the assessment considers the worst or maximum case scenario in terms of the size and scale of the Project including relevant mitigation associated with design.

Approach to Assessing Significant Effects

11.4.26 To predict and describe the potential effects on the landscape and visual resource, baseline information is combined with the different components of the Project at all its different stages (construction / demolition, operation and decommissioning).

11.4.27 The assessment will take into account the spatial and temporal nature of potential effects:

- Direct effects are those imposed on landscape elements on the site (those that occur within the Project Site) as a direct result of development, such as the loss of existing trees or other vegetation;
- Indirect and secondary effects may occur some distance from the Project Site (outside of the Project Site, but within the Study Area) as a consequence of the development occurring, such as the removal of screen vegetation which would allow views in from surrounding areas;
- Cumulative effects occur when additional developments of similar type appear in an area.

- Short, Medium or Long Term describes the duration of an effect; and
- Permanent or temporary relates for example to additional effects during construction compared to the permanent change caused by the Project.

11.4.28 Adverse effects are those that cause detriment to the pre-development situation, Beneficial effects are those that restore or improve the landscape, and neutral effects might change the existing situation, but on balance make the situation neither better nor worse.

Sensitivity

11.4.29 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.

11.4.30 LANDMAP also includes evaluation scores, which are defined as in Table 11.2 below:

Table 11.2 LANDMAP Evaluation

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

11.4.31 Tables 11.3 and 11.4 describe differing degrees of sensitivity ranging between low to high.

Table 11.3: Landscape Sensitivity (as recorded in LANDMAP)

Sensitivity	Description
High	Important / highly 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;

Sensitivity	Description
	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	Landscape of moderately valued characteristics reasonably tolerant of changes; Landscape is not recognised by national or regional designation; The landscape is relatively intact, with a distinctive character. and The landscape is reasonably tolerant of change.
Low	Relatively degraded or low value landscape with no designations; Landscape integrity is low, with a landscape in poor condition and a degraded character; and The landscape has potential capacity to accommodate significant change.

11.4.32 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.

Table 11.4: Visual Sensitivity

Sensitivity	Description
High	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 would include: • Residents experiencing views from dwellings; • Users of public rights of way and access land; • Strategic recreational footpath and cycleways; and • People experiencing views from important landscape features of physical, cultural or historic interest, beauty spots and picnic areas. Large number of viewers and/or location in highly valued

Sensitivity	Description
	landscape could elevate viewer sensitivity to highest level.
Medium	Viewers with moderate interest in their environment, and discontinuous and/or irregular viewing periods. Such receptors would include: Road or rail users – travellers and passengers of moving vehicles. Users engaged in outdoor sport or recreation other than appreciation of the landscape (i.e., hunting, shooting, golf, water-based activities) Users of secondary footpaths or footpaths that may be already impacted by intrusive features.
Low	Small number or low sensitivity of viewers assumed. Viewers with a passing interest in their surroundings and momentary viewing periods. Such receptors include: Drivers/travellers and/or passengers of moving vehicles including trains. People at their place of work, including agricultural workers and other non-motorised users on most roads or those already impacted by intrusive features.

Magnitude

11.4.33 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 would 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.

11.4.34 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.

11.4.35 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 would be visible; their position in the view; the presence of other conspicuous features; and the extent to which views of the Project would 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.

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

- The attributes of the landscape where the Project would be sited (i.e. the scale and character of the landscape in which it would 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.

11.4.37 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 11.5

Table 11.5: 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	Total permanent/ long term loss or major change in the existing view, change very apparent involving high level of change in character and composition

	character.	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 elements of the baseline that are important to character.	Very minor permanent/ long term loss or change in the existing view, change barely distinguishable from surroundings. Character and composition of view substantially unaltered.
No Change	No change would be perceptible either positive or negative.	No change would be perceptible either positive or negative.

Significance of Effect

11.4.38 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 impact or 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 effects need to be combined. The assessment will combine the sensitivity of the receptors with the predicted magnitude of impact in order to establish the significance of the landscape and visual effects as shown in Table 11.6.

Table 11.6: Significance of Landscape/ Visual Effects

		Magnitude of Effect				
		Major	**Moderate**	**Minor**	**Negligible**	**No Change**
Landscape and Visual Sensitivity	**High**	Very Large/ Large	Large / Moderate	Moderate	Slight	Neutral
	Medium	Large	Moderate	Slight / Moderate	Slight / Neutral	Neutral
	Low	Moderate	Moderate / Slight	Slight / Neutral	Slight / Neutral	Neutral

11.4.39 Judgements on the overall significance of effect need to be determined using informed and well-reasoned professional judgement. To help guide the judgements the following scale of significance and associated descriptions will be used in the assessment – refer to Table 11.7 below.

Table 11.7: Definition of Significance of Effects

Significance	Landscape Effects	Visual Effects
Very Large	The Project would result in effects that: Are at a complete variance with the landform, scale and pattern of the landscape; Would permanently degrade, diminish or destroy the integrity of valued characteristic features, elements and/or their setting; Would cause a very high quality landscape to be permanently changed and its quality diminished; and Will be substantially damaging to a high quality landscape.	The Project would cause a very significant deterioration in the existing view. The view would be completely lost on a permanent/ very long term basis. The visual, aesthetic and perceptual qualities would be very substantial altered in detriment to the special qualities/ key characteristics of the landscape and its amenity.
Large	The Project would: 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 would cause a significant deterioration in the existing view. The view would be partially lost on a permanent/ very long term basis. The visual, aesthetic and perceptual qualities would be significantly altered in detriment to the special qualities/ key characteristics of the landscape and its amenity.

Significance	Landscape Effects	Visual Effects
Moderate	The Project would: affect the character of the designated landscape or reason for which it was designated; Be out of scale and/ or out of context with the receiving landscape;	The Project would cause a noticeable deterioration in the existing view. The view would be partially impacted upon. The visual, aesthetic and perceptual qualities would be changed/ altered affecting the special qualities/ key characteristics of the landscape and its amenity.
Slight	Slight or minor change affecting the character of the landscape or the elements therein.	The Project would 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'.

11.5 Consultation

11.5.1 Table 11 in Appendix A of this PEIR provides a summary of all consultation responses relating to the Landscape and Visual assessment and illustrates how each response has been addressed.

11.6 Baseline Conditions and Receptors

11.6.1 Information regarding baseline landscape features and the landscape context and character is shown on Figures 11.2 and 11.3.

Statutory Landscape Designations

National Park

11.6.2 The Brecon Beacons National Park, which was designated in 1957, lies in close proximity to the northern edge of the Power Generation Plant Site. The purposes of National Park designation are to conserve and enhance the natural beauty, wildlife and cultural heritage; and promote

opportunities for the understanding and enjoyment of the special qualities of National Parks) by the public.

11.6.3 The nearest Conservation Area to the Project Site is located in Aberdare town centre. As a result there are no Conservation Areas in the immediate vicinity or intervisible (which could affect setting) with the Project.

Historic Parks and Gardens

11.6.4 Within Rhondda Cynon Taf there are five historic parks and gardens. The closest of these historic parks and gardens is Aberdare Park located in Trecynon, Aberdare. However this Grade II listed park is not within sight of the Project.

11.6.5 Further information on features of historic and cultural heritage significance are outlined in Section 14 of this PEIR.

Statutory Nature Conservation Designations

Blaen Cynon Special Area of Conservation (SAC)

11.6.6 Blaen Cynon contains an extensive complex of damp pastures and heaths supporting a large population of the rare marsh fritillary butterfly. The butterfly is found in a range of habitats in which its larval food plant, devil's-bit scabious occurs. It is located on the southern edge of Brecon Beacons National Park and its boundary lies on the opposite side of the A465 from the proposed Power Generation Plant Site.

11.6.7 An aerial map of Blaen Cynon SAC made up of Cors Bryn-y-Gaer SSSI (1 large site in the middle and 2 smaller sites at bottom of image) and Woodland Park and Pontpren SSSI (3 small sites at top of image) is shown below in Insert 11.1.

Insert 11.1 Blaen Cynon SAC

Cors Bryn-y-Gaer SSSI

11.6.8 Cors Bryn-y-Gaer forms part of the Blaen Cynon SAC and is of special interest for its lowland bog and for areas of soligenous flush, marshy grassland, dry neutral grassland and lowland acid grassland. The site is located immediately northwest of Hirwaun and south of Brecon Beacons National Park.

11.6.9 Cors Bryn-y-gaer supports the following UK Biodiversity Action Plan priority habitats: lowland raised bog, purple moor-grass and rush pasture, fen, lowland acid grassland and lowland meadow.

Woodland Park and Pontpren SSSI

11.6.10 Woodland Park and Pontpren SSSI is of special interest for the mixture of habitat types, including marshy grasslands, dry acid and neutral grassland, heathland and woodland.

11.6.11 The site is 14.5 ha in size and consists of three separate blocks of land, approximately 1km south of the village of Penderyn and 3km north of the Project Site. Along with the nearby Cors Bryn-y-gaer SSSI it comprises the Blaen Cynon Special Area of Conservation (SAC).

Hirwaun Common

11.6.12 Upland parts of the Common support an extensive upland mosaic characterised as upland marshy grassland with significant areas of dry heath (heather, bilberry and western gorse) and areas of flushed wet heath. The lower slopes of Hirwaun Common represent an expanse of

marshy grassland, which includes, sphagnum flushes, wet heath and acid grassland on old spoil.

Non-statutory Landscape Designations

Special Landscape Areas

The following two SLAs lie within the Study Area:

11.6.13 The Hirwaun Common SLA lies in north west of Rhondda Cynon Taf from the county boundary south of Rhigos, extending eastward along tops and slopes of upper Cynon Valley and side valleys to Cwm Aman. The hillsides and tops of Hirwaun Common are very prominent from the A465 and Brecon Beacons National Park. The landscape comprises mainly traditional open common land and dramatic crags and steep hillsides affording spectacular views from Rhigos road and Graig road.

11.6.14 The Brecon Beacons Edge at Llwyncoed SLA lies in the north eastern sector of Rhondda Cynon Taf, immediately adjacent to the Brecon Beacons National Park boundary. To the north west are Penywaun and Llwydcoed form the edges to the south and forestry to the east. It provides an important setting for the National Park and provides a buffer zone to settlements and industry.

The Site and Surrounding Area

Site Context

11.6.15 The Project Site lies entirely within the jurisdiction of RCTCBC. The Project Site is located close to the Brecon Beacons National Park, administered by the BBNPA.

11.6.16 Hirwaun is located four miles north west of Aberdare in Rhondda Cynnon Taff, South Wales. The village sits to the north of the Heads of the Valleys Road (A465), within the County Borough of Rhondda Cynon Taf and on the southern edge of the Brecon Beacons National Park.

11.6.17 Land surrounding the Project Site is characterised by a mixture of industrial units, scrub grassland, intensively grazed agricultural land and plantation woodland. The A465 'Heads of the Valleys' Road runs approximately 100m north of the Project Site and the Tower Colliery is approximately 1km south of the Project Site. The closest residential receptors to the Project Site include:

- Rhigos (1.3km south west);
- Hirwaun (1.4km east);

- Penderyn (1.8km north); and
- Aberdare (5km east).

11.6.18 Although the area immediately surrounding the proposed Power Generation Plant is characterised by industrial development, the wider landscape is made up of open countryside with rolling hills and agricultural landholdings.

Land Use and Vegetation

11.6.19 The Power Generation Plant Site / Electrical Connection route corridor options are dominated by land which is currently occupied by a large industrial building currently used for storage and distribution. The area immediately adjacent to the Power Generation Plant Site is also used for miscellaneous industrial/ commercial use and can be characterised as a former works site. Amenity planting along Main Avenue and along the site fence and within the grounds has matured or is in decline. Conifer plantations provide screening on the external boundaries.

11.6.20 Land on which the Gas Connection would be sited is characterised by intensively grazed agricultural land and the A4061 road.

11.6.21 In the wider countryside, field hedgerows are varied. Around the large arable fields on the valley floor they are often gappy, with few hedgerow trees. Some boundaries having been grubbed up to form large field sizes, leaving ditches and the occasional solitary tree. On the restored land around Rhigos the hedges have been designed to include a range of species and are well kept, thick and provide a distinctive field boundary linking small wooded copses.

11.6.22 Higher up on the valley sides, boundaries are marked by stone walls with single old stunted hawthorns or the occasional oak tree. The fields are pasture grazed predominantly by sheep and on the higher land the boundaries have been lost and the fields merge seamlessly with open moor land vegetation. Broadleaf copses link together to form small areas of woodland, especially on the south facing slopes of Penderyn.

11.6.23 The area of the Brecon Beacons National Park closest to the Project Site can be categorised as an enclosed and relatively settled pastoral landscape. Ancient woodlands surround the streams and waterfalls. Between the valleys are ridges of higher land with a more open quality and long views.

Landform and Drainage

11.6.24 The topography of the surrounding landscape comprises a U-shaped valley with steep slopes in gently S-dipping Pennant sandstones

(Upper Carboniferous), containing well-preserved glacial cirques in Cwm Dare & Craig y Bwlch. The lower slopes underlain by Productive Coal Fm mudstones covered by extensive boulder clay and patches of peat, infilling glacial lakes at Hirwaun Ponds.

11.6.25 Located in South Wales the River Cynon is one of the largest tributaries of the River Taff. Arising in the Brecon Beacons it is supplemented by a number of small streams as it passes through Hirwaun. The river passes in a south easterly direction through Aberdare before eventually meeting up with the River Taff at Abercynon. Following the closure of the coal industry and the demolition of the smokeless fuel plant, the quality of the river has improved dramatically.

Public Rights of Way & Recreation

11.6.26 There are no public rights of way or open access land within the Project Site.

11.6.27 There are two large areas of Open Access Land within the Study Area. Hirwaun Common lies to the south of the estate and occupying a large swathe of north facing hillside above the Tower Colliery coal mine. The other area lies within the Brecon Beacons National Park to the north east of the estate (still within Hirwaun Parish) and takes in Mynydd-y-glog, part of the Fforest of Fawr.

11.6.28 One long distance recreational trail, the Coed Morgannwg Way, passes through Hirwaun Common and Dare Country Park.

11.6.29 The Penderyn Quarry Line runs along the former quarry railway line that linked the limestone quarry to the ironworks and now provides a local recreational route. It is currently under consideration as a branch of the National Cycle Route 46 (Neath to Hereford) which is under development.

11.6.30 Whilst Hirwaun Industrial Estate is open to vehicles, cyclists and pedestrians it does not have any dedicated public footpaths. The estate is linked to Hirwaun by pavements adjacent to main roads. Several public footpaths link the west of the industrial estate with Rhigos, Bryn and Cefn Rhigos. To the south, the land is reclaimed colliery land and a public right of way has been included within the restoration scheme. This footpath runs east west between Bryn in the west and Hirwaun in the east. To the north west the industrial estate is connected by a public footpath to Pwll-y-Crochan Waterfall and the waterfalls north of Pontneddfechan. Another footpath runs north from the industrial estate between Penderyn Reservoir and Pantcefnffordd onto the village of Penderyn.

Settlement

11.6.31 Hirwaun is situated on a ridge above the Neath and Cynon Valleys. Access can be gained via two streets leading of the main A465 Heads of the Valleys Road. Brecon Road from the eastern roundabout on the outskirts of the village and Rhigos Road from the western edge of the village converge onto the High Street, which forms the main cluster of retail, services and community facilities.

11.6.32 The villages of Rhigos and Bryn lie to the west of the Project Site and has recently had a number of new housing developments in the village. The hamlets of Cefn Rhigos and Cwm-Hwnt lie to the west of the village. The closest residential receptor to the Project Site is along Rhigos Road, approximately 150m to the south of the Power Generation Plant Site. This property is predominantly separated from the Power Generation Plant Site by industrial units, landform and vegetation. Large residential areas in the area include Rhigos / Bryn (1.3km south west) and Hirwaun (1.4km east). Further away are Penderyn (1.8km north) and Aberdare (5km east). The villages of Rhigos and Bryn lie to the west of the Project Site and have recently had a number of new housing developments in the village. The hamlets of Cefn Rhigos and Cwm-Hwnt lie further to the west.

Infrastructure

11.6.33 The Heads of the Valleys Road, the A465 trunk road, lies close to the Project Site. Connecting Neath to Abergavenny it forms part of the strategic transport corridor across south Wales linking the Midlands and northern England to west Wales and Ireland. As part of the National Transport Plan the A465 dualling scheme will improve the length between Abergavenny and Hirwuan to dual 2-lane standard. The section of the route nearest to Hirwuan is scheduled for completion by 2020.

Landscape character

11.6.34 The baseline study includes a detailed appraisal of the landscape, within a 0-3km Study Area with a higher level appraisal of landscape character up to 15km. Information has been gathered through a combination of desk studies and field survey

Local Landscape Character

11.6.35 LANDMAP is the national information system, devised and managed by NRW, for taking landscape into account in decision making. Landscape characteristics within the vicinity of the Project Site are described with reference to the following 5 constituent Aspect data sets in LANDMAP:

- *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.

11.6.36 The comparative landscape evaluations assigned to each aspect area within the 5 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.

11.6.37 Table 11.8 provides extracted information from LANDMAP for all aspect areas directly affected by, or intervisible with the Project at classification level 3 or 4. It sets out a description of each area, an evaluation score (including reasoning) which reflects the value placed on that area, and any landscape management guidelines for the area, which indicates the direction of change desired.

11.6.38 Aspect areas within which the Project is proposed, and those adjacent, are most likely to undergo change. However, distant aspect areas where views form part of the area's key characteristics, or to which the landscape of the 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 ES LVIA and detailed consideration will be given to aspect areas with an evaluation of High or Outstanding.

Table 11.8: Summary of LANDMAP Aspect Areas

Area Name	Aspect Area code	Description	Overall Evaluation Score (from LANDMAP)	Guidelines
Visual and Sensory Aspect Areas within and adjacent to the Project Site (up to ~5km)				
Aberdare	CynonVS522	Level 3 classification: Development / Built Land / Urban. Urban development in floor of relatively wide valley. Range of built form creates visual complexity, e.g. houses, industrial estates, spoil heaps. Some views out to neighbouring upland areas provide a partial antidote to the unattractive built environment and contribute to its sense of place within the wider upland setting. Background traffic noise from A4059	Low Lacks any positive visual and sensory qualities, this urban area with remnants of past mining industry has little or no importance. Views out to the adjacent upland areas are the only limited visual quality, and these are usually compromised by an element of built form.	Medium term: Careful development control to limit housing / urban sprawl
Opencast	Cynon VS368	Level 3 classification: Development / Developed Unbuilt Land / Excavation. Areas of opencast mining at Tower Colliery and Llanilid.	Low. No qualities of distinction apart from a relative amount of rarity	Medium term: Programme of restoration of topography and vegetation following excavation, to return to agriculture

Penderyn	CynonVS833	Level 3 classification: Upper valley sides with strong upland feel-both from the strong visual link that exists and the rough grazing with some woodland / conifer elements. Slight urban feel on lower slopes but dominant character is that of an upland area. visual detractors include pylons and the sharply defined urban edge. Noise and movement from the A465. Scattered farmsteads.	Moderate. Some attractive views to uplands but visual detractors e.g. urban edge, pylons. Valley sides with pattern of field boundaries / woodland, but detractive elements e.g. urban edge, pylons, traffic noise of local importance	Immediate: Soften urban edge. Medium term: Restrict pylons. Reduce impact of A465 e.g. planting.
Hirwaun Common	CynonVS430	Level 3 classification: Upland / exposed Upland / Plateau / Upland Grazing Dramatic landscape of rough grazed grassland with rock outcrops and some marshy areas lying between approximately 200m and 515m AOD. Wind noise is a dominant aesthetic factor, which evokes particular experience of exposure and wildness. Attractive upland views within and attractive rolling terrain to the north. A475 is a visual detractor. Adjacent Tower Colliery has expanded, so aspect area boundary in west has been altered to change detection.	**High.** Attractive upland views. Largely unspoilt landscape, some pylons present but not visible on skyline so not intrusive. Strong upland fell giving sense of place. Attractive largely unspoilt upland area with a strong sense of place and good views.	Long term: Grazing management to prevent over grazing.

Mynydd Nant y bar / Mynydd Blaenafan	NPTVS962	Level 3 classification: Upland / Exposed Upland / Plateau / Woodland Upland & Plateaux. Large area of undulating plateau running across the high ground between the Afan valley and Neath valley to the east of the county borough. Rising from approx 50m AOD in Neath valley to 600m AOD. Numerous small valleys provide added topographical interest to this landscape, which the conifers emphasise and add drama to. The area is almost entirely covered with coniferous plantation, mainly spruce, with larch leads to a monotonous cover on the plateau tops. There are some areas of open ground and exposed rock, primarily at summits or steeper ground. There are no roads or settlements in this area apart from the Coed Morgannwy Way long distance trail, which almost dissects the area. and provides access along a long distance trail. In many areas the abrupt forest edge sits uncomfortably with the surrounding open landscape. Cleared areas of	Moderate. Area of forestry is constantly managed and contains numerous landscape features, exposed rock and open upland, which add to the aesthetic quality of this area. The edges and skyline against the Afan and Neath valley complement the valleys characters. Well managed commercial plantation.	Medium term: Vary composition of woodland to increase variety – larch / deciduous. Enhance landscape features within forestry by selective thinning and felling. Maintain open heath and exposed rock.

		forest are unsightly.		
Nedd Fechan and Melite Valleys	BRCKNVS876	Level 3 classification: Upland / Upland Valleys / Open / Wooded Mosaic Upland Valleys.. The pastoral upland valleys of the Melite and Nedd Fachan run south from the upland massif of the Fforest Fawr cutting through the limestone upland. Between them is a low ridge, which has rock outcrops and common land in places. This is more open with larger fields and little woody vegetation. The landcover is dominated by pasture with riparian deciduous woodland, particularly on steep slopes, and grown out hedgerows, all of which contribute to an enclosed, sheltered landscape. Some of the woodland is grazed, eliminating understorey and allowing clear views. Rectilinear blocks of coniferous forest lie on the upper slopes of Fan Llia and Fan Nedd. Occasional conifers associated with dwellings reinforce the upland character. Settlement is mainly scattered farmsteads. Ystradfelite and Pontneddfechan are the only settlements, nestling in the	**Outstanding.** The valleys have a high scenic quality through their unspoilt upland pastoral mosaic character. The main interest is in the river courses with their superb landscape of rocky beds, waterfalls and caves in a woodland setting. The area is known as Waterfall Country and has a strong sense of place. It is well visited for the beauty of the countryside as setting for the waterfalls, which indicates consensus on value. The area s generally of consistent character.	Medium term. Manage river corridor to minimise impact of visitors on river, rocks and vegetation. Conserve / manage woodland cover avoiding grazing of woodland floor. Conserve / manage hedgerows, laying where appropriate. Manage commons for sward species diversity. Restrict growth of settlements.

		valley floor of the Melite and Nedd Fechan respectively. The latter has crept up the hill with suburban housing, which is out of character. The main interest in the area is focussed on the rivers with their associated waterfalls and limestone caves. The river courses are rocky and have strong riparian vegetation. Visitors focus on these areas for walking.		
Craig Nantmelyn	CynonVS890	Level 3 classification: Upland / Hills, Lower Plateau & Scarp Slopes / Hillside & Scarp Slopes Grazing Lower slopes to the east of Hirwaun Common. Generally grazing land with bracken and small scattered clumps of woodland. Open character and more upland feel is tempered by urban edge presence to north (Penywaun). Views similarly polarised into upland to south west and urban to north east. Some more distant upland views to north east Penywaun however.	Moderate Some attractive views out to neighbouring upland, and slightly detractive views to urban areas in valley floor. Urban edge detracts from overall integrity. Moderate sense of place. No single defining feature of regional importance to justify more than local importance. Scenic quality and integrity both reduced by the presence of urban areas.	Medium term: Land management to prevent over grazing and to control bracken. Limit spread up valley sides that could reduce well defined edge. Conserve openness.

Geological Landscape Aspect Areas within or adjacent to the Project Site (up to ~2.5km)				
Rhigos	CynonGL028	Level 3 classification: Mountain and upland valley / Glaciated mountain terrain / Glacial mountain valley. S margin of the NE-SW Upper Neath valley, S of the Neath fault zone (including part of SSSI Dyffrynoedd Nedd a Melite, a Moel Penderyn SSSI). Steep scarp slope in gently S-dipping Pennant sandstones (Upper Carboniferous), eroded into prominent cirque with landslips in Craig y Llyn SSSI. Lower gentle slopes in Productive Coal Fm (Upper Carboniferous), covered with extensive boulder clay & patches of peat, which fills a glacial lake at Hirwaun Ponds. NW-SE Hirwaun fault zone. Coal Measures worked in Tower colliery & reclaimed opencast sites. Adits in Pennant measures.	**Outstanding.** Southern area includes edge of plateau with well developed cirques – includes Dyffrynoedd Nedd a Melite, a Moel Penderyn and Craig y Llyn SSSIs with interests including Westphalian stratigraphy (Upper Carboniferous) and RIGS for glacial geomorphology and Carboniferous stratigraphy.	Long term: Maintain SSSI in favourable condition by implementation of management plans and ensure that RIGS are safeguarded using Local Plan policies and constraint mapping. Ensure that no significant features of geological or geomorphological significance, including glacial cirques in south of AA and lake sediments at Hirwaun Ponds, are lost / damaged due to development / forestry etc.
Upper Cynon valley - E	CynonGL019	Level 3 classification: Mountain and upland valley / Glaciated mountain terrain / Glacial mountain valley. E side of upper Cynon valley, controlled by the Werfa fault, with steep upper parts cut into gently S-dipping Pennant sandstones (Upper	**High.** Northern part of AA includes Namurian, Basal Grit outcrop with important karstic features including prominent swallow holes, which may be of RIG	Long term: Ensure that no significant features of geological or geomorphological significance are lost / damaged due to

		Carboniferous). Valley floor underlain by mudstones of the Namurian, Lower & Middle Coal Measures (Upper Carboniferous). Valley floor opens northwards onto the S dip slope of the Namurian basal grit conglomerates, with prominent swallow holes. Extensive boulder clay cover. Disused sandstone quarries, colliery tips & shafts.	importance.	development, etc., in particular karstic features that may be of regional importance (i.e. potential RIGS sites).
Upper Cynon valley - W	CynonGL020	Level 3 classification: Mountain and upland valley / Glaciated mountain terrain / Glacial mountain valley. U-shaped valley with steep slopes in gently S-dipping pennant sandstones (Upper Carboniferous), containing well-preserved glacial cirques in Cwm Dare & Craig y Bwlch. Lower slopes underlain by Productive Coal Fm mudstones covered by extensive boulder clay and patches of peat, infilling glacial lake at Hirwaun Ponds. Alluvial fan developed at mouth of Cwm Dare. Dip slope in Namurian (Upper Carboniferous) with swallow holes & clitter. Major NNW faults at low angle to valley trend. Partially reclaimed opencast site.	**High.** Landscape with important glacial features of at least regional importance (including RIGS site), including cirques in Pennant sandstones (Cwm Dare & Craig y Bwlch) and glacial lake at Hirwaun	Long term: Ensure that RIGS sites in the area are protected using Local Plan policies and constraint mapping. Ensure that no significant features of geological or geomorphological significance are lost/damaged due to development, forestry etc.

Penderyn	CynonGL021	Level 3 classification: Tectonically controlled topography / Tectonically controlled valley (Valley following folds, fault controlled gorges, or scarps. Dip slope of S- and N-dipping Dinantin limestones (Lower Carboniferous), with swallow holes, to S of Neath fault zone. Minor strike valley filled by boulder clay on Lower Limestones Shale Group forms part of Cwm Cadlan, with underground drainage. Limestone dip steepens westwards to zone of folding fault zone at Moel Penderyn & Neath-Melite SSSI. Large working limestone Penderyn Quarry & many disused limestone quarries.	**Outstanding.** Includes important exposure of Lower Carboniferous limestone in working quarry and karstic features, also Dyffrynoedd Nedd a Melite, a Moel Penderyn SSSI and RIGS for Carboniferous stratigraphy.	Long term: Maintain SSSI in favourable condition by implementation of management plans and ensure that RIGS are safeguarded using Local Plan policies and constraint mapping. Ensure that no significant features of geological or geomorphological significance are lost / damaged due to development / inappropriate restoration.
Pen moelallt	CynonGL024	Level 3 classification: Mountain and upland valley / Glaciated mountain terrain / Glacial mountain valley. Western slopes of gently S-dipping Namurain (Upper Carboniferous) in upper Taff valley, with steep slope into valley. Basal Grit of Namurian exposed in high crags & cliff lines, covered by boulder clay across lower slopes.	Moderate. Forestry covered slopes with natural exposure of Basal Grit succession, as seen elsewhere in the district.	Long term: Ensure that no significant features of geological or geomorphological significance are damaged by forestry operations.

Banwen	NPTGL018	Level 3 classification: Mountain and upland valley / Undulating upland terrain and dissected plateau / Upland plateau. Steep E and S facing slopes below South Wales Pennant Formation in S-W and N-dipping mudstones and coals of Productive Coal Formation around closure of plunging NE-SW regional synform, cut by major NNW-SSE faults and forming slopes to NW-SE Afon Pyrddin. Extensive cover of boulder clay on lower slopes and some peat. Very large worked out opencast area and opencast workings on E facing slopes, with areas of made ground.	**High.** Glacial drift covered Productive Coal Fm with large opencast; made ground in worked out areas.	Long term: Monitor reclamation of opencast area, possible enhancement of outcrop.
Landscape habitats within or adjacent to the Project Site (up to ~2.5km)				
-	CynonLH046	Level 3 classification: Dry (Relatively) terrestrial Habitats / Woodland & Scrub / Mosaic	**Outstanding** SAC designated in part and has outstanding assemblage of lower parts and lichens. Valuable broadleaved woodland with added watercourse and excellent lower plant assemblages. Diverse semi-natural	Long term: Ensure watercourse remains unpolluted. Intermediate: Remove Japanese knotweed.

			woodland with outstanding assemblages of lower plants and lichens. Includes area of conifers, bracken and marshy grassland	
-	CynonLH051	Level 3 classification: Dry (Relatively) Terrestrial Habitats / Grassland & Marsh / Mosaic	**Outstanding** Large areas of Purple moor grass priority habitat, which is a much declined and threatened habitat. SAC and SSSI designations are present. Lowland marshy grassland with transition to upland marshy grassland including the largest area of peat based valley mire in Mid Glamorgan. Hirwaun ponds support a rich dragonfly fauna.	Long term: Ensure grazing levels do not degrade habitat. Preserve Marsh Fritillary habitats. Medium term: Introduce Glastir scheme. Introduce Tir Gofal scheme.
-	CynonLH053	Level 3 classification: Dry (Relatively) Terrestrial Habitats / Grassland & Marsh / Improved Grassland	Low Low ecological value habitat with no key species.	Long term: Encourage diversification within existing habitat.
Cultural Landscape Aspect Areas within and adjacent to the Project Site (up to ~5km)				
Hirwaun	CynonCL042	Level 4 classification: Influences / Material Expressions / Industrial /	**High**	Tolerance to change:

		Heavy Industry. Hirwaun is situated on a ridge above the Neath and Cynon Valleys. It was an early centre of ironworking, being the first place in Wales where iron was smelted using coke. The Ironworks was established in1757 on the site of an earlier charcoal-fuelled furnace. The settlement is surrounded by evidence of coal mining – in modern times, mostly open cast. Inside the settlement street patterns follow the lines of tram roads; externally, the image of Hirwaun to passers-by is conveyed by the bulk of the pair of high-rise tower blocks, incongruous both in this terrain and in the vernacular culture of residential development in the Valleys.	High as a ridge-top settlement where sings of sequential development are still evident, and benefiting from proximity to the A465 Heads of the Valleys road.	No known threats to the current integrity and condition of the Cultural Landscape features of this area.
Aberdare	CynonCL039	Level 4 classification: Influences / Material Expressions / Industrial / Heavy Industry. Aberdare has the air of a thriving sub-regional market town and proud municipality despite being surrounded by former industrial settlements. Proximity to the A465 Heads of the Valleys road improves its strategic position as a centre for business,	**High** High, for its balance of 21st century commercialism, regeneration of the town centre, and preservation of significant examples from its industrial past.	Tolerance to change: No known threats to the current integrity and condition of the Cultural Landscape features of this area.

		retail and commerce. Its Conservation Area around Victoria Square lends a kind of elegance, many of its Victorian and Edwardian buildings have a certain distinction. Mid-19th century terraced housing still dominates the town's several residential areas, one of which – Trcynon – is lavishly endowed with chapels of various Nonconformist denominations. The remains of its former industrial importance are now sparse, but Gadlys Ironworks is one of the more complete remaining groups of ironworks buildings in South Wales. The town has a prominent position within the Cynon River Park, and care is taken to maintains its public open spaces, such as Aberdare park and the extensive Dare Valley Country Park – the latter being the first in England and Wales to be created on reclaimed land.		
The Rhigos	CynonCL041	Level 4 classification: Associations / Notional Expressions / Places / Sense of Place The name "The Rhigos" is not so much one place as an idea. It exerts	**High** High because there is a palpable sense of history and of place, leading to an idea of small-scale	Tolerance to change: No known threats to the current integrity and condition of the Cultural Landscape

		physically, but its value is in what can be seen. The Aspect area is based on a small informal viewpoint in a pull-off from the mountain road above the Rhondda Valleys. From here can be seen a microcosm of the cultural influences of the Study Area – man-made reservoirs, roads, prehistoric remains, colliery workings, relict quarries and small industrial workings, forestry.	exploitation and use over millennia.	features of this area.
Brecon Beacons National Park	CynonCL044	Level 4 classification: Associations / Notional Expressions / Institutions / Land Divisions Brecon Beacons National Park has been designated over 1344 sq km. There is a relatively small portion of its southern part in the Study Area, though larger tracts of land abut it. The landscape here typifies the contrast between high moorland to the north of the Coal Measures and A465 trunk road, and the deeply incised valleys to the south. The portion within the Study Area lies to the south of the looming bulk of Pen-y-Fan, and consists mostly of sheep-grazed moorland, which contains much evidence of prehistoric	**Outstanding** Outstanding as a component part of the wider Brecon Beacons National Park, itself a widely recognised cultural area of outstanding designated landscape.	Tolerance to change: No known threats to the current integrity and condition of the Cultural Landscape features of this area.

		occupation and exploitation. On its western edge there are extensive eroded landscapes, cave systems and a spectacular series of waterfalls in the Neath River's headwaters.		
Historic Landscape Aspect Areas within and adjacent to the Project Site (up to ~5km)				
Cynon Valley Corridor	CynonHL117	Level 3 classification: Built environment / Settlement / Nucleated Settlement This aspect area is characterised as an urban and industrial transport and communication corridor stretching along the length of the Cynon Valley from Abercynon, north to Pontneddfechan. This aspect area includes the settlements of Mountain Ash, Cwmamen, Aberdare and Hirwaun. The aspect area has a strong prehistoric presence in the north of the valley corridor; many Bronze Age funerary cairns adorn the valley slopes. Aberdare was one of the county's ancient upland parishes (strictly, a chapelry of Llantrisant, as the humble St John's church indicates. Industrial	**Outstanding** An area of outstanding historic importance, based on the fact that it contains some of the best preserved industrial monuments surviving not only within the Caerphilly / RCT historic landscape, but in South Wales generally.	Not assessed in LANDMAP

		growth began early in the 19th century with the Gladlys Ironworks opening in 1827, and the first steam-coal mine a decade later. Industry retreated in the latter half of the 19th century and what survives of Aberdare's industry is of great historical importance.		
Hirwaun Common, Enclosure	CynonHL903	Level 3 classification: Rural Environment / Agricultural / Regular Fieldscapes. This aspect area is characterised by a regular fieldscape, defined by a turf-stone walled boundary, which probably predates industrial activity in the area and may represent the pre-industrial boundary form. These large regular shaped fields enclose what was once the open moorland of Hirwaun Common. T he aspect area in the late 18th and 19th centuries was characterised by an extensive network of tram roads servicing the iron works at Hirwaun, and further east at Merthyr and Ebbw Vale. The present landscape consists of marginal upland grazing dominated by irrigation ditches; in attempt to remove mountain run off from the common	**High** Of high value as a well-preserved example of a late 19th – 20th century regular enclosed fieldscape with extensive, broadly distributed relict remains of 18th – 19th century industrial extractive activity.	
Penderyn	Cynon HL176	Level 3 classification: Rural	**Outstanding**	Not assessed in

		Environment / Agricultural / Other Fieldscapes. A large rural aspect area characterised by regular fieldscapes interspersed with natural woodland. Several large reservoirs define the character area's most southerly and easterly aspect. The dominant field boundary within the aspect area is drystone boulder dykes and earth and stone banks, although deteriorated post and wire has patched some breeches in the afore mentioned boundaries. The eastern and northern areas of this aspect belong to the Registered Historic Landscape (HLW(MGI/P)3. The dramatic landscape south of Fforest Fawr was first manipulated in the Neolithic and Bronze Ages. These periods are represented by the numerous lithic monuments.	An important, multi-period landscape with significant evidence of prehistoric funerary activity / field clearance incorporated into a later medieval / post medieval fieldscape, with substantial remains of the 18th – 20th century industrial activity superimposed onto this landscape.	LANDMAP
Rhondda Uplands	CynonHL687	Level 3 classification: Rural Environment / Non agricultural / Marginal Land This aspect area of dramatic escarpments of Pennant Sandstone cliffs, glacial cymoedd or corries, and extensive open upland ridges and mountain is a landscape of some	**Outstanding** The outstanding value assigned to this area is based on the fact that it represents a remarkably well preserved multi-period upland landscape, containing evidence of human activity dating back to the	Not assessed in LANDMAP

		importance recognised by its inclusion within the Rhondda Historic Landscape on Cadw / ICOMOS Register. It is characterised as a relict upland agricultural landscape, chiefly mountain sheepwalk, though partially forested with post-medieval industrial incursion typically extraction related. The area is a multi-period and multi-functional upland landscape dominated by prehistoric funerary and ritual features, and with prehistoric, Roman, medieval and post-medieval upland settlement, also included are Roman and medieval military structures, prehistoric / early medieval boundaries, the cross dykes are also visible and characteristic features of the area.	Mesolithic era, including sites of national importance such as the extensive settlement site of Hen Dre'r Mynydd, the largest undefended Iron Age settlement in SE Wales	
Tower Colliery	CynonHL183	Level 3 classification: Rural Environment / Non agricultural / Reclaimed Land This aspect represents the extent of opencast industrial activity to the west of Hirwaun Common, north of the Rhondda Uplands and south of the Hirwaun transport corridor. This radically altered landscape is the result of opencast exploitation of the mineral resource over the past several	**High** The high value of this aspect area is chiefly due to the survival of substantial and historically important remains of 19th – 20th century industrial extractive activity (in particular the Tower No. 4 Colliery); extensive modern opencast mining and forestry plantation has largely obliterated earlier	Not assessed in LANDMAP

		centuries. The landscape, once open moorland, has been irrevocably altered by this industry and recently altered once more by the complete reclamation and drainage of this area converting coal faces and tips into open improved pasture. The industrial activity within this landscape seems to have obliterated all evidence of past human activity; however not without record.	patterns of settlement and consequently the archaeological record for this area prior to the 19th century is very limited.	
Cwm Wyrfa	CynonHL772	Level 3 classification: Rural Environment / Agricultural / Regular Fieldscapes. This aspect area is characterised by a regular fieldscape, influenced heavily by early industrial activity. The aspect area is bounded to the north by the Cynon Valley transport and communication corridor. The eastern boundary is defined by the extent of opencast encroachment from Tower Colliery into this aspect area. A gliding club represents modern recreational activities within this aspect area.	Moderate An extensive tract of enclosed upland common influenced by early industrial activities; the pattern of rectilinear field enclosure has remained essentially unchanged from that shown on the OS 1st edition map of 1885.The moderate value assigned to this area reflects the limited nature of the archaeological record and the encroachment on its eastern edge by open cast mining activity.	Not assessed in LANDMAP

Landscape Character - Designated Landscapes

11.6.39 The designation of landscapes indicates a recognised value placed by society on a landscape. There are no landscape designations covering the Project Site. Table 11.9 below sets out the baseline information for relevant designated landscapes and the reasons for their designation.

11.6.40 Section 14 of the PEIR provides further baseline information on Areas of Landscapes of Historic Interest in Wales, Parks and Gardens of Historic Interest and non-statutory historic landscapes.

11.6.41 With reference to Table 11.9 below, landscape character information is derived from the Brecon Beacons National Park landscape Character Assessment, Fiona Fyfe Associates, August 2012.

11.6.42 The SLAs below are located within Rhondda Cynon Taf's administrative area. The information In Table 11.9 is derived from the Proposals for Designation of Special Landscape Areas in Rhondda Cynon Taff – Statement of Value (2008). It describes the specific qualities for which each area is valued which underpin the relevant policies in the Local Development Plan.

Table 11.9 Designated Landscapes within the study area

Designated Landscape	Description
National Level (within 15km)	
Brecon Beacons National Park	The Brecon Beacons National Park is located approximately 0.2km north of the Project Site at its nearest point and continues beyond the Study Area boundary. The Park contains some of the most spectacular and distinctive upland landforms in southern Britain. The bulk of the area is underlain by Old Red Sandstone, rocks of Devonian age and these form the characteristic north and north east facing escarpments, including the Black Mountain in the western area. The older Ordovician and Silurian rocks of Mid Wales cross into the north western corner of the Park, giving a landscape of southwest-northeast trending ridges and valleys. Coal Measures outcrop along the Park's southern boundary. Two landscape character types within the National Park lie within the LVIA study area: **Landscape Character Area 3: FForest Fawr (LCA3)** Broad Landscape Type :Uplands Summary description: " A bleak, upland moorland landscape, the character of which is locally influenced by its past use as a royal hunting ground and more recent estate ownership, apparent through the drystone boundary walls, estate corrages, shelterbelts and former rabbit farms. Remains of prehistoric and medieval occupation, and later industrial archaeological sites, are visible in the landscape. Away from the occasional roads which run across the area, it feeld tranquil, and with a sense of remoteness and relative wildness. Its distinctiveflat-topped summits and steep northern escarpment are prominent in views from the north." The overall management strategy for LCA3 is to protect and enhance special qualitites of the landscape including tranquillity, remoteness and relative wildness, and its historic fetures, long views and open skylines. Sensitivity: **High** **Landscape Character Area 4: Waterfall Country and**

	Southern Valleys (LCA4) Broad Landscape Type: Upland Valleys Summary description: "The predominantly limestone geology of his LCA creates its characteristic rough texture and grey colour, appearing in the crags, walls andbuildings of this enclosed and relatively settled pastoral landscape. Ancient woodlands surround the streams and spectacular waterfalls which are found in the south of the LCA, flowing in deep fern-filled gorges. Between the valleys are ridges of higher land with a more open quality and long views. The dark green of the extensive blocks of conifers in the south of the area contrasts with the surrounding grasslands." The overall management strategy for LCA4 is to maintain and enhance the special qualities of the landscape, in particular its historic features and magnificent waterfalss, resisting development which would impact on views from the area.. Sensitivity: **High**
Local level (Within 10km)	
Hirwaun Common Special Landscape Area	Primary landscape qualities and features include: "High scarp along northern edge of coalfield; Series of well-defined steep glacial cirques cut into scarp; Very dramatic scenery overlooking Heads of Valleys and dwarfing the small settlement of Cwmaman in the valley bottom to south; Spectacular views from the Rhigos road to north and Graig road over from Aberdare; Important for intervisibility with peaks of Brecon Beacons National Park; Edge of Craig-y-Llyn geological SSSI showing Westphalian stratigraphy; Llyn Fawr is typical glacial lake; Forestry on slopes below Llyn Fawr are being opened up and more in keeping with special scenery, and backdrop to Tower Colliery remains; Steep slopes and tops are mainly open common land, with grassland and heather habitats; Cairns and other ancient monuments on tops are widespread evidence of early settlement;

	Coed Morgannwg Way passes through area, from Dare Country Park; and Areas of broadleaf woodland on lower slopes around Dare valley, blends with Country Park." Relevant landscape policies and management include: Enhance views and access to this specially scenic part of the county; Ensure that geomorphological features are not lost to development and road building; Conserve skylines and views; and Ensure that major development in valley bottom integrates with surrounding hillsides. Sensitivity: **High**
Brecon Beacons Edge at Llwyncoed Special Landscape Area	Primary landscape qualities and features include: "South-facing gentle slopes and small side valleys of the head of the Cynon Valley; The upper north eastern part is bleak open land and forestry with storage tanks being very prominent features for miles around; The A465 Heads of the Valleys road traverses the area, due for dualling in future; Merges with Brecon Beacons National Park to north and west, forming buffer zone to settlements and industry; Reclaimed land alongside Cynon and edge of Penywaun, now well wooded; and Areas of broadleaf ancient woodland on small valley sides." Relevant landscape policies and management include: Safeguard edges of the Brecon Beacons National Park; and Safeguard land adjacent to A465 Sensitivity: **High**

Historic Landscape

11.6.43 Section 14 of this PEIR provides the archaeological and cultural heritage impact assessment. However, many aspects of the landscape are derived from past events and activities and therefore any

understanding of landscape character should include the historic landscape.

11.6.44 The Hirwaun Industrial Estate came about three years after the outbreak of the Second World War. The part of Hirwaun Wrgant Common lying between the main Cardiff to Swansea main road and the Great Western railway line was requisitioned for the construction of a Royal Ordnance Factory. The factory, known as Royal Ordnance Factory Number 26, was built between May 1941 and February 1942 and specialised in small arms ammunition manufacture. It covered an area of 1.7km east to west by 1.0km. At the end of the war, in 1945, the Board of Trade took over the site for use as an industrial estate.

11.6.45 Within the wider area, the visually imposing northwards-facing escarpments and adjoining dramatic mountain masses of the Black Mountains, the Brecon Beacons, Fforest Fawr and Mynydd-y-glôg together form a vast natural ridge and physical barrier that divides mid-Wales from the south.

11.6.46 *East Fforest Fawr and Mynydd-y-glôg Historic Landscape Areas* (lying to the north east of the Project Site) comprise an extensive area of unimproved moorland and rough grazing. The land is subdivided into generally large irregularly-shaped enclosures defined by dry stone walls. When viewed from the south near Hirwaun Common, the historic landscape area forms the mid distance view, with the Brecon Beacons in the far distance.

11.6.47 The area is rich in archaeological evidence, which points to quite intense occupation and land use with evidence of early agriculture and prehistoric and medieval settlement. By the early medieval period the area formed part of the cantref (hundred) of Cantref Mawr in the kingdom of Brycheiniog, which had emerged as one of the early British kingdoms in Wales by the 7th to 8th century AD. The kingdom was conquered by the Norman baron, Bernard de Neufmarché, in the late 12th century and continued to be administered as a marcher lordship until the 16th century.

11.6.48 The greater part, if not the whole of the historic landscape area formed part of one of the largest hunting preserves in Wales, belonging to the lords of Brecknock known as Fforest Fawr or the Great Forest of Brecknock stretching for about 20 kilometres from east to west and 12 kilometres from north to south (about 12 miles by 8 miles), called the Forestya de Brechonie ('Forest of Brecon') by the 1160s and 1170s. In documents of the early 17th century it is named as Forest y Brenin ('King's Forest'), the area having been forfeited to Henry VIII by the Duke of Buckingham in 1521.

11.6.49 Fforest Fawr remained Crown property until the sale of the central part of the area in 1819. The unenclosed moorland within the historic landscape area was unaffected by this sale, however, and is still mostly Common Land/ Open Access Land. The historic landscape area falls wholly within the Brecon Beacons National Park.

11.6.50 Greater awareness of the surviving archaeological remains was a major factor in the inclusion of the East Fforest Fawr and Mynydd-y-glog historic landscape area in the Register of Landscapes of Special Historic Significance in Wales, published under the auspices of Cadw, the Countryside Council for Wales and ICOMOS UK in 2001.

11.6.51 The historic landscape area now also falls within the Fforest Fawr Geopark, established to promote both the geological heritage and economic development of the area and granted recognition by the UNESCO Global Geopark Network in 2005.

Visual Amenity

Visual Receptors

11.6.52 Visual receptors, such as users of buildings, recreational spaces, footpaths and transport routes, have differing sensitivities to their visual environment. Generally, this is 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, 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; and

- Viewers' expectations, occupation and activities when experiencing the view.

Visual Baseline Conditions

Key Views

11.6.53 Whilst the valley floor is extensive, it's gently undulating and many local and distant views of the Project Site are screened by intervening buildings, vegetation and topography. However, from elevated positions such as the valley sides and plateau edges, panoramic views across the valley are possible from several locations.

Receptors

Settlement/Residential

11.6.54 The Project Site is located on the outskirts of Hirwaun, within the County Borough of Rhondda Cynon Taf. Other villages in the locality include Penywaun, Rhigos and Croesbychan. There are a number of small hamlets in the area including Cefn Rhigos and Cwm-Hwnt.

11.6.55 The closest residential properties to the development are those in Halt Close, located off the Rhigos Road. The housing development includes a range of medium sized detached dwellings.

Road & Public Rights of Way

11.6.56 The A465 passes to the north of the Project Site on an elevated embankment dividing the Hirwaun Industrial Estate. With the planned upgrade of the Heads of the Valleys Road, it may result in higher volumes of traffic passing the Project Site. However, much of the Project Site is screened from road users by vegetation alongside the highway and within the industrial estate. Views are partial and in many cases, only the occasional glimpse of the area is available.

11.6.57 Road users along driving north along the A4061towards Hirwaun have extensive views out across the Hirwaun Valley and beyond to Mynydd-y-glog in the mid distance (other side of the valley) and then beyond to the Brecon Beacons. Those using the A4059 will have much more restricted views of the Project Site due to vegetation and the natural topography screening the Project Site.

11.6.58 Local B Roads and trackways will have a variety of views of the Project Site. Many of the views from these roads are curtailed by local vegetation or buildings.

11.6.59 Important visual amenity considerations include public footpaths in the area and any Open Access Land (such as Hirwaun Common and Mynydd-y-glog).

Baseline Views

11.6.60 The potential visual amenity effects arising from the Project Site have been considered throughout the Study Area. A preliminary survey was

carried out to identify useful viewpoints for the impact assessment. In all, 13 viewpoints (noted below as preliminary Viewpoints - (pVP) were visited. These locations were initially selected as they provided a 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 key receptor points.

11.6.61 Therefore the list of viewpoints in the PEIR is only preliminary and will be further refined/ added to following discussions with NRW, RCTCBC and BBNPA. Following initial discussions with NRW and BBNPA a further 8 additional viewpoints (apVP) were identified to provide a wider coverage of the area. However, these have not yet been visited in the field. All 21 viewpoints are identified on Figure 11.3. A final agreed list of viewpoints will subsequently be used for the full assessment and for a selection of supportive photomontages. The field survey work will be undertaken during the winter season so that any intervening deciduous vegetation will be in its winter state without leaves.

11.6.62 The following description for the Preliminary Viewpoints are for the purposes of better understanding the local context. The additional preliminary viewpoints have not been visited in the field and are therefore not included in the descriptions. An agreed set of viewpoints will be used for the actual assessment and fully described in the Environmental Statement.

Preliminary Viewpoints

11.6.63 **Thirteenth Avenue pVP1** is located at the junction of Thirteenth Avenue and Rhigos Road. At this point, the industrial estate is a mix of scattered offices and manufacturing units both in use and in a redundant state. There is no clear view of the Project Site as the natural topography and tall pine trees screen views to the east.

11.6.64 **Sixteenth/Seventeenth Avenue pVP2** is located at the north western edge of Hirwaun Industrial Estate, at the junction of Sixteenth and Seventeenth Avenue. From the viewpoint there are views across scrubland with industrial units to the north and south. There is no clear view as the natural topography and tall pine trees help to screen the Project Site.

11.6.65 **Draw Farm pVP3** – No View.

11.6.66 **Llwyncoch pVP12** – No View.

11.6.67 **A4061 pVP4** is located along the A4061 road travelling downhill. The landscape is widely exposed and consists of open moorland with

extensive views of the valley floor and hills beyond. The proposed development is clearly visible with the reflective white roofs dominating the view. In the distance the peaks of the Brecon Beacons can be clearly seen along with Penderyn Reservoir.

11.6.68 **Mount Pleasant pVP5** – No View.

11.6.69 **Cemetery pVP6** is located within the Cemetery grounds, just off the A4059. The site is dominated by mature trees running along access roads forming avenue style planting. In the foreground a coal loading bay and conveyor unit dominate the view. The adjacent landscape is open pasture and scrub which forms part of the Blaen Cynon Special Area of Conservation. There is no clear view of the Project Site due to the natural topography and vegetative screening.

11.6.70 **Cwm – hwnt pVP11** – No View.

11.6.71 **Farmstead pVP13** – No View.

11.6.72 **Pantcefnffordd pVP7** – No View.

11.6.73 **SW Pantcefnffordd pVP8** is located in open countryside south west of Pantcefnffordd with clear views of Hirwaun and the valley below. The surrounding landscape consists of a country lane running through moorland and pasture with oak woodland (stunted) and scattered hawthorn. The white roofs of Hirwaun Industrial Estate are clearly visible from the viewpoint.

11.6.74 **Smiths Avenue pVP9** – No View.

11.6.75 **Gliding Club pVP10** – No View.

Viewpoints for consultation

11.6.76 In addition to the list of preliminary agreed viewpoints above, a series of preliminary photomontages have been produced, showing a representation of how the Power Generation Plant may look from a range of locations around the Project Site. These photomontages are shown in Figures 11.5 – 11.11.

11.6.77 Although not all of these photomontages will be used in the final assessment, they nevertheless give a preliminary indication of how visible the Power Generation Plant is likely to be from a range of different locations.

Summary Table 11.10: Baseline Views

Receptors: H = Residential; R = Recreational; T = Road user or worker; and C = Cultural heritage

Viewpoint	Receptor	Location	Grid Ref.	Existing View	Predicted View	Receptor Sensitivity/ Magnitude of Change
VP1	H/T	**Hughes's Patch** –Along Rhigos Road.	928, 062	B Road. Hedgerows with occasional trees. Open fields to south. Housing development to north.	No view of Project. Screened by vegetation and landform.	**MEDIUM Sensitivity**
VP2	H/T	**Castell Farm** – Edge of housing development between Rhigos Road and A465.	929, 064	B Road. Hedgerows with occasional trees. Detached dwellings. Open fields to east.	No view of Project. Screened by vegetation and landform.	**MEDIUM Sensitivity**
VP3	H/R	**Draw Farm** – Public Right of Way at the edge of housing development.	925, 054	Public Right of Way. Edge of housing development. Hedgerows with occasional trees. Open fields/countryside.	No view of Project. Screened by vegetation and landform.	**MEDIUM Sensitivity**
VP4	R	**Hirwaun Common** – Public Right of Way at the edge	937, 051	Public Right of Way. Near A Road Open countryside.	Partial view of Project.	**HIGH Sensitivity**

Viewpoint	Receptor	Location	Grid Ref.	Existing View	Predicted View	Receptor Sensitivity/ Magnitude of Change
		of the common.				
VP5	H/T	**Mount Pleasant** – Edge of housing development along the A4059.	953, 059	A4059 Road Views across farmland. Trees restrict view of development.	No view of Project. Screened by vegetation and landform.	**MEDIUM Sensitivity**
VP6	T	**Trebanog fawr** – Along the A4059.	949, 073	A4059 Road Views across open farmland. Hedgerows with occasional trees. Trees restrict view of development.	No view of Project. Screened by vegetation and landform.	**MEDIUM Sensitivity**
VP7	H/R/ T	**Pantcefnffordd** - Public Right of Way at the edge of the Penderyn village.	945, 085	C road. Stonewalls border road. Trees divide farmland and restrict views.	No view of Project. Screened by vegetation and landform.	**MEDIUM Sensitivity**
VP8	R	**Clwyd-rhyd-fan** - Public Right of Way near Ffynnon Ddu (spring).	931, 084	Public Right of Way. Open countryside. Views of Hirwaun.	Partial view of Project.	**HIGH Sensitivity**
VP9	H/R	**Smiths Avenue** - Public Right of Way near housing development at Cefn Rhigos.	916, 067	Public Right of Way. Near B Road Open countryside.	No view of Project. Screened by vegetation and landform.	**MEDIUM Sensitivity**

Viewpoint	Receptor	Location	Grid Ref.	Existing View	Predicted View	Receptor Sensitivity/ Magnitude of Change
				Trees and hedgerows restrict views.		
VP10	R	**Gliding Club** - Public Right of Way near Waun-grwn Place.	909, 065	Public Right of Way. Near B Road Trees and hedgerows restrict views.	No view of Project. Screened by vegetation and landform.	**MEDIUM Sensitivity**
VP11	T	**Cwm – hwnt** – junction near Rhigos Bryn.	916, 056	B Road. Row of detached dwellings. Hedgerows with occasional trees. Views of open countryside.	No view of Project. Screened by vegetation and landform.	**MEDIUM Sensitivity**
VP12	H	**Llwyncoch** – residential dwelling overlooking Hirwaun.	972, 063	Public Right of Way. Near A465 Road. Hedgerows with occasional trees. Views of open countryside.	No view of Project. Screened by vegetation and landform.	**MEDIUM Sensitivity**
VP13	T	**Farmstead** – Public Right of Way north of Penderyn.	946, 103	A4059 Road. Views of open countryside. Stonewalls, hedgerows and trees. Views across Hirwaun.	No view of Project. Screened by vegetation and landform.	**HIGH Sensitivity**

11.7 Preliminary Assessment of Potential Impacts

Key features of the proposed Project.

11.7.1 There are three key elements to the Project; the Power Generation Plant, the Gas Connection, and the Electrical Connection.

Power Generation Plant

11.7.2 The Power Generation Plant comprises gas turbine generators, cooling equipment; workshops and stores; water tanks; administration and control building; gas receiving station; auxiliary boiler, transformers, gatehouse and various other buildings and associated equipment. The 'worst case scenario' which has been used for assessing the Power Generation Plant in this preliminary LVIA is set out in Table 11.1.

11.7.3 Construction / demolition and commissioning will take between 18 and 36 months, depending on the final choice of plant configuration selected.

11.7.4 The main works associated with the construction / demolition phase would be the demolition of existing buildings, removal of old foundations / hardstanding, excavation and site levelling for new foundations and, potential piling (if required).

11.7.5 A small laydown area to the south of the main Power Generation Plant Site (to the south of Main Avenue) could be used as a laydown area for the storage of plant and equipment during construction.

11.7.6 Indicative dimensions of all plant items are provided in Table 4.1.

11.7.7 The key visual effects arising from the Power Generation Plant will be during the operational phase and will be in relation to the gas turbine generators and their associated stacks 35m high. Although the Power Generation Plant Site is already well screened by trees on the existing industrial estate, the stacks are likely to be visible from locations in and around the Project Site as well as from further afield.

11.7.8 Views from the southern side of the valley looking into the National Park will have the stacks in the foreground. These views into the National Park (in particular from the open access areas of Hirwaun Common) are the most significant and it will be important to protect the special qualities of the Park as viewed from outside the boundaries of the National Park. However, as these long distance views of the National Park are only obtainable from an elevated position, the view of the stacks will be from above. Therefore the stacks and buildings will be viewed from above and appear to have diminished height against

the background. An important visual element will be that the buildings and stacks will not be seen against the sky, but will be seen against a backdrop of other industrial buildings and roads and general woodland/ screen planting.

11.7.9 Views from the north side of the valley are from within the National Park. Recreational receptors within the Park are an important consideration as the amenity of key routes for walking, cycling and horse riding should not be detrimentally affected by development on this southern fringe. The open access areas of Moel Penderyn and Mynydd-y-glog will afford views along and across the Cynon Valley. Whilst the views to the south will be dominated by the hills overlooking the valley, the remnants of open cast coal mining, the infrastructure passing along the valley floor such as roads; former railway; overhead powerlines; and industrial units, all contribute towards an industrial/ peri-urban landscape within the valley. Therefore the significance of the visual effects of the power plant on views to the south will be much reduced due to the disturbed landscape surrounding the Project Site.

Sources of potential impact during construction / demolition

11.7.10 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 / demolition 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 / demolition activities including the movement of large scale construction equipment, i.e. tower cranes, smaller cranes, batching plants drilling rigs etc; 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 Power Generation Plant and any other ancillary buildings; and

- Construction of the permanent perimeter security fence.

11.7.11 In addition there will be impacts associated with the construction of other infrastructure such as the Gas and Electrical Connection. Construction impacts would be similar to those described above. They would be temporary and would not require extensive areas of hardstanding.

Sources of potential impact during operation

11.7.12 The following long term actions will contribute to the landscape and visual effects from the Project:

- The introduction of the Power Generation Plant and permanent structures associated with the Gas and Electrical Connection. . The final layout proposal will incorporate a degree of flexibility with respect to the actual sizing and siting of buildings / structures;
- The creation of new hard and soft landscape elements associated with the Power Generation Plant;
- Increased vegetation cover following tree and shrub mitigation planting;
- New perimeter security fencing along the boundary of the Project Site;
- Operational traffic; and
- Increased lighting.

Sources of potential impact during decommissioning

11.7.13 Temporary landscape and visual impacts similar to those described for construction are likely to arise during decommissioning.

Gas Connection (Options 1 and 2)

11.7.14 The Gas Connection comprises a new gas pipeline that connects the Power Generation Plant with Feeder 2 on the National Transmission System. The gas pipeline would be buried to a depth of cover, which is in accordance with recognised industry standards. For example, depths of cover would be: No less than 1.2m on agricultural land, No less than 2m under road crossings; and No less than 1.7m under water crossings. The route of this pipeline is shown on Figure 4.2.

11.7.15 Two possible connection points have been identified as being potential locations to connect into the NTS Infrastructure.

11.7.16 Connection to the National Transmission System would require the installation of a Minimum Offtake Connection (MOC) facility of around 30m x 30m and a Pipeline Inspection Gauge Trap facility (PTF) of around 30m x 23m, which would be located within the Power Generation Plant Site.

11.7.17 Technical advice would 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.

11.7.18 Hedge planting could be undertaken directly across the pipeline where visual screening is required and where it is necessary to gap up a field boundary hedge. Planting in these locations is undertaken using shallow rooting species including hawthorn, blackthorn, elder, hazel and privet. Dense mass planting cannot be undertaken within 10m of a pipeline, although individual specimens or a row of trees could be planted between 6 and 10m of it. Plant species should be selected from their list of suitable species.

11.7.19 Given the similarity of the landscape in which the two options are being proposed, there are not anticipated to be significant differences between the two options.

11.7.20 Visual amenity effects associated with the gas pipeline will be minimal as the pipeline will be underground. In sensitive landscapes the construction of an underground pipeline can have noticeable impacts on landscape features such as hedges, trees and leave crop marks in fields. Route Option 1 for the gas pipeline may have some minor effects on the landscape where it crosses hedge boundaries, but these crossings will be replanted and are unlikely to leave significant residual effects. Route Option 2 will have no landscape impact as it follows an existing road for the majority of its length.

Electrical Connection (Options 1 and 2)

11.7.21 The Electrical Connection comprises a new 400kV underground cable or overhead line, running west from the boundary of the Power Generation Plant Site to the new Rhigos Substation (due 2016). A new banking compound would also be required, This would be situated within Power Generation Plant Site.

11.7.22 It is possible that the connection would be via underground cable (option 2) or overhead line (option 1). If an overhead line is required it is likely to have tower heights ranging between 35m and 45m depending on design requirements and have a span of approximately 250m. Detailed technical advice would be sought from National Grid prior to

developing the planting proposals. An overhead line may be considered preferable in order to avoid direct impacts on sensitive habitat land.

11.7.23 Should an underground cable be selected then this would be buried along its entire length. Therefore, an underground cable may be preferable to limit visual impact.

11.7.24 Electrical Connection route corridor option 1 will pass through the western part of the Hirwaun industrial estate. As it would be passing through an industrial landscape there will be no sensitive landscape receptors. However, the overhead lines would be viewed from the wider landscape and be visible from within the National Park. This effect would be tempered by a backdrop of existing infrastructure and buildings and in some views, partial screening by vegetation.

11.8 Possible Mitigation

11.8.1 Mitigation of adverse environmental impacts can be achieved by avoidance, reduction, remedying of, or compensation. Primary mitigation measures form an intrinsic part of the Project design through an iterative process. Secondary mitigation measures are those that are designed to address specifically the remaining (residual) adverse effects of the final development proposals.

11.8.2 Mitigation in the form of landscaping and the planting of trees and shrubs will be developed during the design of the building and structures and will be presented in the ES. Planting constraints are likely to exist in the vicinity of the Project Site. They may include buried archaeology, ecological habitats, and underground or overhead services. Mitigation planting will be developed to fulfil ecological objectives and enhance biodiversity where possible. The landscape strategy will comprise proposals for planting and its subsequent management for a minimum period of 5 years to ensure the landscape objectives are achieved successfully.

11.8.3 As part of the iterative design process for the development, primary mitigation relating to the design, layout, selection of materials and colours for the SCGT structures and associated infrastructure will be reviewed following this preliminary assessment. Planting to screen views from highly sensitive receptors will be incorporated into the Project Site landscape strategy where practical.

Construction / Demolition

11.8.4 During construction / demolition, the following measures would be included in the CEMP:

- Limiting land clearance and occupation to the minimum necessary for the works;
- Temporary protection of vegetation and other vulnerable features to be retained in accordance with current industry standards and recognised best practice;
- Temporary storage of topsoil and any other material considered of value for retention. Where practical stores would be sited to screen the construction works from highly sensitive receptors;
- Design and layout of construction areas to reduce adverse impacts arising from the temporary security fencing and lighting;
- Agreed site access routes;
- Restricting construction site lighting outside normal working hours to the minimum required for workforce and public safety and security. Directional luminaries to be used to limit unwanted light spill;
- Maintenance of tidy and contained site compound;
- Temporal measures including the removal of all temporary structures and stockpiles when no longer required, and prompt reinstatement of temporary construction areas;
- Spreading of topsoil, reseeding and planting within the Project Site and adjoining areas that are to be reinstated as soon as possible after sections of work are complete; and
- Management of all reinstated area in accordance with a 5 year aftercare plan to ensure full and successful establishment of the planting to the approval of the planning authority.

Operation

11.8.5 During operation, mitigation would include:

- The high quality design of the proposed buildings, structures and perimeter security fencing;
- Structure / hedgerow planting on the perimeter of the Power Generation Plant Site to reduce views of ground level operational activities;

- 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 form an ecological network;

- Amenity planting at the Power Generation Plant Site entrance using a proportion of large size trees for immediate effect; and

- The design of external lighting to reduce trespass, glare and spillage and by restricting usage to the minimum periods required.

Decommissioning

11.8.6 Decommissioning would comprise the removal of all Power Generation Plant items and restoration of the Project Site. Similar mitigation measures to those described above for construction would be implemented during decommissioning.

11.9 Preliminary Assessment of Residual Effects

11.9.1 On the basis of the preliminary environmental information and assessment described above, taking into account potential mitigation measures, a preliminary assessment is that there are unlikely to be significant impacts on the landscape or visual amenity of the area from construction / demolition, operation or decommissioning of the Project.

11.9.2 The Power Generation Plant Site is already well screened and additional screen planting is likely to be used as landscaping mitigation. The Project Site is currently industrial in nature and the Power Generation Plant Site is occupied by a large storage and distribution warehouse. There would therefore not likely be a significant change to the baseline.

11.10 Next Steps

11.10.1 A full landscape and visual impact assessment (LVIA) will be undertaken in accordance with the assessment methodology and significance criteria, to determine potential significant landscape and visual impacts and to develop appropriate mitigation.

11.10.2 Further consultation will be undertaken with RCTCBC and the BBNPA to select viewpoints to be assessed in the LVIA. Photomontages of the Project will be produced from selected viewpoints in consultation with the local planning authorities.

11.10.3 A visual survey will be undertaken during the winter to assess potential views of the development when screening from vegetation is at its least effective.

11.10.4 The information presented in this Section of the PEIR will be supplemented in the ES.

SECTION 12

WASTE MANAGEMENT AND HEALTH

12 WASTE MANAGEMENT AND HEALTH

12.1 Introduction

12.1.1 This Section of the PEIR addresses the waste management strategy and potential public health impacts of the proposed Project.

12.1.2 At present, it is anticipated that the main potential impacts to human health arising from the proposed Project will result from changes to local air quality during the construction / demolition, operation and decommissioning stages. However, as with any project of this magnitude, there are also potential impacts arising from contaminated land, site run-off and noise impacts.

12.1.3 The biggest potential impacts regarding waste management will be from site preparation and demolition of existing buildings.

12.1.4 The results of preliminary technical assessments relating to specific environmental impacts are presented in Sections 6 to 11 and 13 to 14 of this PEIR. This section will consider these assessments and aims to:

- identify impacts arising from the generation of waste during the construction / demolition, operational and decommissioning stages of the Project and assess the significance of these impacts and how they can be mitigated; and
- describe other potential impacts arising from the Project which may be detrimental to human health and how these impacts can be mitigated.

12.2 Legislative and Policy Context

National Policy Statements

12.2.1 NPS EN-1sets out assessment principles that are particularly likely to be relevant to energy NSIPs. In relation to waste and health related impacts it states:

- Safety (paragraph 4.11) and Hazardous Substances (4.12): describes the relationship with other regimes and the general requirement that the decision maker will need to be satisfied that they are complied with.
- Health (4.13): requires that an assessment of potential health impacts is made in relation to each element of the proposed Project, such as in relation to air quality, waste or noise and

describing the relationship with other regimes, stating at 4.13.5 that where separate air quality regulations are (or will be) satisfied then the decision maker is likely to consider these effective mitigation, whereas for noise or other aspects it will take account of health concerns when setting requirements.

- Waste Management (5.14): requires that waste is managed through the 'waste hierarchy', explains the relationship with the environmental permitting (EP) regime, and sets assessment principles to be used by the Secretary of State in determining a DCO Application for an energy NSIP. These include the suggestion of a site waste management plan within the application, demonstrating that waste volumes are minimised, the impacts of at least the first five years of operation are assessed, and that waste is properly managed.

Other National and Local Policy

12.2.2 Whilst the PA 2008 is clear as to the primacy of the relevant NPS, other national and local planning policy can be considered important and relevant by the Secretary of State in the determination of energy NSIP.

12.2.3 At a regional level (South East Wales), the Regional Waste Plan provides a long term strategic waste management strategy and land-use planning framework for the sustainable management of waste and recovery resources in South East Wales. One of its aims amongst others is to minimise the adverse impacts on the environment and human health.

12.2.4 At a local level, waste policy is addressed through the Rhondda Cynon Taf Council Local Development Plan (LDP) which was adopted in 2011. The council identifies that there needs to be a reduction in waste produced throughout the region, and a greater emphasis on re-using and recycling waste materials needs to be employed.

12.2.5 The council sets out its core strategy on waste in CS 9, and its area wide (North and South) policies in AW 2 sustainable locations, AW 4 Community infrastructure and planning obligations.

12.2.6 These seek to protect humans and the wider environment from waste and pollutants by avoiding developments that could have adverse effects on both human and environmental receptors and where possible mitigate any possible effects by situating such developments in areas more suited to dealing with waste streams and pollutants.

12.3 Realistic Worst Case Scenario for Assessment

12.3.1 In respect of waste management and health, the realistic worst case scenario from within the proposed Project parameters (which are described in Section 4 of the PEIR) are set out in Table 12.1 below.

12.3.2 The reason that the parameters identified in Table 12.1 represent the realistic worst case in relation to waste management and health impacts are that a greater number of gas turbine generator units will give rise to more waste during operation (e.g. more filters, more waste water from blade washing) and, as described in Sections 6 and 7 of this PEIR, give rise to the largest potential impacts in terms of air quality and noise, which, in turn has the potential for more detrimental impacts on human health.

12.3.3 A preliminary assessment of both options for the Gas Connection and the Electrical Connection is presented in this section. A decision on the preferred option for each will be taken following consultation.

Table 12.1 - Worst case parameters for the proposed Project considered within this assessment

Parameters	Details
Power Generation Plant	
Number of gas turbine generator units	5 (~ 59 MWe)
Number of stacks	5
Unit type	Aero derivative

12.4 Assessment Methodology and Significance Criteria

12.4.1 The assessment methodology and significance criteria used in this section differ for each of the potential impacts considered. They are set out in detail in Sections 6-11 and 13-14 of this PEIR. Where the methodology differs for determining impacts specific to human health, these have been stated.

12.5 Consultation

12.5.1 A summary of the consultation responses received to date in relation to waste management and health and how these have been considered is provided in Table 12 in Appendix A of this PEIR.

12.6 Baseline Conditions and Receptors

12.6.1 In terms of waste generation, the Power Generation Plant Site is within an area currently occupied by a large industrial building. As part of the construction / demolition works, the existing building, foundations and some of the associated hardstanding will need to be removed and disposed of. Some of the existing buildings which will be demolished as part of the construction of the Power Generation Plant are known to contain asbestos.

12.6.2 There is also the potential that, due to former site uses, land on which the Power Generation Plant is sited has been contaminated. Previous intrusive site investigations undertaken at the site of the Rhigos Substation recorded areas of made ground and deposits of 'waste' although no elevated concentrations of contaminant were recorded in comparison to CLEA guidelines.

12.6.3 For health impacts, the specific receptors for each area of impact considered within this PEIR (Sections 6 to 11 and 13 to 15) are discussed in those sections.

12.6.4 In general, for public health impacts to be realised, the following must exist:

- A source of (e.g.) contamination, dust or nuisance noise;
- A pathway; and
- A human receptor.

12.6.5 Given the nature of the Project, there are potential sources of contamination (e.g. stack emissions may result in a change in air quality). Therefore, to minimise public health impacts, the sources must be controlled and / or pathways to receptors must be blocked.

12.6.6 Receptors can become exposed to contamination via dermal contact, oral contact or inhalation of a contaminated medium. Receptor sensitivity varies in relation to health, age and duration of exposure.

12.6.7 In this Section, potential receptor groups refer only to human receptors that could potentially come into contact with contaminants resulting from the Project: These receptors include:

- Residents of surrounding towns / villages;
- Adjacent commercial users;
- Recipients of agricultural produce;

- Recreational users (e.g. users of public rights of way); and
- Users of transport infrastructure.

12.6.8 Surrounding towns and villages include:

- Rhigos (1.3km south west);
- Hirwaun (1.4km east);
- Penderyn (1.8km north); and
- Aberdare (5km east).

12.6.9 Adjacent commercial users include other businesses within the Hirwaun Industrial Estate.

12.6.10 Section 4 of this PEIR provides further details of the proposed Project Site and its surroundings.

12.7 Air Quality

12.7.1 Section 6 of this PEIR provides a description of the preliminary assessment of the air quality impacts of the proposed Project undertaken as part of the EIA process.

12.7.2 The identified primary pollutants of concern from an air quality perspective are:

- Dust (PM_{10} and $PM_{2.5}$) during construction / demolition activities; and
- Oxides of nitrogen (NO_x) during operation.

12.7.3 Elevated levels of these pollutants could cause negative health impacts to human receptors. Children are particularly susceptible with regards to elevated NOx concentrations.

12.7.4 DEFRA provides health bandings for concentrations of air pollutants likely to induce public health impacts in susceptible individuals[26]. These can be used as guidelines against which the human health impact of emissions to air can be assessed. For PM_{10} and NO_x, details are provided in Table 12.2.

[26] *DEFRA Air Pollution Bandings: Available at http://uk-air.defra.gov.uk/air-pollution/bandings?view=no2#pollutant (Accessed 06/09/2011).*

Table 12.2 - DEFRA Air Quality Health Bandings

Banding	Health Descriptor	PM_{10} Concentration ($\mu g/m^3$) (Hourly Mean)	NO_x Concentration ($\mu g/m^3$) (Hourly Mean)
Low	Effects unlikely to be noticed, even by sensitive individuals	0 – 64	0 – 286
Moderate	Mild effects may be noticed by sensitive individuals	64 – 96	287 – 572
High	Significant effects noticed by sensitive individuals	97 – 129	573 – 700
Very High	Effects on sensitive individuals may worsen	130 +	764 +

12.7.5 Additionally, the AQS Regulations specify a series of standards and objectives for air quality in the UK. The objectives are summarised in Section 6 of this PEIR.

Construction and Demolition

Whole Project

12.7.6 During construction and demolition, dust emissions from the proposed Project will not be more significant than those normally encountered on construction sites. The dust particles that may be emitted during construction would be of large diameter and would therefore tend to resettle on the ground within 100 m to 500 m of the source; approximately 70 per cent of the dust would generally settle out of the atmosphere within 200 m, and less than 10 per cent could be expected to remain at a distance of 400 m. This is reflected in the distance-related significance criteria presented in Section 6 of this PEIR.

12.7.7 In order to limit any impacts, a CEMP will be prepared prior to construction, which will be prepared in accordance with the outline CEMP to be produced as an Appendix to the final EIA. This will require HPL and its contractors to implement a comprehensive dust suppression / mitigation and monitoring programme, based on '*The control of dust and emissions from construction and demolition – Best Practice Guidance*' (Greater London Authority, 2006).

12.7.8 The implementation of these mitigation measures, as appropriate to the level of risk for each area / activity within the construction site (and the access roads to the site) will ensure that the impact of dust emissions from the construction site will not be significant. This will prevent construction work generating levels of atmospheric dust and emissions which would constitute a health hazard or nuisance to local people or industry.

Operation

Power Generation Plant

12.7.9 To accommodate all operating scenarios for the Power Generation Plant, a stack height of at least 25 m would be required in order to ensure adequate dispersion of the principal emissions from the Power Generation Plant.

12.7.10 The preliminary results of the air dispersion modelling studies are presented in Section 6 of this PEIR which presents the anticipated maximum process contribution to ground level concentrations of the identified pollutants as a result of operation of the Power Generation Plant, together with an assessment of the significance of the resulting total predicted environmental concentration.

12.7.11 Based on the bandings shown in Table 12.2 and the anticipated air quality impacts (including the maximum predicted environmental concentration) of the Power Generation Plant detailed in Section 6 it is extremely unlikely that the Power Generation Plant will have any adverse public health impacts with respect to air quality.

12.7.12 Furthermore, in order that the Power Generation Plant operates in accordance with the appropriate legislation and guidance, and to avoid air quality reaching prolonged unsafe levels, the Power Generation Plant will be designed in accordance with the Best Available Techniques as outlined in the 'Reference Document on Best Available Techniques for Large Combustion Plant' (EU IPPC Bureau, 2006) and the Environment Agency (EA) Sector Guidance Note 'How to comply with your environmental permit: Combustion Activities (EPR 1.01)'

(2009). This will be addressed through the Environmental Permit for the proposed Project.

12.7.13 The air quality assessment will also address the potential for impacts arising from increased vehicle movements as a result construction of the Project.

Gas and Electrical Connection (Options 1 and 2)

12.7.14 The operation of the Gas and Electrical Connection (both options for each) are not considered to have the potential to give rise to any impacts on air quality. There will be no emissions resulting from their operation.

Decommissioning

Power Generation Plant

12.7.15 Works to decommission the structures within the Power Generation Plant Site will be similar to those for construction. Therefore, the assessment undertaken for the construction phase is capable of acting as a proxy in each case for the demolition and decommissioning of the proposed Project. The air quality assessment has adopted this approach. Therefore, it is anticipated that the air quality impacts from decommissioning on public health will be similar to those for construction.

Gas and Electrical Connection (Options 1 and 2)

12.7.16 Decommissioning of the Gas and Electrical Connection are not anticipated to have any impacts on human health as a result of changes to air quality. It is likely that the Gas Connection and Electrical Connection route corridor option 2 will be left in situ and no further ground disturbance will be caused. For Electrical Connection Option 1 the overhead line will be removed and can be considered part of the overall decommissioning of the Power Generation Plant.

Conclusion

12.7.17 Based on the results of the above assessments, it can be concluded that the proposed Project will result in no likely significant effects on public health with respect to air quality.

12.8 Noise and Vibration

12.8.1 Section 7 of this PEIR provides details of the preliminary noise and vibration impact assessment undertaken for the proposed Project.

12.8.2 The existing baseline conditions at NSRs in the vicinity of the proposed Project have been established by way of an attended noise survey as outlined in Section 7.

12.8.3 In order to determine the study area for the noise impact assessment, RCTCBC were consulted in order to agree a baseline noise survey methodology for the EIA for the Project. These discussions identified the nearest residential properties that could potentially be affected by noise generated during construction / demolition, operation and decommissioning of the Project, and considered to be noise sensitive receptors (NSR). These are set out below in Table 12.3.

Table 12.3: NSR Measurement Positions

Location Number	Location	Approximate Distance from Centre of Power Plant Site
1	Rhigos Road	262
2	Hoel-Y-Graig	1250
3	Halt Lane	940
4	Castell Farm	730
5	Tai Cwplau	782
6	Willow Farm	540

Construction and Demolition

Whole Project

12.8.4 Construction / demolition activity inevitably leads to some degree of noise disturbance at locations in close proximity to the construction activities. It is however a temporary source of noise. Noise levels at any one location will vary as different combinations of plant and machinery are used, and throughout the construction of the proposed Project as the construction / demolition activities and locations change.

12.8.5 The outline construction noise assessment identifies that the predicted cumulative construction level is below the daytime limit of 65 dB(A), and the evening and weekend limit of 55 dB(A) at all receptors. Therefore, the significance of the overall impact of construction noise is

predicted to be minor at all NSR locations, as stated in Section 7 of this PEIR.

12.8.6 Noise generating activities during construction and demolition will also be subject to the approved CEMP. This will be secured by a requirement for the submission to and approval by RCTCBC of a CEMP (an outline of which will be produced as an Appendix to the final ES). In addition, a requirement attached to the DCO will control noise levels at residential locations, and provide for the monitoring of noise levels at these locations during construction / demolition.

Operation

Power Generation Plant

12.8.7 The computer noise modelling software CadnaA (Version 4.1), which uses the ISO 9613 propagation algorithms has been used to undertake a provisional noise calculation. The model estimates the contribution to noise levels at each NSR location, and has been created using a representative sound power level for the whole Project.

12.8.8 The model is intended to provide an indicative assessment only for the operational phase of the Project.

12.8.9 The detailed operational noise modelling will be undertaken as part of the EIA, when full details of all plant items will be available.

12.8.10 The predicted noise levels at sensitive receptors from the Project are used to inform the BS 4142 operational noise assessment.

12.8.11 The semantics used for assessing the likelihood of complaints due to the introduction of a new industrial noise source are as follows:

- 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.
- 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.

12.8.12 Table 7.9 shows that at locations 3, 4, 5 and 6 the predicted noise levels from the proposed plant are minor adverse whilst at locations 1 and 2 predicted noise levels are major adverse. It is noted that the

operational noise predictions are subject to change following the detailed noise modelling that will be undertaken during the EIA.

12.8.13 A requirement attached to the DCO will require that an acoustic design report will be submitted to and approved by RCTCBC prior to commencement of construction / demolition. This will ensure that the proposed Project incorporates noise-minimising measures by design. A requirement will provide for the on-going monitoring of noise at the boundary of the proposed Project Site to ensure that the specified noise levels for operation are met.

Gas Connection (Options 1 and 2)

12.8.14 As stated in Section 7.7, there may be a very slight noise produced by the AGI associated with the Gas Connection. However, this will be barely perceptible and will not cause any impacts to human health.

Electrical Connection Option 1

12.8.15 Should an overhead line be selected as the preferred Electrical Connection, there may be a very slight noise produced by electricity flowing through the line. However, this will be barely perceptible and will not cause any impacts to human health.

Electrical Connection Option 2

12.8.16 Should an underground cable be chosen as the preferred connection option, there would be no perceptible noise produced during operation of the connection.

Decommissioning

Whole Project

12.8.17 Works to decommission the Power Generation Plant will be similar to those for construction. Therefore, the assessment undertaken for the construction phase is capable of acting as a proxy in each case for the demolition and decommissioning of the proposed Project.

Conclusion

12.8.18 Based on the results of the above noise and vibration assessments, it can be concluded that that the proposed Project will have no adverse effects during the construction phase. The preliminary results of the operational noise assessment suggest that noise impacts will range from minor to moderate adverse.

12.9 Water Quality and Resources

12.9.1 Section 9 – Water Quality and Section 10 – Geology, Ground Conditions and Hydrogeology provide the water quality and resources impact assessments to date. The public could be exposed to contaminated water via:

- The recreational use of contaminated water;
- Drinking contaminated drinking water; or,
- Consuming agricultural produce which has come into contact with contaminated water.

12.9.2 Children and the elderly will be most vulnerable to negative health effects.

12.9.3 Exposure to contaminated water can have a wide range of health impacts. For example, acute level exposure to Poly-aromatic hydrocarbons (PAHs) leads to red blood cell damage which can lead to anaemia and a suppressed immune system[27].

12.9.4 Drinking water and surface water quality standards can be used to assess the safety of contamination levels. For example, the maximum allowable concentration of PAHs in drinking water is 0.1 µg/l, with anything above this concentration deemed unsafe if ingested[28].

Construction and Demolition

Whole Project

12.9.5 Several construction / demolition activities could require the disposal of water from the proposed Project Site including wheel washing facilities, welfare facilities and water used for dowsing (e.g. of cutting operations or stockpiles) and surface water runoff, as well as de-watering activities as a result of e.g. foundation excavation.

12.9.6 Construction activities may, if uncontrolled, potentially cause changes to surface water drainage due to the creation of soil piles formed during on-site excavation, levelling and other such on–site works. Impacts would be associated with the potential to alter the efficiency /

[27] *US Environmental Protection Agency: Available at:*

http://www.epa.gov/ogwdw/pdfs/factsheets/soc/tech/pahs.pdf (Accessed 07/09/2011).

[28] *DEFRA: Available at:*

http://dwi.defra.gov.uk/consumers/advice-leaflets/standards.pdf (Accessed 07/09/2011)

performance of the existing land drainage systems both on-site and in the vicinity of the proposed Project Site.

Operation

Power Generation Plant

12.9.7 During the operation of a SCGT power plant which incorporates air cooling, the use of operational water is minimal, as water is not required for the generation of steam or for cooling.

12.9.8 As such, the water at the Project Site during operation will be primarily for maintenance and domestic sanitation, with a small quantity required for NOx control.

12.9.9 This domestic / sanitary water will be discharged to a drainage system. Where appropriate, this drainage will be passed through oil interceptors and sediment traps which will be removed from site for disposal by a suitably licensed contractor.

12.9.10 There will be no uncontrolled discharge to neighbouring watercourses.

12.9.11 The proposed Project Site will be predominantly covered with hard standing and surface water from any potentially contaminated areas will be retained on-site.

12.9.12 The design of the surface and foul water drainage scheme will be subject to approval by NRW prior to commencement of construction.

12.9.13 Access to the Power Generation Plant Site will be strictly controlled and security measures will incorporate suitable fencing and the use of security cameras. These measures will be put in place to ensure controlled access Project such that no unauthorised persons will come into contact with any potentially contaminated materials. Therefore no potential pathway exists to impact on public health from contaminated water on-site.

12.9.14 Given the depth and low hydraulic transitivity of the superficial deposits overlying the Secondary aquifer A in the area, the potential for contaminated water percolating beneath the proposed Project Site into the Aquifer is considered negligible.

12.9.15 The handling and storage of chemicals, fuels, oils and lubricants on-site for the purposes of operation will be controlled by a requirement. This provides for the submission to and approval of handling and storage details to RCTCBC prior to commencement of operation of the proposed Project.

Gas and Electrical Connection (Options 1 and 2)

12.9.16 During operation, neither of the Gas Connection or Electrical Connection options require water. There will therefore be no impacts on water quality, resources or human health from operation of the connection.

Decommissioning

Whole Project

12.9.17 Works to decommission the Power Generation Plant and structures will be similar to those for construction. Therefore, the assessment undertaken for the construction phase is capable of acting as a proxy for the demolition and decommissioning of the proposed Project.

12.9.18 The geology and land contamination assessment has adopted this approach. Therefore, the surface water quality impacts from decommissioning on public health will be similar to those for construction.

Conclusion

12.9.19 Based on the results of the above assessments, it can be concluded that the proposed Project will result in no significant adverse public health impacts with respect to surface water quality.

12.10 Geology and Land Contamination

12.10.1 Section 10 – Geology, Ground Conditions and Hydrogeology provides the impact assessment to date. No ground investigations have been undertaken at the Project Site. However, given the previous site uses and the results of ground investigations at the adjacent Rhigos Substation development, there is the potential for contamination to be present at the Project Site. This will be investigated in more detail as the EIA progresses.

12.10.2 Soil guideline values can be found on the NRW website[29]; these provide guideline daily and mean exposures to contaminants according to land-use (residential, allotment and commercial) and could be used as guidelines against which soil samples could be compared to ensure the safety of future users.

[29] *Environment Agency Website: Available at:*

http://www.environment-agency.gov.uk/research/planning/64015.aspx (Accessed 07/09/2011)

Construction / Demolition

Whole Project

12.10.3 During construction / demolition, the existing soil conditions could potentially negatively impact upon construction workers. However, potential impacts to health (arising from oral, inhalation or dermal contact with potential contaminants within the made ground) are negated by the implementation of the confirmed mitigation measures (as set out in Section 10 of this PEIR) at all times. The most relevant of these confirmed measures is the appropriate use of PPE at all times. For the Power Generation Plant Site, when breaking ground, this PPE is likely to include gloves, mask, overalls and eye protection.

12.10.4 Additionally, an outline CEMP will include a suggested protocol to follow in the event of construction workers discovering contaminated material.

12.10.5 Potential impacts to public health (human receptors outside of the construction site) will be avoided by implementation of a Site Waste Management Plan, to be secured by a requirement. Measures will also be implemented to prevent the escape of contaminants. This will be secured by the CEMP, which must be approved by RCTCBC / NRW prior to commencement of construction / demolition.

12.10.6 Successful implementation of the mitigation measures discussed above and in Section 10 will result in there being no significant public health impact with regards to land contamination.

Operation

Whole Project

12.10.7 The proposed Project Site will predominantly comprise buildings and / or areas of hardstanding. A small part of the proposed Project Site may be landscaped but no areas of exposed (unvegetated) soils will remain and any landscaped areas will be covered with 600 mm of clean cover.

12.10.8 Therefore the potential pathway between any ground contaminants and site users will be broken. It is considered that the potential for direct contact (dermal, oral or inhalation) with any remaining contaminants present beneath the surface is extremely low for future site operatives.

Decommissioning

Whole Project

12.10.9 Works to decommission the Power Generation Plant and structures on the proposed Project Site will be similar to those for construction. Therefore, the assessment undertaken for the construction phase is capable of acting as a proxy in each case for the demolition and decommissioning of the Project. The geology and land contamination assessment has adopted this approach.

12.10.10 Therefore, the geology and land contamination impacts from decommissioning on public health will be similar to those for construction.

Conclusion

12.10.11 Based on the results of the above assessments, it can be concluded that that the proposed Project will result in no significant public health impacts with respect to geology and contamination.

12.10.12 The Power Generation Plant Site is an existing industrial site covered in buildings and hardstanding. The construction of the Power Generation Plant is likely to require site remediation in the form of removal of existing potentially contaminative materials (e.g. asbestos in existing buildings) upgrading of drainage systems and removal / covering of any ground contamination. Construction of the Power Generation Plant would not require the removal of any land currently used for agriculture. Therefore, based on the preliminary assessment undertaken to date (following the assessment criteria outlined in Tables 10.2-10.4), there is considered to be a moderate beneficial impact

12.11 Waste

12.11.1 In terms of waste generation, the Power Generation Plant Site is within an area currently occupied by a large industrial building. As part of the construction works, the existing building, foundations and some of the associated hard standing will need to be removed and disposed of. Some of the existing buildings which will be demolished as part of the construction of the Power Generation Plant are known to contain asbestos.

12.11.2 There is also the potential that, due to former site uses, land on which the Power Generation Plant is sited is contaminated.

12.11.3 The pathways for waste from the proposed Project to impact upon human receptors will potentially be through:

- Inhalation of emissions from waste; and

- Dermal contact / ingestion of leachate from waste that could contaminate soils.

12.11.4 The proposed Project will operate in full accordance with the Waste Framework Directive, the EPR and the Waste (England and Wales) Regulations 2011 (where relevant). HPL, at all phases of the Project, will seek to apply the waste hierarchy as part of their waste prevention and management policy.

12.11.5 The waste hierarchy consists, in order of preference, of:

- Prevention;
- Re-use;
- Recycling;
- Other recovery (e.g. energy recovery); and
- Disposal.

Construction / Demolition

Whole Project

12.11.6 A CEMP will be produced, which provides for the submission of construction method statements for approval by the local authority prior to commencement of construction, secured by a requirement attached to the DCO.

12.11.7 Measures 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.

12.11.8 The CEMP will ensure that 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. Where hazardous waste is transported from the proposed Project Site, it will be handled in accordance with relevant regulations, and, where necessary, be transported in sealed tankers.

12.11.9 Any asbestos present in the existing buildings at the Power Generation Plant Site which are to be demolished as part of the construction works will be removed and disposed of by a suitably licensed asbestos contractor. All works would be subject to a detailed working method statement and work would adhere to the “Control of Asbestos Regulations 2012” and associated guidance.

Operation

Whole Project

12.11.10 A feature of the gas turbine generator technology to be incorporated in the proposed Project is that waste generated should be minimal and will be restricted to the following:

- General office wastes;
- Used GT air intake filters (typically replaced annually);
- Used ion exchange resins or used RO membranes (typically replaced every 5 to 10 years);
- Separated oil / sludge from oil / water separators; and
- Used oil, chemicals or chemical containers.

Waste Classifications

12.11.11 There are a number of steps required in order to determine if a waste is hazardous or non-hazardous, as described in the EA "*Technical Guidance* WM2 - *Interpretation of the definition and classification of hazardous waste*" (2013).

12.11.12 The revised Waste Framework Directive (rWFD) (2008/98/EC) provides a Europe-wide definition of hazardous waste as, "*a waste possessing one or more of the 15 hazardous properties set out in Annex III of the rWFD*," and requires the correct management and regulation of such waste. Waste classification is based on the European List of Waste (Commission Decision 2000/532/EC) (formerly the European Waste Catalogue) and the '*hazardous properties'* provided in Annex III of the rWFD.

12.11.13 There are three categories of entries in the List of Waste (LoW):

- Absolute entries are automatically considered hazardous;
- Mirror entries are linked entries that are considered hazardous (or non-hazardous) if they contain "dangerous substances" and the waste possesses properties specified in Regulation (EC) 1272/2008 on the classification, labelling and packaging of substances and mixtures; and
- Non-Hazardous entries are neither absolute or mirror entries.

12.11.14 For the wastes identified in Paragraph 12.9.6, the relevant entries of the LoW are presented in Table 12.3.

TABLE 12.3 - EUROPEAN LIST OF WASTES ENTRIES – GENERAL*

Project Waste	LoW	Waste Descriptor	Type of Entry
General Office Waste	20 03 01	Mixed municipal waste	Non-Hazardous
Demineralisation Media	19 08 06*	Saturated or spent ion exchange resins	Absolute Hazardous
	19 08 08*	Membrane system waste containing heavy metals	Mirror Hazardous
Oily Water	13 05 02*	Sludges from oil/water separators	Absolute Hazardous
	13 05 03*	Interceptor sludges	Absolute Hazardous
	13 05 04*	Oil from oil/water separators	Absolute Hazardous
	13 05 05*	Oily water from oil/water separators	Absolute Hazardous
Waste Mineral Oil	12 01 06*	Mineral-based machining oils containing halogens (except emulsions and solutions)	Absolute Hazardous
	12 01 07*	Mineral-based machining oils free of halogens (except emulsions and solutions)	Absolute Hazardous
Compressor Wash Fluid	20 01 29*	Detergents containing dangerous substances	Mirror Hazardous
	20 01 30	Detergents other than those mentioned in 20 01 29	Mirror Non-Hazardous
Used Antifreeze	16 01 14*	Antifreeze fluids containing dangerous substances	Mirror Hazardous
	16 01 15	Antifreeze fluids other than those mentioned in 16 01 14	Mirror Non-Hazardous
Laboratory Waste	16 05 06*	Laboratory chemicals, consisting of or containing dangerous substances, including mixtures of laboratory chemicals	Mirror Hazardous
Discarded	16 05	Discarded inorganic chemicals	Mirror

Chemicals	07*	consisting of or containing dangerous substances	Hazardous
	16 05 08*	Discarded organic chemicals consisting of or containing dangerous substances	Mirror Hazardous
	16 05 09	Discarded chemicals other than those mentioned in 16 05 06, 16 05 07 or 16 05 08	Mirror Non-Hazardous
Scrap Metal	02 01 10	Waste metal	Non-Hazardous

* Note: Air filters are predominantly made of steel (frames) and plastic / fabric filter materials that are considered non-hazardous. However, power stations in the UK treat these as 'special wastes' (i.e. not 'hazardous') that are removed from site by suitably licensed contractors that have the capacity to process such items.

Waste Storage and Disposal

12.11.15 In addition, building waste will be produced. In order to facilitate the implementation of the Waste Framework Directive during decommissioning, much of the structures and equipment for the proposed Project will be made of materials suitable for recycling as far as is practicable. For example, a large proportion of the buildings will be constructed of pre-fabricated steel and will therefore be of interest to scrap metal merchants.

12.11.16 Only small quantities of potentially hazardous waste will be stored on-the Project Site at any time, and any such substances will be held in secured containers to prevent contaminant migration. Closed storage facilities or suitable dampening techniques will be utilised within the Project where emissions of dust etc. from waste are possible. All mitigation measures will be in full accordance with industry good practices.

12.11.17 All waste will be dealt with in a manner that complies with the relevant regulations and (upon leaving the Project Site) waste will be treated and disposed of by suitably licensed contractors.

<u>Decommissioning</u>

Whole Project

12.11.18 A full Environmental Departure Audit will be carried out prior to decommissioning. This will examine, in detail, all potential environmental risks existing at the proposed Project Site and make comprehensive recommendations for any remedial action required to remove such risks.

12.11.19 The decommissioning process will be in full accordance with the prevailing legislation, guidance will be followed and the departure audit will be complied with.

12.11.20 Following completion of the demolition, a Final Environmental Departure Audit will be carried out to ensure that all remedial work has been completed successfully; the audit reports will be made available to any future users of the Project Site.

Conclusion

12.11.21 Based on the results of the above assessments, it can be concluded that that the proposed Project will result in no adverse public health impacts with respect to waste.

Potential Mitigation Measures

12.11.22 In order to limit impacts to human health resulting from air quality, noise, or contamination, mitigation measures which are set out in Sections 6, 7, 9 and 10 of this PEIR are considered to be appropriate to mitigate any impacts to human health.

12.11.23 In terms of potential impact from waste, the following mitigation measures will be applied:

- Any substances will be held in secured containers to prevent contaminant migration. Closed storage facilities or suitable dampening techniques will be utilised within the Project where emissions of dust etc. from waste are possible. All mitigation measures will be in full accordance with industry good practices.
- All waste will be dealt with in a manner that complies with the relevant regulations and (upon leaving the site) waste will be treated and disposed of by suitably licensed contractors.
- A CEMP will be produced, which provides for the submission of construction / demolition method statements
- Measures 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.
- The CEMP will ensure that all construction waste will be dealt with in a manner that complies with relevant legislation and (upon leaving the site) waste will be treated and disposed of by suitably licensed contractors. Where hazardous waste is transported from

the proposed Project Site, it will be handled in accordance with relevant regulations, and, where necessary, be transported in sealed tankers.

- Any asbestos present in the existing buildings at the Power Generation Plant Site which are to be demolished as part of the construction works will be removed and disposed of by a suitably licensed asbestos contractor. All works would be subject to a detailed working method statement and work would adhere to the "Control of Asbestos Regulations 2012" and associated guidance.

12.12 Preliminary Assessment of Residual Effects

12.12.1 On the basis of the preliminary environmental information and assessment described above, taking into account potential mitigation measures, there are not predicted to be likely significant effects on waste management and public health as a result of the proposed Project.

SECTION 13

TRAFFIC, TRANSPORT AND ACCESS

13 TRAFFIC, TRANSPORT AND ACCESS

13.1 Introduction

13.1.1 This Section considers the likely impacts of the Project on the local transport network. A Transport Assessment (TA) will be prepared as a separate document to accompany the proposed DCO Application. This Section will report on the relevant findings at this preliminary stage of the assessment.

13.2 Legislative and Policy Context

13.2.1 The following describes the existing policy and existing transport infrastructure.

13.2.2 The TA will be prepared in accordance with the Department for Transport's Guidance on Transport Assessments which present a framework for assessing development in the context of its impact on their transportation assets.

National Policy Statements

13.2.3 As explained in Section 2, the NPS EN-1 explains the assessment principles to which the SoS will have regard in the examination of an energy NSIP (such as the proposed Project), and explains the generic traffic and transport impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (EN-2). The NPSs for Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5) provide specific considerations potentially relevant to the Gas Connection and Electrical Connection respectively.

13.2.4 Whilst the PA 2008 is clear as to the primacy of the relevant NPS, other national and local planning policy can be considered important and relevant by the SoS in the determination of an energy NSIP.

13.2.5 Section 5.13 of the National Policy Statement (NPS) for Energy EN-1 considers the impacts of traffic and transport. Paragraph 5.13.2 states that 'The consideration and mitigation of transport impacts is an essential part of the Government's wider policy objectives for sustainable development', therefore, it is necessary for projects that are likely to have significant transport implications a Transport Assessment and if appropriate a Travel Plan should be included.

13.2.6 The NPS states that where substantial impacts arise on the surrounding transport infrastructure, applicants should seek to mitigate them, including during the construction phase. The Infrastructure

Planning Commission may attach requirements where there is likely to be substantial HGV traffic, to control HGV numbers, parking and disruption.

Guidance on Transport Assessments (March 2007)

13.2.7 This document leads on from the PPG13 document, providing information on how to prepare a TA.

13.2.8 The paper outlines the need for the TA to encourage sustainable access and mitigate residual impacts of vehicles. It states that the goal of a TA is to estimate the impacts of the development and improve accessibility and safety for all modes, putting the focus on using public transport, walking and cycling.

Planning Policy Wales, Edition 5, November 2012

13.2.9 Planning Policy Wales (PPW) sets out the land use planning polices of the Welsh Government (WG) and is supplemented by a series of technical advice notes.

13.2.10 Transport guidance is outlined in Chapter 8 of the document. The guidance follows the guiding principle that new development should wherever possible be "accessible in the first instance by walking and cycling, then by public transport and then finally by private motor vehicles" (PPW5, para. 8.1.3).

13.2.11 A brief overview of the transport objectives are set out below:

- Locating development where there is good access by public transport, walking and cycling
- Locate developments near related uses to enable multi-purpose trips, thus reducing the number and length of journeys
- Supporting the provision of high quality public transport
- Supporting necessary infrastructure improvements
- Promoting sustainable transport options for freight, commerce and also rural areas
- Ensuring that transport is accessible to all, taking into account the needs of disabled and other less mobile people

Technical Advice Note 18 (Transport)

13.2.12 TAN 18 was published by the WG in March 2007 and is a supplementary document to Planning Policy Wales (PPW). It provides

guidance on issues relating to sustainable development through transport.

13.2.13 By integrating land use planning and transport, TAN 18 can help the WG achieve its wider sustainable goals, such as:

- Promoting resource and travel efficient settlement patterns
- Support the provision of high quality public transport
- Demand management through road user charging and workplace parking levy
- Road traffic reduction
- Ensure that major travel generating developments are easily accessible by a range of transport modes from nearby residential areas
- Inclusive mobility and access for disabled people
- Public transport integration across a wider area

13.2.14 With particular relevance to the Project, TAN 18 states that new developments or major alterations to existing developments must include appropriate provision for pedestrians (including those with special access and mobility requirements), cyclists, public transport, and traffic managements and parking provision.

13.2.15 In addition, developments that may incur an increase in travel demand should consider the potential for changing existing unsustainable travel through a coordinated approach to the development plan application and transport improvement.

Wales Transport Strategy (2008)

13.2.16 The Wales Transport Strategy 'One Wales: Connecting the Nation' was published in April 2008 by the WG. The main goal of this legislation is to '*promote sustainable transport networks that safeguard the environment while strengthening our country's economic and social life'.*

13.2.17 The following are identified as key points within the strategy:

- Integrate local public transport with any new developments
- Improve access to education, training, and lifelong learning
- Improve access to shops and leisure facilities

- Improve the impact of transport on the local environment while reducing the contribution of transport to air pollution and other harmful emissions
- Improve the efficient, reliable and sustainable movement of people around and within the new development

Wales Infrastructure Investment Plan

13.2.18 The WG is responsible for planning, constructing, and maintaining all of Wales' 1000 miles of Trunk Roads and 75 miles of Motorways'. The Wales Infrastructure Investment Plan (WIIP) for Growth and Jobs 'sets out the WG strategic investment priorities' through to 2014/15.

13.2.19 The priorities relevant to the proposed Project are:

- Economic growth – addressing urban congestion and improving access to key areas
- Improving inter-modal transport links
- Delivering more efficient and economical public services
- Improving the quality of the educational estate, particularly schools

CSS Wales Parking Standards (2008)

13.2.20 The standards outlined within this document aim to achieve 'a transparent and consistent approach to the provision of parking, submission of travel plans and sustainability considerations that will inform developers, designers and builders what is expected of them and from them at an early stage of the development process'.

13.2.21 Information is contained within the document relating to Industry and Industrial Warehousing although no reference is made to construction phases of these developments.

South East Wales Transport Alliance Regional Transport Plan

13.2.22 South East Wales Transport Alliance (SEWTA), which includes ten constituent councils, produced a 15 year long Transport Plan in 2010, and thus details the regional transport strategy from 2010 to 2025. The vision of the plan is to develop a 'modern, accessible, integrated and sustainable transport system for South East Wales which increases opportunity, promotes prosperity for all and protects the environment'. (SEWTA Regional Transport Plan, Page 18).

13.2.23 The Regional Transport Plan outlines thirteen main objectives, grouped under five headings, which are presented below.

Safety and Security

- To reduce the number and severity of road traffic casualties
- To improve actual and perceived levels of personal security when travelling

Connectivity and Accessibility

- To improve access for all to employment opportunities, services, healthcare, education, tourism and leisure facilities
- To improve connectivity by sustainable transport between South-East Wales and the rest of Wales, the UK and Europe

Quality and Efficiency

- To improve interchange within and between modes of transport
- To improve the quality, efficiency and reliability of the transport system
- To reduce traffic growth, traffic congestion and to make better use of the existing road system

Environment

- To achieve a modal shift towards more sustainable forms of transport for moving both people and freight
- To reduce significantly the emission of greenhouse gases from transport
- To reduce the impact of the transport system on the local street scene and the natural, built and historic environment
- To promote sustainable travel and to make the public more aware of the consequences of their travel choices on climate, the environment and health

Land use and Regeneration

- To ensure developments in South East Wales are accessible by sustainable transport
- To make sustainable transport and travel planning an integral component of regeneration schemes

13.2.24 In order to fulfil these objectives, the Regional Transport Plan outlines actions to be taken, which are organised within several categories. Pertinent schemes identified in the plan within 2km of the Project Site are listed in Table 13.1 below.

Table 13.1: Transport schemes adjacent to the Project Site identified within SEWTA Regional Transport Plan 2010

Project Name/Scheme Ref.	Project Description
RCT16 & RCT19	Heads of the valley cycle route and links to Hirwaun Industrial Estate from planned and aspirational routes

RCTCBC Local Development Plan up to 2021

13.2.25 The current transport policy relating to development in the County Borough is stated in the RCTCBC Local Development Plan (LDP), adopted in March 2011 and covers the period up to 2021. This local development plan will be the basis for judging planning applications over that period.

13.2.26 The vision of the RCTCBC: "working together to enable individuals and communities to achieve their full potential, in terms of both their work and social life."

13.2.27 The sections of 'Policy CS 1 – Development in the North' directly relevant to transport are:

- Promoting accessibility by securing investment in new roads, public transport improvements, walking and cycling; and
- Promoting and enhancing transport infrastructure services to support growth and investment

13.2.28 'Policy CS 8 – Transportation' sets out the strategic routes in the County Borough which any proposals will be expected to safeguard and contribute towards the development of. The LDP also emphasises the importance of public transport improvements and walking and cycling provision when considering the transport needs of any proposal.

13.2.29 The Northern Strategic Area Policy 'NSA 3 – Development in the key settlement of Hirwaun' highlights the potential for residential, commercial and community development in the town, and the fact that any such growth must be supported by appropriate local services and infrastructure in order to meet present and future needs. The report also identified the need to create sustainable access to employment opportunities and to encourage the sustainable use and improvements of the transportation network.

A465 (Heads of the Valleys Road) - Dualling Scheme (Welsh Government website)

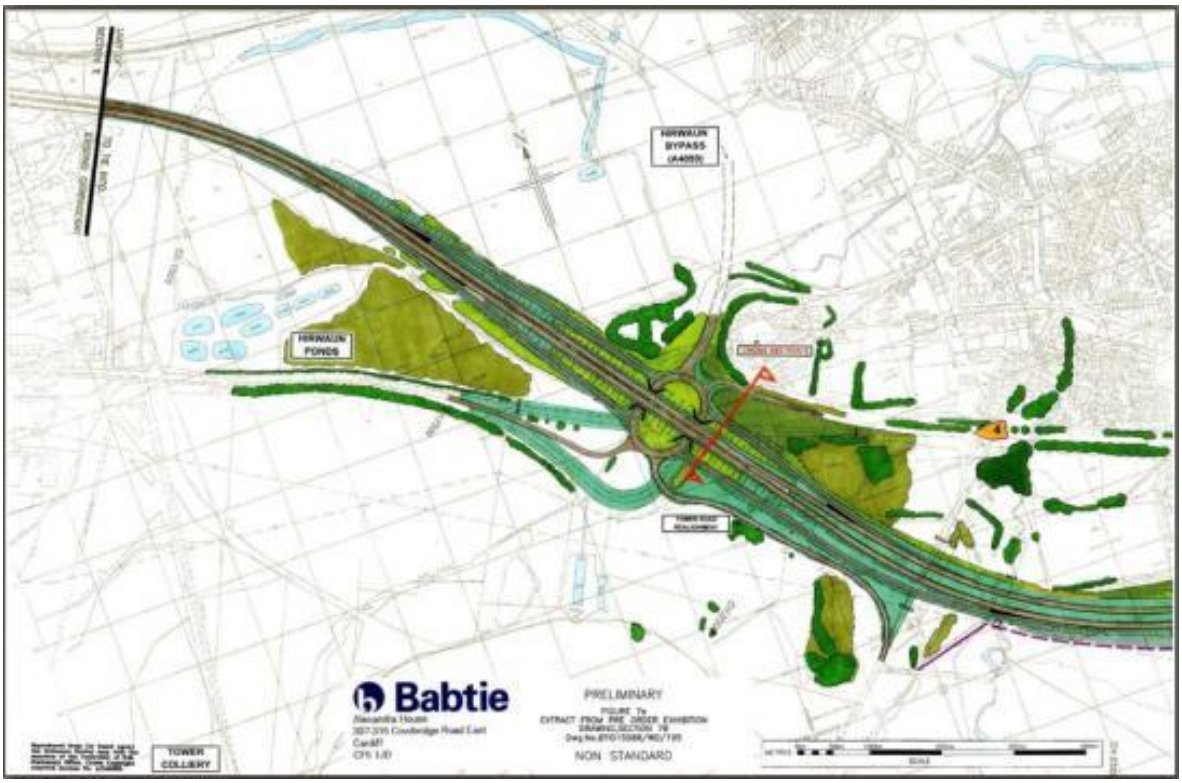
13.2.30 This major project is part of the National Transport Plan and is intended to improve links to businesses and communities, ease traffic congestion and improve safety. The scheme comprises widening of approximately 40km of the A465 between Hardwick Roundabout at Abergavenny and the existing roundabout to the west of Hirwaun.

13.2.31 The last section of the scheme is within close proximity of the proposed power station; however construction has not yet started. It also does not yet have a programme date, but is planned to commence in time for completion in 2020.

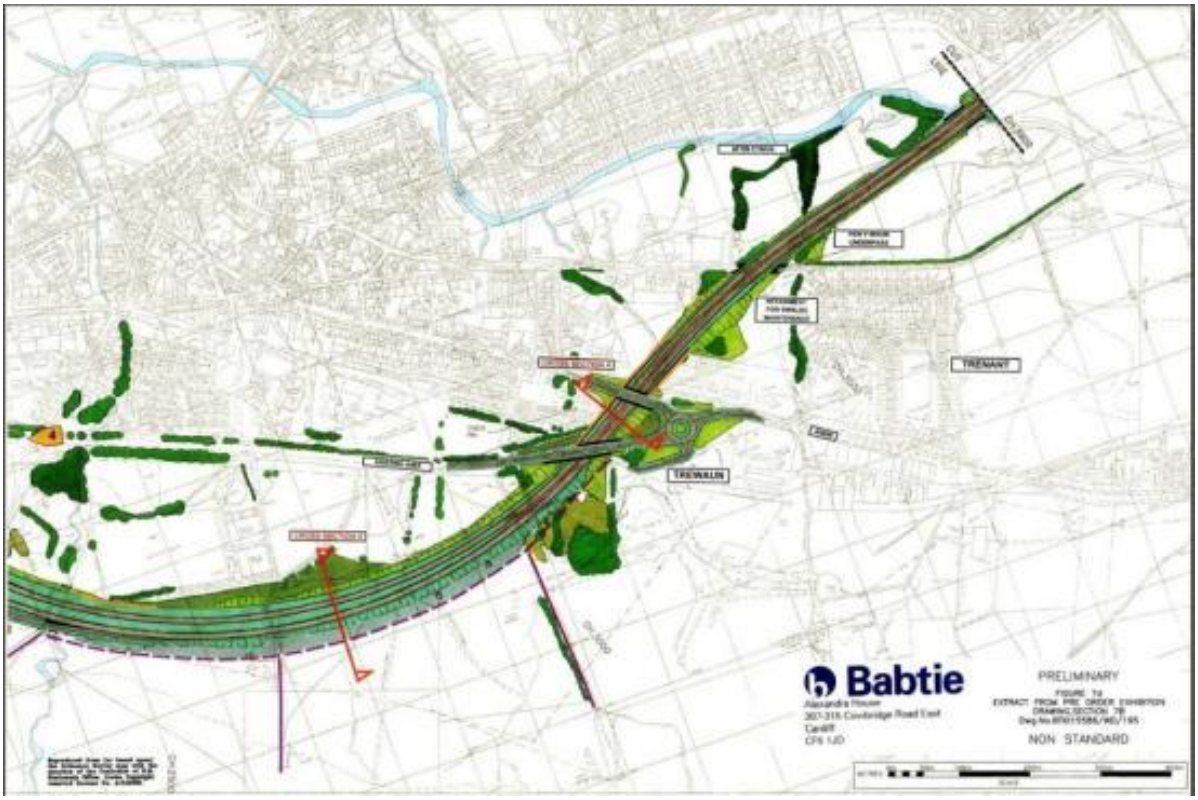
13.2.32 The TA will consider the proposed network changes including any overlap of construction phasing for the Project and the A465 construction.

13.2.33 The proposed scheme layout is shown in Insert 13.1 – A schematic drawing of the proposed dualling of the A465, beginning at the existing roundabout west of Hirwaun and Insert 13.2 - A schematic drawing of the proposed dualling of the A465, beginning at the existing roundabout east of Hirwaun

INSERT 13.1- A schematic drawing of the proposed dualling of the A465 west of Hirwaun



Insert 13.2: A schematic drawing of the proposed dualling of the A465 east of Hirwaun



13.3 Realistic Worst Case Scenario for Assessment

13.3.1 In respect of traffic, transport and access, the realistic worst case scenario from within the proposed Project parameters (which are described in Section 4 of the PEIR) are set out in Table 13.1 below.

13.3.2 The reason that this represents the realistic worst case in relation to traffic, transport and access impacts is that the more gas turbine generator units required, the more deliveries are required during construction. Five is the maximum number of units being considered for this Project. More units will also generate the most vehicle movements during operation for maintenance visits etc.

13.3.3 A preliminary assessment of the traffic impacts and residual effects of both options for the Gas Connection (Corridor 1 and 2) and the Electrical Connection (Corridor 1 and 2) has been undertaken and there are no material differences in their impacts on traffic and transport. A decision on the preferred option for each will be taken following consultation.

Table 13.2 – Realistic Worst Case Scenario for Traffic and Transport Impacts

Parameters	Details
Power Generation Plant	
Number of gas turbine units	5 (~ 59 MWe)
Number of stacks	5
Unit type	Aero derivative

13.4 Assessment Methodology and Significance Criteria

Transport Assessment Scope

13.4.2 A meeting was held with the Local Highways Authority and the South Wales Trunk Road Agent in September 2013 in order to discuss the scheme with these Authorities and the potential impacts of the Project and the available data sources to assist with the assessment.

13.4.3 At the time of writing, the content of the provisional TA is still being scoped with these authorities. It was agreed at the meeting that the scope of the TA would include a number of assumptions about the Project given the limited level of detail that is known about the exact construction methods, as they are dependent on the final choice of technology. At this stage, it is anticipated that the proposed structure of the TA is:

- Introduction - Describing the scale and location of the Project.
- Policy Context - highlighting how the Project fits with national, regional and local policy, and identifying policies that will guide the content of the TA.
- Existing Conditions - details on the surrounding transport network, including committed development and infrastructure in the local area, and the spatial and temporal scope of the traffic impacts.
- Assessment Methodology - a description of the data collection, use of existing data sources, trip generation and trip distribution methodologies used, and a summary of the assessment outcome.
- Link and Junction Capacity Analysis - an assessment of the capacity of the links across the network.
- Road Safety Analysis - an assessment of the study area accident record.
- Environmental Impacts – an assessment of transport against sensitive receptors.

- Mitigation – an outline of potential measures that could mitigate the impact of the Project.
- Conclusion – a summary of the TA findings.

13.4.4 During the scoping process, it was indicated that there will need to be consideration of the transport impacts for the construction / demolition, operational and decommissioning phases of development, and as such these shall be considered within the TA chapter.

13.4.5 The TA will establish the existing capacity and speed conditions around the Project Site and assess network and corridor performance in relation to a number of receptors. This will be based on data collected on site and existing data.

13.4.6 The TA 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.

13.4.7 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' and the impacts will be presented in the TA. If necessary, mitigation measures will be proposed to reduce the number of trips, or provide capacity to cater for these additional trips.

13.4.8 A Travel Plan will be created and adopted in which sustainable transport will be promoted throughout the life cycle of the Project.

Study Area

13.4.9 The Study Area used for this assessment is approximately a 5km radius from the centre of the Project Site.

Environmental Impacts

13.4.10 Potential environmental impacts 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 impacted.

13.4.11 The likely 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). This evaluation will be informed by the findings of the TA.

13.4.12 The proposed scheme 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.

13.4.13 As further work is progressed in the full TA, the transport related environmental effects (as defined by IEA guidelines) will be assessed for the following factors:

- Traffic flows
- Delay
- Road safety
- Intimidation and fear
- Severance
- Pedestrian amenity

13.4.14 The effects of traffic in relation to noise and vibration, and air quality will be considered in relevant sections of the EIA.

13.4.15 The following describes how these effects may be caused, the consequences, and how the significance of these effects can be measured.

Traffic Flows

13.4.16 The Project is expected to result in changes in traffic flow for each of the construction, operation and decommissioning phases.

13.4.17 Changes can be considered as having a negative effect if there is a larger traffic flow, which can result in congestion, delay, severance and a polluted, unattractive and stressful environment. A larger traffic flow could be caused by an increase in vehicle demand, or through an increase in the number of HGVs.

13.4.18 Changes may also have a positive effect, if the consequence of the Project is a reduced traffic flow. This, for example, could be the outcome of one development which presently generates a high volume of traffic being replaced with a much less traffic intense development. Reduced traffic flows can result in an improvement in congestion, delay and overall amenity of the environment.

13.4.19 IEA provides guidance on how the magnitude of changes in traffic flow should be determined, as shown in Table 13.3.

Table 13.3: 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%)

13.4.20 The overall significance of change is categorised based on the sensitivity of the receptor as shown in Table 13.4. 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.

TABLE 13.4: CLASSIFICATION OF EFFECTS

Sensitivity of Receptor	Magnitude of Impact			
	High	**Medium**	**Low**	**Very Low**
High	Major	Major / Moderate	Moderate	Moderate / Minor
Medium	Major / Moderate	Moderate	Moderate / Minor	Minor
Low	Moderate	Moderate / Minor	Minor	Negligible

13.4.21 The positive or negative effect of changes may therefore vary across receptors, with some road links experiencing a positive impact or being of low sensitivity, whereas others may have high sensitivity and high magnitude of impact and these will be identified accordingly.

13.4.22 Effects of moderate significance or above are considered to be significant for the purposes of the EIA Regulations.

Delay

13.4.23 An increase in delay, i.e. time spent in traffic queues is a negative effect that has repercussions in terms of pollution, accessibility, severance, and driver stress. Increases in delay can be the result of junctions and links operating above capacity, or due to the implementation of speed restrictions.

13.4.24 A decrease in delay is a positive effect that can lead to reductions in pollution and stress and improvements to accessibility and severance. A decrease would most likely be the result of improved junction capacity, either as a result of reduced traffic flow or a reengineered junction.

Road Safety

13.4.25 The Project may have road safety implications, either in terms of an improvement or deterioration of the effect. Road safety has further implications in terms of driver stress, intimidation and fear, and severance.

13.4.26 Analysis within the TA will be able to provide a qualitative assessment of the quantity and cause of accidents and identify any patterns that may be exacerbated or mitigated by the Project.

Intimidation and Fear

13.4.27 Intimidation and fear can be caused by a wide range of factors including location, highway layout, level of crime, and driver stress. However as discussed in the IEA guidelines, there are no commonly agreed thresholds for estimating these from other measurable factors.

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

Severance

13.4.29 The IEA guidelines describe severance as a perceived division that can occur within a community when it becomes separated by a major traffic artery. This, for example, may be a pedestrian unable to cross a road as a result of a large volume of traffic, or the loss of a public right of way or cycle lane.

13.4.30 It will be possible, using the Site Audit and Non-motorised User Assessment sections of the TA to provide a qualitative assessment of the effect the Project has on severance.

Pedestrian Amenity

13.4.31 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.

13.4.32 A qualitative assessment of the effect of the Project on pedestrian amenity can be given using the Site Audit and Non-motorised User Assessment included in the TA, with particular consideration given to any key public rights of way identified during the stakeholder consultation process.

13.4.33 A preliminary assessment of the likely impacts listed above for each of the elements of the Project and each project phase is presented below.

13.5 Consultation

13.5.1 A summary of the consultation responses received to date in relation to traffic, transport and access, and how these have been considered is provided in Table 13 in Appendix A of this PEIR.

13.6 Baseline Conditions and Receptors

13.6.1 The following transport infrastructure exists within the vicinity of the Project Site.

Pedestrian and Cycle Facilities

13.6.2 Existing pedestrian footways in the Study Area are shown in Insert 13.3

13.6.3 All the main roads within the industrial estate have footways provided on both sides of the road. There is connectivity between the Project Site and Hirwaun Town via footpaths. Additionally, the residential area of Rhigos is also connected via footways to the Project Site.

13.6.4 The provision of pedestrian infrastructure in the immediate area surrounding the Project Site also allows access to bus services at stops on Rhigos Road.

Insert 13.3: Existing Pedestrian Footway Provision Within the Study Area.

13.6.5 National Cycle Network Route 46 runs through the study area, from the A465, onto the A4061 and then along Rhigos Road. The route through the local area is mostly flat but is not clearly sign posted. The route is shown in Insert 13.4.

Insert 13.4: Cycle route through study area

Bus Services

13.6.6 There are several routes and bus stops in the vicinity of the Project Site, although no bus services enter the Hirwaun Industrial Estate itself. Bus stops are located along Rhigos Road to the south of the Project

Site. The nearest bus stop to the Project Site is Pont yr Ochain located 150m away. The next nearest bus stop is Maesglas Farm, at the roundabout junction between Rhigos Road / A4061 and Fifth Avenue, approximately 550m from the Project Site. Bus services along Rhigos Road are shown in Insert 13.5. Insert 13.6 shows public transport services across the wider area.

Table 13.5: Bus services

Service	Operator	Route	Frequency	First Service	Last service
7	Stagecoach South Wales	Glynhafod – Aberdare – Hirwaun – Penderyn	2 per hour	0730	1740
8	Stagecoach South Wales	Glynhafod – Aberdare – Hirwaun – Rhigos – Glynneath	2 per hour	0545	1845
6A	Glamorgan Bus and Coach Company	Aberdare – Llwycoed – Hirwaun – Rhigos	Evening Service	1940	2040

Insert 13.5: Public transport provision within the vicinity of the Project Site

Insert 13.6: Public transport provision – wider coverage (Source: http://www.travelbreconbeacons.info/exploring-the-park/local-busses-and-train-services)

Number	Route	Operator
24	Pontsticill – Merthyr Tydfil	Stagecoach in South Wales
30	Brynmawr – Blaenavon – Pontypool – Newport	Stagecoach in South Wales
39	Brecon – Hay-on-Wye – Kingstone – Hereford	Stagecoach in South Wales
64	Brecon – Llandovery	Roy Browns Coaches
X75	Merthyr Tydfil – Hirwaun – Glynneath – Neath – Swansea	First Cal
T4	Newtown - Llandrindod Wells - Brecon - Merthyr Tydfil - Cardiff	Stagecoach in South Wales
X4	Hereford – Abergavenny –Merthyr Tydfil – Cardiff	Stagecoach in South Wales
X33	Abergavenny – Pontypool – Cwmbran – Cardiff	Stagecoach in South Wales
X43	Brecon – Crickhowell – Abergavenny	Stagecoach in South Wales
X63	Brecon – Ystradgynlais – Neath – Swansea	First Group

Rail Services

13.6.7 Aberdare is the nearest railway station, approximately 7km south west of the Project Site and is an important local transport hub . The rail station can be accessed using the bus services above, but it is approximately 180m from the bus stop on Duke Street in Aberdare to the Station.

13.6.8 Rail services are managed by Arriva Trains Wales. A half hourly service operates to Cardiff, from which it is possible to catch trains to London, Bristol, the North and Swansea, as well as other local services.

Parking Provision

13.6.9 Car parking will be provided within the compound of the Power Generation Plant during construction. The Project will consider the council's policy on parking standards during the operational phase of the Project and consider sustainable transport methods.

Highway Network

13.6.10 Insert 13.7 shows the local highway network.

Insert 13.7: Local highway network

13.6.11 The A465 runs north-west to south-east to the north of the Project Site and is a dual carriageway.

13.6.12 Rhigos Road is single carriageway local B road running east to west along the southern border of the Hirwaun Industrial Estate, and is marked with national speed limit. It connects the A465 to Cefn Rhigos and Pont Walby.

13.6.13 The A4061 is a local A road that runs north to meet Rhigos Road at a roundabout junction in the south east corner of the industrial estate, and then turns east to join the A465. The road connects Trehebert in the South to Hirwaun town and the industrial estate. The A4061 operates under the national speed limit.

Insert 13.8: Existing pedestrian footway provision within the study area

13.6.14 Fifth Avenue forms an arc running north-south from Rhigos Road towards the underpass of the A465 where it then runs parallel with the A465 before it joins with Halt Road at the west of the Industrial Estate. The road has a 30mph speed limit for the majority of its length. Fifth Avenue has a roundabout junction with Main Avenue (described below) on which the Power Generation Plant Site is located.

13.6.15 Main Avenue is also a local road within Hirwaun Industrial Estate that runs east-west through the centre of the industrial estate and is the road on which the Power Generation Plant Site is proposed. It has the same speed limit as Fifth Avenue at 30mph. At the opposite end to its junction with Fifth Avenue, Main Avenue meets Thirteenth, Fourteenth and Sixteenth Avenue, all of which are a similar standard.

Junctions

13.6.16 Consideration will be given to the assessment of junctions within the area and will be identified in collaboration with RCTCBC and SWTRA at a later stage.

Access

13.6.17 Access to the Power Generation Plant and Electrical Connection for both construction and operational vehicles will be from Main Avenue via an existing gated access for International Greetings UK Ltd. A view looking west is shown in Insert 13.9.

13.6.18 Access for the Gas Connection AGI will be via a short length of new access track constructed between the A4061 and the AGI location.

Insert 13.9: Proposed access – view looking west (image © 2013 GOOGLE)

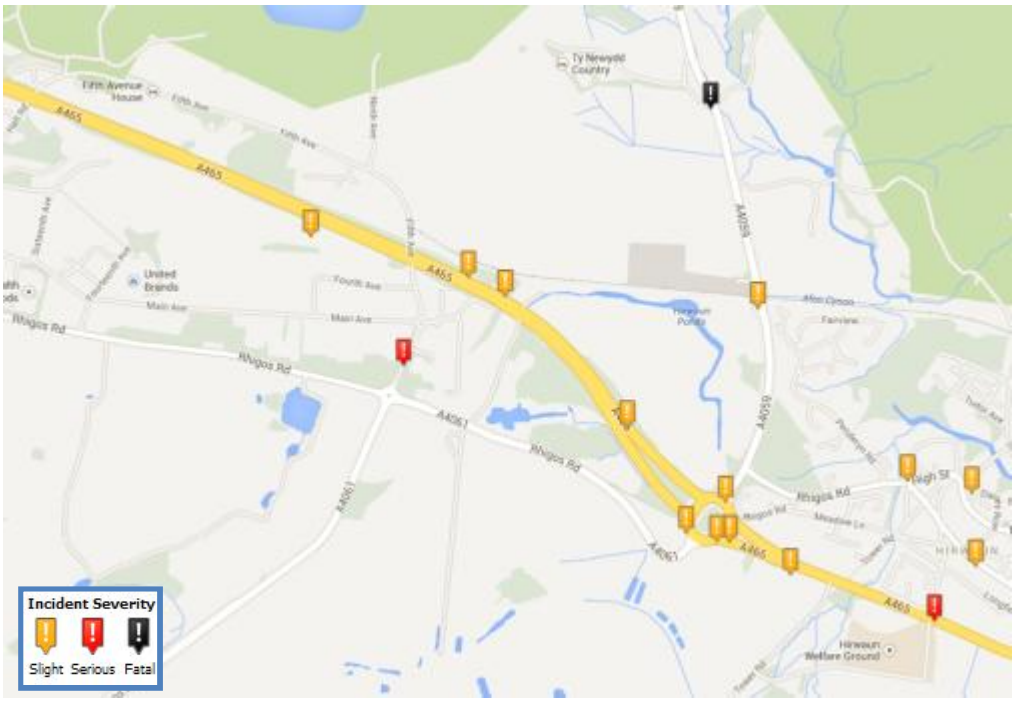
Road Safety and Collisions

13.6.19 An initial review of accident data shows that there were 16 accidents between 2009 and 2011 in the study area. There were no accidents along Rhigos Road or Main Avenue. There was a serious collision between two vehicles on Fifth Avenue.

13.6.20 There is a cluster of slight accidents at the A465 / A4059 roundabout which would be expected at a junction of this type.

13.6.21 Insert 3.10 provides a summary of the accidents in the study area.

Insert 13.10: Road accidents (source:www.crashmap.co.uk)



13.6.22 The initial analysis of the accident records does not identify any abnormal results or clusters that are of concern.

13.6.23 However, the most up to date available accident data to further assess the road safety implications of the Project will be assessed as part of the full TA.

13.7 Preliminary Assessment of Impacts

Transport Impacts

13.7.2 A preliminary assessment of the likely impacts for each of the elements of the Project is presented below.

Power Generation Plant

Construction / Demolition

13.7.3 There is likely to be an increase of traffic on the A465/ A4059/ A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout as construction workers travel to and from the Project Site and HGV's access the Project Site.

13.7.4 There will be up to 250 construction workers present at the Project Site at the peak in construction workforce. Assuming that an average of two construction workers travel in each car, this will result in a maximum of 125 vehicle trips to and from the Project Site every day.

13.7.5 However, this would be for a very short period (around 2-3 months) of the overall construction period and therefore a preliminary assessment is that any impacts are likely to be minor.

13.7.6 Abnormal loads are unlikely to cause any significant impacts on the road network as routes, delivery times and street furniture assessments will be planned to accommodate abnormal loads and this will be agreed with RCTCBC and SWTRA officers prior to undertaking.

Operation

13.7.7 There will be minimal impacts during the operation 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.

Decommissioning

13.7.8 The decommissioning stage will be similar to the construction phase in that a number of construction staff will be required to decommission the Power Generation Plant. Therefore, there is likely to be an increase of traffic on the A465/ A4059/ A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout as construction workers travel to and from the Project Site and HGV's access the Project Site.

Gas Connection route corridor option 1

Construction

13.7.9 The number of construction workers required to construct the Gas Connection Route 1 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. There will be temporary traffic management in place on Main Avenue and the Rhigos Road to reduce the impact of traffic and to ensure safety on site.

Operation

13.7.10 Maintenance vehicles are expected to be very infrequent and are not anticipated to cause any detriment to the local transport network.

Decommissioning

13.7.11 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.

Gas Connection route corridor option 2

Construction

13.7.12 The number of construction workers required to construct the Gas Connection Corridor Option 2 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. There will be temporary traffic management in place on Main Avenue and Fifth Avenue to reduce the impact of traffic and to ensure safety on site. The impacts of this are likely to be negligible.

Operation

13.7.13 Maintenance vehicles are expected to be infrequent and are not anticipated to cause any detriment to the local transport network. Access to the Gas Connection route corridor option 2 will be via Main Avenue, Fifth Avenue and Rhigos Road.

Decommissioning

13.7.14 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.

Electrical Connection route corridor option 1

Construction

13.7.15 The number of construction workers required to construct Electrical Connection Option 1 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 are A465/ A4059/A4061 Roundabout, Rhigos Road, A4061/ Fifth

Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.

Operation

13.7.16 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 Main Avenue and Fourteenth Avenue.

Decommissioning

13.7.17 The decommissioning stage will be similar to the construction phase in that a number of construction staff will be required to decommission Electrical Connection Option 1. However, as with construction, the number of workers required to decommission the Connection will be low and as such, there is likely to be limited impacts associated with additional trips on the network.

Electrical Connection route corridor option 2

Construction

13.7.18 The number of construction workers required to construct Electrical Connection route corridor option 2 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 are the A465/ A4059/A4061 Roundabout, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.

Operation

13.7.19 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 Main Avenue and Fourteenth Avenue.

Decommissioning

13.7.20 The decommissioning stage will generate very few vehicle movements, as it is likely that Electrical Connection route corridor option 2 will be left in situ.

13.8 Mitigation

13.8.1 Once further work has been undertaken for the EIA, it will be possible to identify highway works, or provision for non-motorised users based on the findings of the assessment.

13.8.2 Physical mitigation could be temporary, dependent on whether impacts are linked to the construction / demolition or operational phases of development. A Travel Plan will be produced to promote sustainable travel to and from the Project Site.

13.9 Preliminary Assessment of Residual Effects

13.9.1 On the basis of the preliminary environmental information and assessment described above, taking into account potential mitigation measures, potential residual impacts are detailed in Table 13.6 below.

Table 13.6 – Preliminary Assessment of Residual Effects

Description	Detail	Unmitigated Potential Impact	Mitigation / Monitoring Measure	Residual Impact
Power Generation Plant				
Construction / Demolition	Construction worker traffic travelling to and from Project Site.	Increased traffic levels on the A465/ A4059/ A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	Travel Plan measures to reduce the number of vehicles on the road network.	Minor/ moderate increases in traffic
	HGV construction traffic	Increased traffic levels on the A465/ A4059/ A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	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 times resulting in minor impacts during peak times
	Abnormal loads	Obstruction for normal vehicles and potential impact on street furniture.	Abnormal load routing will be agreed with RCTCBC officers and the SWTRA this will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival	Minor impacts from disruption to the road network during off peak times
Operation	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	Negligible impact on surrounding road network
Decommissioning (similar to construction)	Construction worker traffic travelling to and from Project Site	Increased traffic levels on the A465/ A4059/ A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue	Travel Plan measures to reduce the number of vehicles on the road network	Minor / Moderate impact on surrounding roads.

		Roundabout.		
	HGV construction traffic	Increased traffic levels on the A465/ A4059/ A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	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 times resulting in minor impact during peak times
	Abnormal Loads	Obstruction for normal vehicles and potential impact on street furniture	Abnormal load routing will be agreed with RCTCBC officers and the SWTRA this will ensure planned routes are agreed and adhered to and any street furniture is removed prior to arrival	Minor disruption to the road network during off peak times
Gas Connection Route Corridor Option 1				
Construction	Construction worker traffic travelling to and from Project Site	Minor increase of traffic levels on the A465/ A4059/ A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	Site compound to be located within the Power Generation Plant. Low number of vehicles anticipated with construction work.	Low / minor increase of traffic levels the surrounding roads.
	Road works over existing road	Road works over access roads during the construction of the gas connection causing negligible impacts.	Temporary traffic management plan. Temporary traffic management will be in place on Fourteenth Avenue, Main Avenue and Fifth Avenue to reduce the impact of traffic and to ensure safety on Project Site.	Negligible impacts
	HGV construction traffic	Increased traffic levels on the A465/ A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	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
	Abnormal Loads	Obstruction for normal vehicles and potential impact on street furniture	Abnormal load routing will be agreed with RCTCBC officers and the SWTRA and 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
Operation	Maintenance vehicles expected to be infrequent	Very low additional traffic on the network	None required	Negligible impact on surrounding road network
Decommissioning	No Impacts predicted as Gas Connection will be left in situ.			
Gas Connection Route Corridor Option 2				
Construction	Construction worker traffic travelling to and from Project Site	Minor increase of traffic levels on the A465/ A4059/ A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	Travel Plan measures to reduce the number of vehicles on the road network. Site compound to be located within the Power Generation Plant and journeys to the Gas Connection to be optimised to reduce the number of vehicles on the road network	Low / Minor increase of traffic levels on the surrounding roads.
	Road works over existing road	Road works over access roads during the construction of the gas connection causing negligible impacts	Temporary traffic management plan. Temporary traffic management will be in place on Fourteenth Avenue, Main Avenue and the Rhigos Road to reduce the impact of traffic and to ensure safety on site.	Negligible impacts
	HGV construction traffic	Increased traffic levels on the A465/ A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	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
	Abnormal Loads	Obstruction for normal vehicles on surrounding roads.	Abnormal load routing will be agreed with RCTCBC officers and the SWTRA officers and 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
Operation	Maintenance vehicles expected to be infrequent	Very low additional traffic on the network	None required	Negligible impact on surrounding road network
Decommissioning	No Impacts predicted as Gas Connection will be left in situ.			
Electrical Connection Route Corridor Option 1				
Construction	Construction worker traffic travelling to and from Project Site	Moderate increase of traffic levels on the A465/ A4059/A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	Travel Plan measures to reduce the number of vehicles on the road network. Site compound to be located within the Power Generation Plant and journeys to the Electrical Connection adjacent to Power Generation Plant will be limited with little use of road network.	Negligible impact on surrounding road network.
	HGV construction traffic	Increased traffic levels on the A465/ A4059/A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	Delivery timings to be monitored to assess need 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 minor impact during peak times
	Abnormal Loads	Obstruction for normal vehicles on surrounding roads.	Abnormal load routing will be agreed with RCTCBC officers and the SWTRA officers and 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

Operation	Operational worker traffic travelling to and from Site to the Substation via Fourteenth Avenue.	Very low numbers of vehicles anticipated – limited impact on road network.	Gated access to substation required.	Negligible impact on surrounding road network
Decommissioning (similar to construction)	Construction worker traffic travelling to and from Site	Increased traffic levels on the A465/ A4059/A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	Travel Plan measures to reduce the number of vehicles on the road network. Site compound to be located within the Power Generation Plant and journeys to the Electrical Connection adjacent to Power Generation Plant will be limited with little use of road network.	Negligible impact on surrounding road network.
	HGV construction traffic	Increased traffic levels on the A465/ A4059/A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	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
	Abnormal Loads	Obstruction for normal vehicles on surrounding roads. Potential impact on street furniture	Abnormal load routing will be agreed with RCTCBC officers and the SWTRA officers and 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
Electrical Connection Route Corridor Option 2				
Construction	Construction worker traffic travelling to and from Project Site	Moderate increase of traffic levels on the A465/ A4059/A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	Travel Plan measures to reduce the number of vehicles on the road network. Site compound to be located within the Power Generation Plant and journeys to the Electrical Connection adjacent to Power Generation Plant will be limited with little use of road network.	Negligible impact on surrounding road network.

	HGV construction traffic	Increased traffic levels on the A465/ A4059/A4061, Rhigos Road, A4061/ Fifth Avenue Roundabout and the Fifth Avenue and Main Avenue Roundabout.	Delivery timings to be monitored to assess need 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
	Abnormal Loads	Obstruction for normal vehicles on surrounding roads.	Abnormal load routing will be agreed with RCTCBC officers and the SWTRA officers and 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
Operational	Operational worker traffic travelling to and from Site to the Substation via Fourteenth Avenue.	Very low numbers of vehicles anticipated – limited impact on road network.	Gated access to substation required.	No impact on surrounding road network
Decommissioning	No Impacts predicted as Electrical Connection will be left in situ.			

13.10 Next Steps

13.10.1 The lead objective of the traffic and transportation input to the EIA is to determine the impact of all phases of the Project on users of all modes of transport. This will make it possible to develop appropriate mitigation measures that will minimise adverse transportation impacts for those impacted.

13.10.2 To achieve this objective, the following assessments will be undertaken as part of the next stage of the assessment:

- Identification of the scope and boundary of construction works, Project Site operations and Project decommissioning. This will include details on enabling highways works, staff arrangements, types of vehicles, and means of access.
- Estimation of the number of trips generated during peak periods for each development phase. These will be derived from use of the TRICS database where appropriate, or will alternatively be based on staffing and construction/service vehicle requirements.
- Assessment of traffic growth on the transport network in the study area. This would involve use of a gravity model to establish the origin and destination of Project traffic. It would be necessary to compare the 2013 base year with a future year do nothing scenario (without the Project) and a future year do something scenario (with the Project).
- Link Capacity Analysis of key corridors to the Project. This will identify the need for any road improvements.
- A Non-Motorised User Assessment will provide a qualitative assessment of the impacts faced by non car users, i.e. an assessment of the Project impact on Pedestrian Amenity and Severance.
- A review of accident data to identify any safety issues and offer mitigation, where appropriate.
- A review of any other planned developments in the area that may co-coincide with the Project

13.10.3 A review of the access arrangements for Abnormal Loads and any temporary mitigation measures required to enable their travel to the Project Site

SECTION 14

ARCHAEOLOGY AND CULTURAL HERITAGE

14 ARCHAEOLOGY AND CULTURAL HERITAGE

14.1 Introduction

14.1.1 The construction (including demolition), operation and decommissioning of the proposed Project have the potential to impact upon both surface and buried archaeological assets, as well as the setting and appreciation of assets of Cultural Heritage importance, including surrounding Listed Buildings, Scheduled Monuments and Conservation Areas.

14.1.2 At this PEIR stage of the assessment, an archaeological Desk Based Assessment (DBA) has been undertaken which investigates all historical records within 1km of the centre of the proposed Project Site (the study area)

14.1.3 This Section presents the findings of the DBA and provides a summary of the remaining work that is planned prior to completion of the ES.

14.2 Legislative and Policy Context

National Policy Statements

14.2.2 As explained in Section 2, the NPS EN-1 explains the assessment principles to which the SoS will have regard in the examination of an energy NSIP (such as the proposed Project), and explains the generic historic environment impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (EN-2). The NPSs for Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5) provide specific considerations potentially relevant to the Gas Connection and Electrical Connection Compound and Electrical Connection respectively.

14.2.3 NPS EN-1 at section 5.8 sets out assessment principles relevant to energy NSIPs in relation to the historic environment. .

14.2.4 Paragraph 5.8.1 of the NPS states that the construction, operation and decommissioning of energy infrastructure has the potential to result in adverse impacts on the historic environment. The following paragraph (5.8.2) defines the historic environment as including 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, landscaped and planted or managed flora. Those elements of the historic environment that hold value to this and future generations because of their historic,

archaeological, architectural or artistic interest are called heritage assets. The policy states that a heritage asset may be any building, monument, site, place, area or landscape, or any combination of these. The sum of the heritage interests that a heritage asset holds is referred to as its significance.

14.2.5 Paragraph 5.8.3 discusses statutory designated heritage assets and suggests such categories are: a World Heritage Site; Scheduled Monument; Protected Wreck Site; Protected Military Remains, Listed Building; Registered Park and Garden; Registered Battlefield; Conservation Area; and Registered Historic Landscape (Wales only).

14.2.6 Paragraph 5.8.4 goes on to highlight that there are heritage assets with archaeological interest that are not currently designated as scheduled monuments, but which are demonstrably of equivalent significance. These include those that have yet to be formally assessed for designation; those that have been assessed as being designatable but which the SoS has decided not to designate, and those that are incapable of being designated by virtue of being outside the scope of the Ancient Monuments and Archaeological Areas Act 1979. Furthermore, in Paragraph 5.8.5 the policy considers that the absence of designation for such heritage assets does not indicate lower significance. If the evidence before the SoS indicates to it that a non designated heritage asset of the type described in 5.8.4 may be affected by the proposed development then the heritage asset should be considered subject to the same policy considerations as those that apply to designated heritage assets.

14.2.7 In paragraph 5.8.6 the section concludes that the SoS should also consider the impacts on other non-designated heritage assets, as identified either through the development plan making process (local listing) or through the SoS decision making process on the basis of clear evidence that the assets have a heritage significance that merits consideration in its decisions, even though those assets are of lesser value than designated assets.

14.2.8 The policy considers (Paragraph 5.8.8) that as part of the applicant's assessment the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the heritage asset. As a minimum the applicant should have consulted the relevant Historic Environment Record and assessed the heritage assets themselves using expertise where necessary according to the proposed development's impact.

14.2.9 Paragraph 5.8.9 is concerned with heritage assets with an archaeological interest and states that the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation.

Other National and Local Policy

14.2.10 The Rhondda Cynon Taf Local Development Plan (2011) sets out "...the framework for decisions to be made up until 2021 on how land is used in the County Borough, for example what type of development is appropriate or desirable and how best to protect our environment". The Local Development Plan provides part of the Development Plan against which applications under the TCPA regime are to be determined, and parts may be relevant and important under the PA 2008 regime. One policy is relevant and is outlined below:

"Policy AW8 – Protection and Enhancement of the Natural Environment: Development proposals which impact upon sites of architectural and/ or historical merit and sites of archaeological importance will only be permitted where it can be demonstrated that the proposal would preserve or enhance the character and appearance of the site."

14.2.11 The Supplementary Planning Guidance (2011) provides more specific advice on all aspects of the 'The Historic Built Environment' including Conservation Areas, Listed Buildings, Scheduled Monuments, archaeology, historic parks and gardens and historic landscapes. For archaeology, the following applies:

"Where an archaeological site is identified as present, consideration will be given to the extent, nature, condition and importance of any such site. Sufficient information should be made available to determine the impact of the proposed development on the archaeological resource. Where appropriate, conditions will placed on planning permissions to ensure the archaeological resource is appropriately surveyed, preserved and recorded. Mitigation measures should also be put in place where appropriate."

14.2.12 The Study Area also covers part of the Brecon Beacons National Park, which has specific policies relating to the historic environment. This includes the Brecon Beacons National Park Authority Local Plan, which was adopted in 1999. It contains three policies relating to archaeology:

"**Policy CL8:** Development proposals which would have an adverse effect on the remains or the settings of nationally important sites of

archaeological interest and of Scheduled Ancient Monuments will not be permitted."

"**Policy CL9:** Development proposals which would have an adverse effect on historic landscapes, sites and features of archaeological interest or of local cultural importance and their settings will only be permitted where:

- the effect is minimal;
- archaeological remains can be protected in situ by appropriate design and siting; or
- the benefits of the proposals outweigh any adverse effects."

"**Policy CL10**: Where important archaeological remains are known to exist or may exist within an area for archaeological evaluation, the Authority will require the archaeological implications of development proposals to be evaluated before planning applications are determined. Planning permission will not be granted where the Authority deems such evaluation to be inadequate."

14.2.13 Deposit Local Development Plan (2010). As this plan follows the policies in PPW for listed buildings, scheduled monuments, world heritage sites, conservation areas and historic parks and gardens, the only different policy is as follows:

"**Policy 49 Areas of Archaeological Evaluation**: Where important archaeological remains are known to exist or may exist within an area for archaeological evaluation, the archaeological implications of development proposals shall be evaluated before planning applications are determined. Planning permission will not be granted where the evaluation is deemed inadequate."

Approach

Standards and Guidance

14.2.14 The Hirwaun Power Project Scoping Report (Parsons Brinckerhoff 2013) proposed the undertaking of a Desk-based Assessment (DBA), and consequently this document has been written in accordance with the relevant professional guidelines - Institute for Archaeologists (IfA) and English Heritage (IfA 2012a Standard and Guidance for Archaeological Desk-based Assessments; IfA 2012b Code of Conduct; English Heritage 2006 Management of Research Projects in the Historic Environment (MoRPHE)).

Study Area

14.2.15 This DBA has focused on the Project Site, although historic information for the immediate surrounding area (hereafter known as the Study Area) has been considered in order to provide an essential contextual background. In accordance with the Scoping Study and in consultation with the Glamorgan and Gwent Archaeological Trust, this extends for approximately 1km from the outer limits of the Project Site.

Terminology

14.2.16 The technical terminology applied to the assessment process in this document is based on that contained within the Cultural Heritage Section (Volume 11, Section 3, Part 2) of the Design Manual for Road and Bridges (DMRB) issued by the Highways Agency in 2007. This has been widely adopted throughout the heritage industry as a baseline. However, the terminology has been enhanced as appropriate throughout this report.

14.2.17 Cultural heritage comprises scheduled monuments, listed buildings, parks and gardens, battlefields, conservation areas, earthworks and buried archaeological remains. For the ease of presentation in this document cultural heritage features are referred to as Heritage Assets, and additionally for the purposes of clarity a minor distinction is made between standing remains and buried archaeology.

Aims

14.2.18 The DBA will study the historic environment within the agreed study area. It will consist of an analysis of data in order to identify the likely Heritage Assets, their significance, character of the study area and consideration of the setting of the Heritage Assets, and the nature, extent and quality of the known or potential archaeological, historic, architectural and aesthetic interest. Significance is to be judged in a local, regional, national or international context as appropriate (IfA 2012a).

Objectives

14.2.19 The specific objectives of this DBA are to:

- Assess the potential for Heritage Assets to survive within the Project Site;
- Assess the importance of the known or potential Heritage Assets;

- Identify the potential impact of proposed or predicted changes on the significance of the assets and their settings;
- Provide strategies for further evaluation where the nature, extent or significance of the resource is not sufficiently well defined;
- Assess the potential cumulative impacts of this development with other reasonably foreseeable planned developments.
- Suggest strategies to conserve the significance of the Assets and their settings, and;
- Present proposals for archaeological mitigation.

14.3 Realistic Worst Case Scenario for Assessment

14.3.1 In respect of archaeology and cultural heritage, the realistic worst case scenario from within the Project parameters (which are described in Section 4 of the PEIR) are set out in Table 14.1 below.

Table 14.1 - Worst case parameters for the proposed Project considered within this assessment

Parameters	Details
Power Generation Plant	
Number of gas turbine units	5 (~ 59 MWe)
Number of stacks	5
Height of Stacks	35m
Unit type	Aero derivative

14.3.2 The reason why this configuration has been chosen is that it represents the maximum number of stacks possible (e.g. 5) at their greatest height (35m). This is therefore considered to represent the greatest potential visual impact on the setting of cultural heritage assets. The various scenarios have little difference in terms of ground take or impacts on buried heritage assets.

14.3.3 A preliminary assessment of both options for the Gas Connection and the Electrical Connection is presented in this section. A decision on the preferred option for each will be taken following consultation.

14.4 Assessment Methodology and Significance Criteria

Data Collection

14.4.1 The principal sources of information consulted were historical and modern maps, although published and unpublished secondary sources were also reviewed. The following repositories were consulted during the data-gathering process:

- Glamorgan and Gwent Historic Environment Record (HER);
- Royal Commission on Ancient and Historical Monuments Wales (coflein);
- Aberdare Local Studies Library for a literature review of publicly available data including reports on any cultural heritage or archaeological work conducted in or near the study area; and
- Historical maps including Ordnance Survey.

Site Visit

14.4.2 The Project Site was visited in order to assess its character, identify visible historic features and assess possible factors which may affect the survival or condition of known or potential assets. A photographic record was compiled as a part of the site visit and shown in Plates 14.5-14.12.

14.4.3 All of the Heritage Assets identified through the data collection and the site visit are described in detail in the gazetteer (Appendix B). Their location is shown on Figure 14.1.

Setting of the Assets

14.4.4 The Project Site and its 1km Study Area were visited in order to allow a preliminary assessment of the potential for indirect impacts on the setting of the Heritage Assets. At this stage a drive through of the relevant landscape was undertaken, and an outline photographic archive compiled. The general topography was noted, as was the presence of any large areas of plantation, and building complexes such as housing estates, industrial plant, and so forth. However, due to the preliminary nature of this assessment a worst-case scenario is presented. This outline assessment has highlighted the need for further more detailed assessment of setting at a later stage as appropriate.

14.4.5 Initially, the significance of the Heritage Assets is judged in a neighbourhood, local, regional, national and international context, which results in the cultural value or sensitivity of the asset being determined along with the appropriate form of mitigation (Table 14.2 below). Once the value is established then the archaeological, historic, architectural and aesthetic interests are discussed.

Table 14.2: Criteria used to determine Importance of Sites

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/ Negligible)	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.	Avoidance unnecessary

	Such sites are likely isolated findspots, place names or cropmarks identified on aerial photographs.	

14.4.6 Table 14.2 is a general guide to the attributes of Cultural 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.

14.4.7 In order to consider the archaeological and historic significance in particular, an additional set of criteria are employed which relate to the SoS 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 (2010). These criteria relate to period, rarity, documentation, group value, survival/condition, fragility/vulnerability, diversity, and potential and are presented in Section 14.6. The consideration of the significance of statutory designated assets including listed buildings is reflected in their Grade, and so it is not necessary to apply the criteria mentioned to this type of Heritage Asset.

14.4.8 In order to assess the potential impact of any future development on built heritage or buried archaeological remains, consideration has been afforded to:

- Assessing in detail any impact and the significance of the effects arising from any future development of the Project Site;
- Reviewing the evidence for past impacts that may have affected the archaeological sites of interest identified during the desk-based assessment;
- Outlining suitable mitigation measures, where possible at this stage, to avoid, reduce, or remedy adverse impacts.

14.4.9 Key impacts have been identified as those that would potentially lead to a change to the Heritage Asset. Each potential impact has been determined as the predicted deviation from the baseline conditions, in accordance with current knowledge of the Project Site. The impact is assessed in terms of the sensitivity or value of the asset to 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, slight, or negligible, as shown in Table 14.3, below.

Table 14.3: 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.
Slight	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.

14.4.10 The interaction of the potential scale of impact and the importance of the Heritage Asset produce the impact significance. This may be calculated by using the matrix shown in Table 14.4:

Table 14.4: Impact Significance Matrix

VALUE		No Change	Negligible	Slight	Moderate	Substantial
	Very High	Neutral	Slight	Moderate/ large	Large /very large	Very large
	High	Neutral	Slight	Moderate /slight	Moderate /large	Large /very large
	Medium	Neutral	Neutral /slight	Slight	Moderate	Moderate /large
	Low	Neutral	Neutral /slight	Neutral/slight	Slight	Slight /moderate
	Negligible	Neutral	Neutral /slight	Neutral /slight	Neutral /slight	Slight
		SIGNIFICANCE OF THE IMPACT				

14.4.11 It is normal practice to state that impacts of moderate significance and above are regarded as significant impacts in EIA terms. Mitigation measures as appropriate for each Heritage Asset affected are presented in Section 14.8.

14.5 Consultation

14.5.1 A summary of stakeholder consultation undertaken so far in relation to archaeology and cultural heritage is provided in Table 14 in Appendix A.

14.6 Baseline Conditions and Receptors

14.6.1 The following Section presents a summary of the historical and archaeological background of the general area. This is presented by historical period (Table 14.5), and has been compiled in order to place the study area into a wider archaeological context.

Table 14.5: Summary of British archaeological periods and date ranges

Period	Date Range
Prehistoric Period: Palaeolithic Mesolithic Neolithic Bronze Age Iron Age	 30,000 – 10,000 BC 10,000 – 3,500 BC 3,500 – 2,200 BC 2,200 – 700 BC 700 BC – AD 43
Romano-British	AD 43 – AD 410
Early Medieval	AD 410 – AD 1066
Late Medieval	AD 1066 – AD 1540
Post-medieval	AD 1540 – c1750
Industrial Period	cAD1750 – 1901
Modern	Post-1901

14.6.2 Prehistoric Period (30,000 BC – AD 43): Early human activity in South Wales is attested with the discovery of an Upper Palaeolithic burial in a cave at Paviland in the Gower Peninsula approximately 40km to the south-west of the Study Area (Walker 2011). Mesolithic flint tools have been found at two sites in Penderyn parish approximately 1km to the north of the Study Area. Together with pollen sample evidence, it suggests that the sites were seasonally occupied by hunter-gatherers

traversing the landscape in search of resources (Selwood 2000: 12). Numerous Mesolithic flint implements and manufacture waste have been found in the surrounding area of the Study Area including a possible temporary settlement approximately 1km to the south (PRN04591m). Further Microlithic findspots have been identified to the south and south-west of the Study Area (e.g. PRN00925w, PRN01686w, PRN01787m).

14.6.3 Within Glamorganshire, the Neolithic is typified by chambered tombs and long barrows, which have mainly been identified during upland surveys (Evans and Lewis 2003: 6). Several findspots of Neolithic flints have been recovered, particularly to the south of the Study Area (e.g. PRN01652m, PRN01649m, PRN01769m). A Neolithic hut settlement was excavated at Cefn Glas in 1973 (PRN01764), which is located approximately 2km to the south of the Study Area.

14.6.4 During the Bronze Age, Glamorganshire was characterised by cairns in the uplands and barrows in the lowlands (Evans and Lewis 2003: 8). Bronze Age earthworks, cairns and barrows have been recorded approximately 1km to the north-west of the Study Area (e.g. PRN04523m, PRN00010m, PRN00003m, PRN04524m) and also 2.5km to the south-west at PRN00713w and PRN04125m.

14.6.5 Whilst no Heritage Assets dating to the Iron Age have been identified within the Study Area, there is evidence for Iron Age activity in the wider area. Hillforts were typical Iron Age defensive structures located on high ground. An Iron Age hillfort (PRN01107m) has been identified within the vicinity of the Study Area at Craig y Ddinas, approximately 1.5km to the north-west. It has been suggested that it was only occupied temporarily during times of stress (Selwood 2000: 13). An Iron Age coin attributed to the Durotriges (PRN01687w) was recorded approximately 2.5km to the south-west of the Study Area. Evidence for Iron Age settlement has been recorded 1km to the south of the Study Area, where enclosures have been identified (PRN00022m). In addition, Iron Age settlement evidence is known further south at PRN00019m, PRN00020m and PRN 00021m, which contained hut circles. Whilst this settlement site was originally thought to be Iron Age and was scheduled as such, CADW now suggest that it may be post-medieval in date.

14.6.6 Romano-British Period (AD43 - AD410): A Roman fort was uncovered at Neath, which is approximately 15km south-west of Hirwaun. A Roman Road runs from Neath to the fort at Brecon (Selwood 2000: 13), approximately 3km to the west of the Study Area. No Heritage Assets dating to the Romano-British period have been identified within the Study Area.

14.6.7 Early Medieval Period (AD 410 – AD 1066): During the eighth century, Hirwaun was part of a territory known as Morgannwg (land of Morgan), which lay between the Rivers Usk and Tawe and was ruled by Morgan ab Athrwys, (Selwood 1977). In the ninth and tenth centuries, this kingdom was besieged by the Kings of Gwynedd, Dyfed and Mercia, along with periodic attacks from the Vikings. By the eleventh century, Cadwgan ap Meurig, the then King of Morgannwg, conceded defeat against Gruffydd ap Llewelyn, the King of Gwynedd and Dyfed. Gruffydd was later killed in 1063 by King Harold of England. Further conflict emerged with the Normans, who built castles at Chepstow and Monmouth and conquered most of Gwent. Hirwaun later came under the control of Gwrgant ab Ithel, who was reputed to have left an area of moorland four miles in length and two miles in width to the common people for the free grazing of animals. This land was later known as Hirwaun Common. A battle between Iestyn ap Gwrgant (son of Gwrgant ab Ithel) and Rhys ap Tewdwr is said to have taken place on Hirwaun Common and this is supported by OS mapping (1921) in which a site of a battle is annotated (See Plate 2, below). However, there is no evidence to support this and it is believed that it was a later invention (Selwood 1977: 16-17).

14.6.8 An early medieval inscribed stone was found just outside the south-eastern edge of the Study Area (PRN01275m), which may date to the late fifth century based on epigraphic evidence. A dyke (PRN02262.0m) has been identified approximately 1.5km to the south of the Study Area. This has been attributed to the Anglo-Saxon period, although its precise origins are unknown. It runs from Hirwaun Common cliff southwards along the boundary between Rhigos and Aberdare parishes. It may have functioned as a boundary marker.

14.6.9 Late Medieval Period (AD 1066 – AD 1540): In 1537, John Leland, an English antiquarian, travelled to Hirwaun and noted the horses on the Common, which were a famous special breed of ponies used until the nineteenth century. Leland also mentions there was ‘good corn’ in Rhigos indicating that the land was used for arable farming as well as for rough pasture (Selwood 1977: 25). Documentary evidence from the parish of Penderyn indicates that the inhabitants practised a mixed form of agriculture and their main income was livestock, especially cattle (Selwood 2000: 37).

14.6.10 Post-Medieval Period (AD 1540 – *c*1750): During the reign of Elizabeth I, the Earl of Pembroke was the landowner of much of Glamorgan (Selwood 1977: 25). After the death of the seventh Earl his daughter, Charlotte inherited the land. In 1703, she married Thomas the first Viscount of Windsor and Hirwaun Common became part of the Windsor estate (Selwood 1977: 48). Documentary evidence from the sixteenth and seventeenth centuries records the presence of several mills

bordering Hirwaun Common, two of which were in Rhigos. These comprised textile and corn mills (Selwood 1977: 38).

14.6.11 Industrial Period (*c*1750 – 1901): During the latter half of the eighteenth century, the lands at Hirwaun passed from the Windsor estate to the Earl of Bute (Selwood 1977: 48). There was increased pressure for land due to an increase in population leading to the encroachments of common land (Selwood 1977: 42), such as Hirwaun Common. Whilst Hirwaun Common had been used for agricultural purposes, the middle of the eighteenth century witnessed the discovery of mineral wealth.

14.6.12 Such is the importance of iron and coal to the history and development of the Cynon Valley and Hirwaun, and which still has an impact on modern period industry, that some detail of the Hirwaun Iron Works and the coal industry is presented below. Hirwaun Iron Works is a Scheduled Monument and lies within 1km of the Study Area.

14.6.13 Lloyd in his account of the South Wales Iron Works (1906) states that as early as 1720 iron ore was being transported by packhorse from Hirwaun to a small furnace in Brecon. The Brecon furnace was acquired by Thomas Maybery in 1753 and eventually passed to his son John Maybery.

14.6.14 It took John Maybery, an enterprising ironmaster, just a few short years to appreciate the potential wealth of Hirwaun, which was rich in iron ore, coal and limestone. In 1757 he leased the mineral rights from the landowner - the Lord Windsor. The lease indenture dated 22nd November 1757 provides an interesting insight into the infrastructure associated with mineral extraction "...to dig for, search, raise and land all mines of iron ore or coal that could or might be found in or upon a certain common, Tyr Wain Wrgan...with liberty of making ditches, gutters, levels, drains, dams and ponds for sourcing and raising the same...." (Lloyd 1906, 12). The indenture also offers a brief view of local life "....the tenants of the said Lord Windsor of a certain hamlet called Rhigos....granted to dig for and raise coal and carry away the same...and upon the common of Hirwain Wrgan for burning and making of lime to manure the lord's lands...". Further details within the indenture hint at the potential mineral wealth that had attracted John Maybery to the common "...and to dispose of 200 dozen horseloads of iron ore per year in any way thought proper...". This was in addition to that worked at the furnace and was presumably sent to Brecon.

14.6.15 Although the mineral rights were agreed with Lord Windsor, Maybery is recorded as having purchased land in the parish of Penderyn for the purposes of constructing a furnace from a different source (*ibid*). However, slightly later in 1760 the lease agreement is amended; John Maybery renegotiated the terms of his lease with the Dowager Lady

Windsor to include various relatives and, in particular, his brother-in-law John Wilkins. In accordance with this revised lease the freehold land is handed over to the Windsor family. The lease also provides an early account of the proposed layout of the iron works "...furnace and works, mine yard...with free liberty to set up, erect and build so many furnaces, blast furnaces, forges, mills, engines, store-houses, coal-houses, yards, courts...for the placing and keeping of ore, coal, coke and charcoal...and the melting and manufacturing...and at all times to bore, dig, search, work for, raise and land all such coal, culme, kennell, slack, iron mine and iron ore, turf or peat as might be found..."

14.6.16 The iron works rapidly developed and proved profitable to such an extent that in 1764 Maybery and Wilkins extended their operations to Tredegar. Unfortunately ten years later, issues in America greatly affected the iron business and in 1775 they parted with Tredegar. The Hirwaun works were leased for a fixed period to John Wasse and Willliam King, the latter a Bristol glass maker (Lloyd 1906, 14). The terms of the lease agreed to "...fix the water wheel and finish the new road to the Bryngwyn coal works..." This is the beginning of a thirty year period of new leases and iron masters. The most notable of these was Anthony Bacon (1780), a Cyfarthfa ironmaster, whose sons are documented as having disposed of the iron works at Cyfarthfa to Richard Crawshay. Jeremiah Homfray and a number of associates took over the works in 1803 and worked it until they became bankrupt in 1814, at which time the iron works was dismantled.

14.6.17 Hirwaun was given a new lease of life in 1817 when William Crawshay (II) of Cyfartha purchased the works. In 1820 four new blast furnaces were erected and a range of calcining furnaces was built. Following the decline of the iron industry in the late nineteenth century, and after a period of being worked as a forge and foundry, the works closed in 1900 (LLoyd 1906, 15).

14.6.18 At a time when the iron industry was in decline the Cynon Valley prospered from the growth of the coal industry, which by the middle of the nineteenth century had spread down the valley following new and deeper pits. The valley lies within the South Wales coalfield which is an elongated geological basin formed of carboniferous rocks and extends 90 miles from St Brides Bay in the west (Pembrokeshire) to Pontypool in the east (Monmouthshire). The following account of the coal mining industry in the valley leans heavily on *Cynon Coal History of a Mining Valley* (Cynon Valley Historical Society, 2009). Tower Colliery is a Grade II Listed Building that lies to the south of the Study Area.

14.6.19 The above account suggests that the early coal industry was limited to levels driven into the hillsides in the north of the valley followed by small and relatively shallow pits. Where local conditions allowed larger

drift mines were opened. The southwards dip of the coal seams being greater than the fall of the valley floor required deeper pits, and so the lower part of the valley had to wait upon developments in the technology of winding, pumping and ventilation (CVHS 2009, 13).

14.6.20 By the seventeenth century local landowners were aware that the coal lying under their lands was an asset and references to leases of this period exist. In 1631 reference is made to the "liberty to dig cole therein" at Tir Wayne Wrgan (Hirwaun Common) and in 1612 a small pit was opened at Rhiogos (*op cit*, 16).

14.6.21 The first important stimulus to the coal industry was the emergence of the local iron industry, and the discovery that coal could be used to smelt iron if it was first converted to coke (Abraham Darby 1709). However, the first coke-fired blast furnace did not arrive in Wales until *c* 1760 and at Hirwaun Ironworks. Coal was also used in the puddling furnaces and to fuel the blast engines. Other minor and more local uses during this period included malting and domestic use (*op cit*, 17). The remoteness of north Glamorgan and the absence of good roads made marketing difficult, and entailed the costly use of packhorses (*ibid*). Transportation improved when the first canals and their associated tramroads were built around the end of the eighteenth century. This led to a demand for better roads and Turnpike Trusts were set up, such as the Merthyr Turnpike Trust, which constructed the road between Merthyr and Glyn Neath crossing Hirwaun Common in 1800 (Selwood 1977: 91). The route of this road was altered in 1840, which ran along the western edge of Hirwaun Common.

14.6.22 A further major development to the industry was the famous four feet seam which was reached in the mid-nineteenth century. This particular coal was of such high quality that it was superior to that of Newcastle. This met an increasing demand for coal from the merchant steam vessels. It was during this period that the great expansion of coal mining in the Cynon Valley began. By 1840 four pits had been sunk; in 1843 three further pits followed; one more in 1844, two in the subsequent year, and two the year after that. By 1860 there were an additional 17 pits (CVHS 2009, 27).

14.6.23 The Cynon Valley collieries began to transport coal by tramroads to the Aberdare canal which had opened in 1812. However the depression in the iron industry of 1814 saw the closure of this vital transport link. Fortunately, following his purchase and renovation of the Hirwaun Ironworks William Crawshay took a controlling interest in the canal which thereafter continued to play a large part in the transportation of coal (*op cit*, 28). By 1841 Merthyr and Cardiff had been connected by the Taff Vale Railway at Abercynon. Although the advent of the railway meant the eventual ruin of the canal, the increased demand for coal

provided enough business for both the railway and the canal (*op cit*, 29).

14.6.24 The late 1900s and early twentieth century was a turbulent time in the coal industry with strikes taking their toll. However, the South Wales steam coal was still much sought after and this was further boosted by the First World War, although demand for coal production resulted in a shortage of mining equipment and the working out of pits. The period following the war was also one of prosperity, but this was short-lived and the number of men employed by the industry fell from 20,000 to 10,000 by 1937 (*op cit*, 173). The demand grew again with the on-set of WWII but the available man power fell as young miners joined the armed forces or worked in alternative industries such as the Hirwaun Royal Ordnance Factory (**HA06**) thus creating a shortage of labour and the subsequent establishment of the Bevin Boys (*op cit*, 179).

14.6.25 The fall of France took away 70% of the UK's coal market, and further loss of men to the industry resulted in an acute shortage of coal. In 1940 industrial scale opencast coal mining was introduced into the UK by the Department of Board and Trade. One of the earliest opencast sites opened under the provisions of the Defence of the Realm Act 1939 was Ffyndaf on the northern edge of Hirwaun Common. At the beginning of the 1970s further sites were opened including Rhigos. Ffyndaf was revisited and came to within 200 yards of Tower Colliery (1km to the south of the Study Area). Despite the widespread decline of deep mining and almost total closure by the 1990s, cast mining continues in the valley on Hirwaun Common (*op cit*, 181).

14.6.26 Modern (post-1901): Hirwaun Industrial Estate was established during WWII for the construction of Royal Ordnance Factory No. 26 (**HA06**). It was built between May 1941 and February 1942 and specialised in small arms ammunition manufacture. It covered an area 1.7km east to west by 1km. In 1945 the Board of Trade took over the site for use as an industrial estate and it is still used as such today. The site has been extensively rebuilt and there is little evidence of wartime use apart from the general road layout, some minor buildings and derelict sections of concrete roadway; nearby at Hirwaun Ponds railway halt, air-raid shelters provided for factory workers still stand.

14.6.27 In the 1960s, GEC Marconi established a TV factory at Hirwaun; in *c* 1974 a joint venture was entered into by GEC with Hitachi and in 1984 Hitachi took over the factory entirely. Hitachi expanded the plant with the 'Advance Factory' constructed in 1988 however by 2001 the decision had been taken to close the plant. In 2002 International Greetings Plc acquired the freehold interest in the entire facility and has operated a storage and distribution facility for its paper gift wrap product since that date.

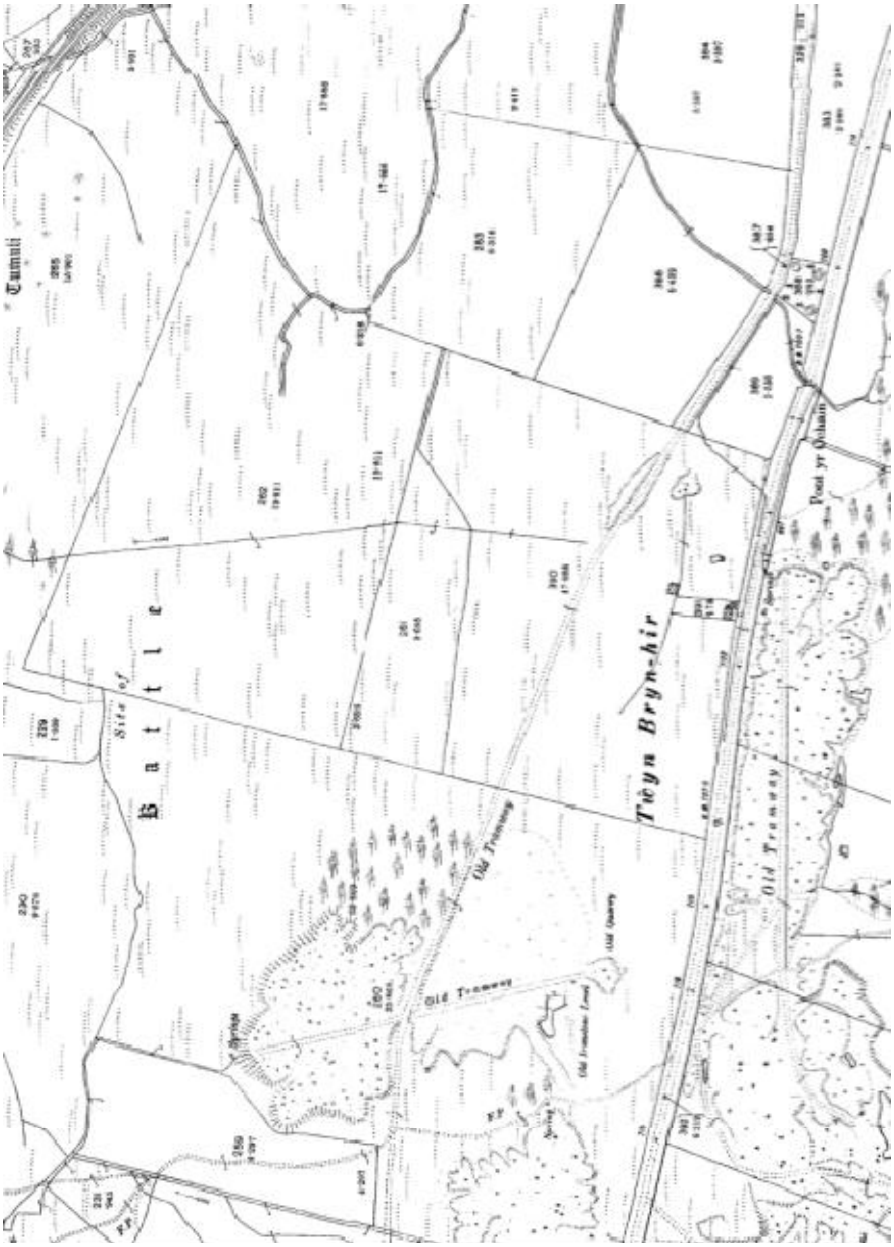
Previous Archaeological Investigations

14.6.28 An archaeological watching brief was undertaken at Hirwaun Industrial Estate in 2011, although no archaeological features, deposits or finds were identified (Dunning 2011). An Environmental Impact Assessment was carried out in 2008 at Enviroparks Hirwaun, which includes Hirwaun Industrial Estate (Enviroparks Ltd 2008). Several field visits have also been undertaken to specific sites, including Caer-llwyn cottage (**HA04**) in 1979 and Tappenden's tramroad east and west (**HA08**) in 2005. This latter visit revealed that only 20% of the entire tramroad survives with some original features still *in situ* (Roberts and Jones 2006).

Historical Development of the Scheme Area

14.6.29 The earliest 1:2,500 Ordnance Survey (OS) map (1899) and the subsequent 1900 edition (Insert 14.1) depict agricultural land, which was part of Hirwaun Common. A 'Site of Battle' is annotated here, which may have been the location for an eleventh century battle. The maps show several buildings just to the north of Rhigos Road, which are labelled as 'Twyn Bryn-hir'. Also outlined are the routes of several old tramways (**HA08**) and an old gravel pit. A 'tumuli' (**HA07**) is also noted in the north-east corner of the maps.

Insert 14.1: Extract from the 1: 2,500 Ordnance Survey map (1899-1900)



14.6.30 The 1:10,560 OS map (Insert 14.2) does not show any changes within the Study Area from the previous map. However, this map provides more detail of the surrounding area and some of the Heritage Assets are annotated, such as Hughes's Patch colliery (**HA03**), Caer-llwyn cottage (**HA04**), Bryn y gaer farmstead (**HA11**), Tappenden's tramroad west (**HA08**), Hirwaun Ponds (**HA12**), the mineral railway (**HA13**), and two 'tumuli' (**HA05** and **HA07**).

Insert 14.2: Extract from the 1: 10,560 Ordnance Survey map (1921)

14.6.31 The 1953 OS map (1:10,560) is the first to depict the Royal Ordnance Survey Factory, and an extensive complex of buildings is clearly illustrated.

14.6.32 By the publication of the 1962-1964 1:2,500 OS map (Insert 14.3), the Royal Ordnance Factory has become Hirwaun Industrial Estate (**HA06**), although a number of the Royal Ordnance Factory buildings are extant. The tramways (**HA08**) are now labelled as dismantled as new infrastructure has been built. Twyn Bryn-hir is shown as one structure and woodland has been planted surrounding it, apart from the south, where it is bounded by Rhigos Road.

Insert 14.3: Extract from the 1: 2,500 Ordnance Survey map (1962-64)

14.6.33 The 1990 1:10,000 OS map (Insert 14.4) shows the development of Hirwaun Industrial Estate (**HA06**) with clear differences in the layout of

the factory from the previous map. For example, the main factory building on Main Avenue has been expanded to the west and a building has been demolished to the east of this building. Instead, a further five main factory structures have been built between the main factory building and Fourth Avenue, along with several smaller buildings. This expansion was carried out by Hitachi in 1988 with further structures added and others demolished. It is similar in plan to the modern OS mapping (2013), although there have been changes to the buildings to the immediate east of the proposed Power Generation Plant more recently. The structure at Twyn Bryn-hir is still extant on this map, along with its surrounding woodland, which survives today. Other Heritage Assets can still be seen, such as Hughes's Patch (**HA03**), Caer-llwyn cottage (**HA04**), Bryn-y-gaer farmstead, which has 'ruins' annotated next to it (**HA11**), Hirwaun Ponds (**HA12**), and the mineral railway (**HA13**).

Insert 14.4: Extract from the 1: 10,000 Ordnance Survey map (1978-90)

Site Setting

14.6.34 A site visit was carried out in June 2013, which included a drive through of the Study Area.

Several key sites were visited and are presented in Inserts 14.5 to 14.12 below. From Hirwaun Industrial Estate, the valley rises steeply to the north. The view to the south is dominated by opencast coal stripping of the Common and an electricity substation. There are no open views to the east or west due to tree plantations within and around the industrial estate.

Insert 14.6: General view within Hirwaun Industrial Estate, facing east, showing a slight dip in the landscape

Insert 14.7: General view within Hirwaun Industrial Estate, facing west, showing a slight rise in the landscape

Insert 14.8: General view from Hirwaun Industrial Park, facing north towards the Brecon Beacons National Park

Insert 14.9: Surviving structures of the Royal Ordnance Munitions factory (HA06), facing north

Insert 14.10: View from Rhigos towards the Project Site, facing east. A small colliery spoil heap is visible behind the hedge line

Insert 14.11: View from the electricity sub-station towards the proposed Power Generation Plant, facing north-west. The wooded nature of the area surrounding the industrial estate can be clearly seen

Insert 14.12: View from Ty Newydd Hotel towards the Project Site showing extant surface strip mining on Hirwaun Common, and the tree plantations surrounding the industrial estate, facing south

Historic Landscape Characterisation

14.6.35 Historic landscape characterisation has been undertaken and the Study Area covers several regions, including Cefn Cadlan, Cwm Cadlan, Dyffryn Hepste, Rhondda Uplands and Rhondda Fawr, as detailed below:

- Cefn Cadlan includes extensive moorland with important traces of prehistoric settlement, land use and burial together with a scattering of post-medieval and recent sheepfolds and small disused quarries and associated limekilns (http://www.cpat.org.uk/projects/longer/histland/fforest/1202.htm).
- Cwn Cadlan comprises an upland valley with a diffuse and dispersed pattern of farms and abandoned farms and generally small irregular fields of medieval and earlier origin together with some larger areas of enclosed grazing on the moorland edge, along with field boundaries formed by drystone walls and hedges (http://www.cpat.org.uk/projects/longer/histland/fforest/1199.htm).
- Dyffryn Hepste is also an upland valley with a coherent and well-preserved pattern of dispersed farms and generally small irregular fields of medieval and earlier origin with boundaries formed by drystone walls and hedges, together with some larger areas of enclosed grazing on the moorland edge (http://www.cpat.org.uk/projects/longer/histland/fforest/1201.htm).
- The Rhondda Uplands contains a mountain sheepwalk, partially forested, multi-period and multi-functional landscape. This includes prehistoric settlement and a funerary landscape, early communication corridor, Roman and medieval military structures, early medieval administrative boundaries, medieval upland settlement, post-medieval industrial landscape, relict upland agricultural landscape, documentary and place name evidence (http://www.ggat.org.uk/cadw/historic_landscape/Rhondda/English/Rhondda_030.htm).
- The Rhondda Fawr has enclosed valley sides comprising a largely relict medieval/post-medieval agricultural landscape, distinctive field boundaries, prehistoric funerary landscape and settlement, upland medieval agriculture and settlement, post-medieval agriculture and farmsteads (predominantly longhouse regional types), documentary evidence for both medieval/post-medieval agricultural practice and settlement, extensive industrial landscape with features dating from the early phases of mineral extraction (http://www.ggat.org.uk/cadw/historic_landscape/rhondda/english/Rhondda_029.htm).

Gazetteer of Heritage Assets

14.6.36 A total of 16 Heritage Assets have been recorded during this DBA. Their full details are provided in Appendix B and they are summarised below in Table 14.6.

Table 14.6 – Summary Gazeteer of Heritage Assets

Asset No.	Name
1	Arched stone tramroad bridge on Tappenden's tramroad West, which is squared off at one end.
2	Bronze spearhead found in open cast coal site. The implement is in a badly corroded condition.
3	Hughes's Patch colliery with remaining working faces and spoilheaps.It is annotated on the 1921 OS map and is marked on the modern OS map.
4	Caer-Llwyn Cottage
5	Llwyncelyn Cairn Group
6	Royal Ordnance Factory, Hirwaun
7	Twyn Bryn-Hir Cairnfield
8	Tappenden's Tramroad West
9	HIrwaun Toll House
10	Trebanog Fach
11	Bryn y Gaer
12	Hirwaun Ponds
13	The Hirwaun Common Mineral Line

Asset No.	Name
14	Stone Road Bridge
15	Building, Glyneath to Aberdare Tramway
16	Hirwaun Ironworks Water Pump

Importance of the Heritage Assets

14.6.37 The assessment has identified a total of 16 heritage assets within the 1km Study Area. Three Heritage Assets have been recorded within the Project Site (**HA06**, **HA08** and **HA09**), although only one (**HA06**) lies within the proposed Power Generation Plant. Table 14.7, below, highlights the cultural value of the Heritage Assets.

Table 14.7: Value of the Heritage Assets Identified

Value/sensitivity	Heritage Assets	Mitigation
International	N/A	To be avoided
National	**HA10**	To be avoided
Regional/County	N/A	Avoidance recommended
Local/Borough	**HA01-HA09, HA11-HA16**	Avoidance recommended
Neighbourhood	N/A	Avoidance not envisaged
Uncertain	N/A	Avoidance unnecessary

Criteria

14.6.38 Where assets do not possess a statutory designation, their significance has been determined with reference to the SoS criteria for assessing the national importance of monuments, as contained in Annex 1 of the

policy statement on scheduled monuments (DCMS, 2010). These criteria relate to period, rarity, documentation, group value, survival/condition, fragility/vulnerability, diversity, and potential. The definition of these criteria is presented in Table 14.8, below.

Table 14.8: Definition of Criteria used to determine Archaeological *Importance*

Criteria	Definition
Period	Heritage Assets that characterise a category of asset or period.
Rarity	This should take account of all aspects of the distribution of a particular class of Heritage Asset, both in a national and a regional context.
Documentary Evidence	The significance of a Heritage Asset may be enhanced by the existence of records of previous investigation or, in the case of more recent assets, by the supporting evidence of contemporary written records
Group Value	The value of a single Heritage Asset (such as a field system) may be greatly enhanced by its association with related contemporary assets (such as a settlement and cemetery) or with assets of different periods.
Survival/Condition	The survival of an asset's archaeological potential both above and below ground is a particularly important consideration and should be assessed in relation to its present condition and surviving features.
Fragility/Vulnerability	Highly important archaeological evidence from some field monuments can be destroyed by a single ploughing or unsympathetic treatment; there are also existing standing structures of particular form or complexity whose value can again be severely reduced by neglect or careless treatment.
Diversity	Some Heritage Assets may possess a combination of high quality features, others a single important attribute.
Potential	On occasion, the nature of the evidence cannot be specified precisely but it may still be

	possible to document reasons anticipating its existence and importance. This is usually confined to buried remains rather than upstanding Heritage Assets.

14.6.39 Similarly, where Heritage Assets do not have statutory designation their historical and aesthetic importance is determined though the use of the criteria defined below (Table 14.9). The aesthetic criteria do not relate to buried archaeological remains as these are not visible above ground. The criteria are generally applied to non-designated buildings and structures, and to places (which are not considered here).

Table 14.9: Definition of Historical and Aesthetic Importance

Criteria	Definition
Historical	This originates from the ways in which past people, events and aspects of life can be connected through a place to the present. This may include illustrative value, such as its connection to an important development, such as technology, or associative value, such as the connection to an important event or person.
Aesthetic	This is derived from the ways in which people draw sensory and intellectual stimulation from a place or building. These may be related to the design of a place, for example, through defensive reasons, or the informal development over time, such as the relationship of structures to their setting.

14.6.40 The consideration of the importance of listed buildings is reflected in their Grade and so it is not necessary to apply the criteria shown above to this type of Heritage Asset. Grade I listed buildings are those which are considered to be of exceptional national architectural or historic importance. Grade II* listed buildings are of particular national importance and special interest. Both Grade I and II* listed buildings are of great importance to the nation's built heritage and their importance will generally be beyond dispute. Grade II listed buildings are usually designated for their architectural and historic interest. They are usually of a more local or regional significance and make up around 95 per cent of all listed buildings.

Statement of Importance

14.6.41 The Heritage Assets within the 1km Study Area (**HA01, HA03-HA09, HA11-HA16**) have been considered using the criteria, with the results

below. Whilst those Heritage Assets located outside the Project Site will not be directly impacted upon, the proposed Project has the potential to impact on these assets in a visual manner. Two Heritage Assets have not been assessed: the findspot of a Bronze Age spearhead (**HA02**) is not assessed as it is no longer *in situ* and cannot be impacted upon by any development. The Listed Building (**HA10**) does not need to be considered here as it is already a designated asset.

14.6.42 Period: The majority of the Heritage Assets identified within the Study Area are typical Post-medieval industrial features of South Wales, such as the colliery (**HA03**), railway (**HA13**) and bridges (**HA01**, **HA14**). The Bronze Age cairnfields (**HA05** and **HA07**) are also characteristic of Bronze Age burial patterns in South Wales.

14.6.43 Rarity: None of the Heritage Assets are considered to be rare.

14.6.44 Documentary Evidence: The iron works, collieries and associated features, such as railways and tramroads in South Wales have been well-documented in the literature and through cartographic sources. Published research also exists for the Bronze Age landscape of this area. Other details could be discerned through further documentary research, but it is likely that this would not alter the results set out in this report.

14.6.45 Group value: The Post-medieval Heritage Assets (**HA01**, **HA03**, **HA04**, **HA08**-**HA09**, **HA11**-**HA16**) are linked through their date and the majority of them are associated with industry, apart from **HA04** and **HA11**, which comprise a house and a farmstead. Heritage Assets **05** and **07** are linked as they are both Bronze Age burial sites.

14.6.46 Survival/Condition: The early period assets (**HA05** and **HA07**) have been disturbed and are fragile in nature. The later assets are much more stable in nature and survive in relatively good condition, such as the extant buildings at the Royal Ordnance Factory site (**HA06**) and industrial sites, such as the bridges (**HA01**, **HA14**), the colliery (**HA03**) the tramroad (**HA08**), the ponds (**HA12**) and water pump (**HA16**). A number of industrial buildings are also still extant including **HA04**, **HA09** and **HA15**.

14.6.47 Fragility/Vulnerability: The buildings related to the Royal Ordnance munitions factory (**HA06**) are vulnerable to any development and the toll house (**HA09**).

14.6.48 Diversity: The post-medieval/industrial period features are diverse in that they include collieries and iron works and associated features, along with infrastructure, such as roads, bridges, railways and tramways (**HA01**-**HA03**, **HA08**, **HA09**, **HA12**-**HA16**).

14.6.49 Potential: Within the proposed Power Generation Plant Site, there is potential for buried archaeological remains dating to WWII and possibly earlier. Within the Project Site, parts of Hirwaun Common have remained agricultural for centuries and there is potential for buried archaeology from any period, although particularly from the Bronze Age considering the wealth of cairnfields in the vicinity, and later coal mining related activities.

14.7 Preliminary Assessment of Potential Impacts

14.7.1 Current planning policy guidance for the historic environment, embodied in PPW (Cymru 2012), advises that Heritage Assets are an irreplaceable resource. It has been the intention of this study to identify the archaeological and heritage significance and potential of the Study Area, and assess the impact of the proposed Project, thus allowing the policy stated in PPW (Cymru 2012) to be enacted upon.

Buried remains

Power Generation Plant

14.7.2 The extent of any previous disturbance to buried archaeological remains is an important factor in assessing the potential impact of the proposed scheme of development. As Hirwaun Industrial Estate was originally a WWII Royal Ordnance munitions factory (**HA06**), it is likely that any buried remains were disturbed during its construction. Prior to the construction of the munitions factory, the land was used for agricultural and mineral extraction purposes for centuries.

Gas Connection route corridor option 1

14.7.3 Land under which Gas Connection route corridor option 1 is sited has remained as undeveloped agricultural land as far as the earliest maps go back. The land was formerly part of Hirwaun Common. There is potential, therefore, for the survival of buried archaeology in these areas, particularly relating to mineral extraction, as this has not been disturbed. Any groundworks associated with development have the potential to impact directly on these assets.

Gas Connection route corridor option 2

14.7.4 The majority of Gas Connection route corridor option 2 runs alongside roads, which may have previously impacted on any buried archaeology present. However, the roads are relatively recent additions to the landscape (approximately 1940s to 1950s). Prior to these roads the land was agricultural and also part of the Hirwaun Common. There is potential, therefore, for the survival of buried archaeology in these

areas, particularly relating to mineral extraction, as this has not been disturbed. Any groundworks associated with development have the potential to impact directly on these assets.

Electrical Connection route corridor option 1

14.7.5 Land under which Electrical Connection route corridor option 1 is situated has not previously been the subject of any development. However, as this connection option will be an overhead line, and the only ground disturbance will be with the Power Generation Plant Site / Rhigos Substation there is not considered to be any potential to impact on buried archaeology. However, as this connection option will be clearly visible and will require support from up to three pylons of approximately 35 m in height, there is the potential that it could have impacts on the setting of above ground heritage assets. These potential impacts are explored in more detail below, along with the potential setting impacts of the Power Generation Plant.

Electrical Connection route corridor option 2

14.7.6 As with the Power Generation Plant, Electrical Connection route corridor option 2 is situated within the Hirwaun Industrial Estate. It is therefore likely that any buried remains were disturbed during its construction

Built Heritage:

Power Generation Plant and Electrical Connection route corridor option 1.

14.7.7 A number of buildings within the industrial estate almost certainly date to the Royal Ordnance Factory (**HA06**). The setting is largely industrial with a rural backdrop.

14.7.8 Tower Colliery, a Grade II Listed Building, was visited in order to assess the setting of this asset. There was no direct line of sight from Tower Colliery and therefore there would be no impact on the setting. Hirwaun Ironworks is a Scheduled Monument, which was visited, but again, no direct line of sight to the Project was witnessed due to a large plantation of mature trees.

14.7.9 Other points of interest in the surrounding area were also visited on a site assessment including Cefn Rhigos, Rhigos, Ty Newydd and Llygad Cynon. The only place where there is potential for visibility is from Rhigos, although the land is undulating and there are plantations of trees, which would obscure the view and protect the setting.

14.7.10 The setting of any built heritage within the Study Area may also be impacted upon visually by the Project, such as the toll house (**HA08**), Caer llwyn cottage (**HA04**), Trebanog Fach (**HA10**), Bryn-y-gaer farmstead (**HA11**) and the cairnfields (**HA05** and **HA07**). As visual impact may extend further than 1km, a larger Study Area will consider this in the forthcoming Cultural Heritage Section of the EIA.

14.7.11 One Heritage Asset (**HA06**) lies within the proposed Power Generation Plant Site and will be impacted upon should any development take place. A further two Heritage Assets comprise a toll house and a tram road (**HA08** and **HA09**), which lie within the Project Site and may also be impacted upon should any development take place.

14.7.12 Following on from the above considerations, the significance of direct impacts on the Heritage Assets within the proposed Power Generation Plant Site and by the Electrical Connection route corridor option 1 has been determined as slight for **HA06**, although this would rise to moderate if the extant buildings were to be demolished. For the Heritage Assets within the Project Site, **HA08** and **HA09** are considered to have a neutral/slight significance of impact.

14.7.13 The significance of indirect impacts on the Heritage Assets within the 1km Study Area is considered to have a neutral/slight impact for all Heritage Assets. See Table 14.10 below for full details.

Table 14.10: Likely Significance of Impact

HA Number	Importance/Value	Impact	Significance of impact
HA01	Local (Low)	Negligible	Neutral/slight
HA02	Local (Low)	Negligible	Neutral/slight
HA03	Local (Low)	Negligible	Neutral/slight
HA04	Local (Low)	Negligible	Neutral/slight
HA05	Local (Low)	Slight	Neutral/slight
HA06	Local (Low)	Moderate	Slight
HA07	Local (Low)	Slight	Neutral/slight
HA08	Local (Low)	Slight	Neutral/slight
HA09	Local (Low)	Slight	Neutral/slight
HA10	National (High)	Negligible	Slight
HA11	Local (Low)	Negligible	Neutral/slight
HA12	Local (Low)	Negligible	Neutral/slight

HA13	Local (Low)	Negligible	Neutral/slight
HA14	Local (Low)	Negligible	Neutral/slight
HA15	Local (Low)	Negligible	Neutral/slight
HA16	Local (Low)	Negligible	Neutral/slight

Gas Connection route corridor options 1 and 2 and Electrical Connection route corridor option 2

14.7.14 Given that both gas connection route corridor options will be mainly buried, the pipeline will not have any impacts on above ground heritage assets. The AGI will be a relatively small structure, screened by vegetation. It is unlikely that it will give rise to any setting impacts on above ground heritage assets. Considering its relatively close proximity to the Power Generation Plant, the same assets as listed in Table 14.10 could potentially be impacted by the AGI. However as the AGI would be far smaller and less intrusive than the Power Generation Plant, at this preliminary stage there are not considered to be any impacts to the setting of above ground heritage assets.

14.7.15 Electrical Connection route corridor option 2 would be buried for its entire length. The only above ground infrastructure would be within the Power Generation Plant Site and Rhigos substation. Therefore there is considered to be no potential for impacts on the setting of above ground assets due to Electrical Connection route corridor option 2.

Mitigation Strategy

14.7.16 Current legislation draws a distinction between archaeological remains of national importance and other remains considered to be of lesser significance. Those perceived to be of international or national importance may require preservation *in situ*, whilst those of lesser significance may undergo preservation by record, where Regional/County or Local/Borough significance can be demonstrated.

14.7.17 One Heritage Asset (**HA06**) lies within the proposed Power Generation Plant Site, which will be directly impacted upon should any development take place. As this Heritage Asset comprises a former WWII Royal Ordnance Factory, it is recommended that a photographic and interpretative survey of any buildings relating to the Royal Ordnance Factory are subject to a building investigation of a sufficient level to allow a descriptive record and interpretation to be compiled. The Heritage Assets that lie within the Project Site (**HA08** and **HA09**) may also be affected by the Project and it is recommended that a low-level of building investigation should be carried out on the toll house (**HA09**) if it is to be directly impacted upon. Any parts of the tramroad

(**HA08**) that would be affected would need to be recorded also, although preservation *in situ* would be preferable.

14.7.18 The most appropriate mitigation strategy will be discussed with the GGAT Planning Archaeologist as part of further ongoing consultations.

14.8 Preliminary Assessment of Residual Effects

14.8.1 On the basis of the preliminary environmental information and assessment described above, taking into account potential mitigation measures, potential residual impacts are detailed in Table 14.11 below.

Table 14.11: Preliminary Assessment of Residual archaeological effects

HA	*HER No.*	*Description*	*Significance of Unmitigated Potential Impact*	*Mitigation / Monitoring Measure*	*Residual Impact*
Heritage Assets					
1	03225.2m	Bridge on Trappenden's Tramroad West	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible
2	00008m	Spearhead	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible
3	01795m	Hughes's Patch	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible

HA	*HER No.*	*Description*	*Significance of Unmitigated Potential Impact*	*Mitigation / Monitoring Measure*	*Residual Impact*
4	01256m	Caer-Llwyn Cottage	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible
5	00005m	Llwyncelyn Cairn Group	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible
6	06322m	Royal Ordnance Factory, Hirwaun	Slight	A photographic and interpretative survey of any buildings relating to the Royal Ordnance Factory are subject to a building investigation of a sufficient level to allow a descriptive record and interpretation to be compiled.	Negligible
7	0006m	Twyn Vryn-Hir Cairnfield	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible

HA	*HER No.*	*Description*	*Significance of Unmitigated Potential Impact*	*Mitigation / Monitoring Measure*	*Residual Impact*
8	03225.1m	Tappenden's Tramroad West	Neutral/slight	Any parts of the tramroad (**HA08**) that would be affected would need to be recorded also, although preservation *in situ* would be preferable.	Negligible
9	01796m	Hirwaun Toll House	Neutral/slight	A low-level of building investigation should be carried out on the toll house (**HA09**) if it is to be directly impacted upon.	Negligible
10	26832	Trebanog Fach	Slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible
11	01092m	Bryn y Gaer	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible

HA	*HER No.*	*Description*	*Significance of Unmitigated Potential Impact*	*Mitigation / Monitoring Measure*	*Residual Impact*
12	01809m	Hirwaun Ponds	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible
13	03220m	The Hirwaun Common Mineral Line	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible
14	01808m	Stone Road Bridge	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible
15	01798m	Building, Glyneath to Aberdare Tramway	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible
16	01800m	Hirwaun Ironworks Water Pump	Neutral/slight	Implementation of the CEMP, where the siting of storage bunds would screen views.	Negligible
Unknown Below-Ground Cultural Heritage / Archaeological Resources					

HA	*HER No.*	*Description*	*Significance of Unmitigated Potential Impact*	*Mitigation / Monitoring Measure*	*Residual Impact*
	N / A	Below-Ground Cultural Heritage / Archaeological Resources	Moderate Adverse Direct Permanent	Implementation of the Mitigation and Monitoring Strategy.	Negligible
	N / A		Moderate Adverse Direct Permanent	Implementation of the Mitigation and Monitoring Strategy.	Negligible
	N / A		Moderate Adverse Direct Permanent	Implementation of the Mitigation and Monitoring Strategy.	Negligible

14.9 Next Steps

14.9.1 A photographic and interpretative survey of any buildings relating to the Royal Ordnance Factory will be subject to a building investigation of a sufficient level to allow a descriptive record and interpretation to be compiled. The Heritage Assets that lie within the Project Site may also be affected by the Project and it is recommended that a low-level of building investigation should be carried out on them.

14.9.2 The most appropriate mitigation strategy will be discussed with the GGAT Planning Archaeologist as part of further ongoing consultations.

SECTION 15

SOCIO-ECONOMICS

15 SOCIO-ECONOMICS

15.1 Introduction

15.1.1 The construction, operation and decommissioning phases of the Project have the potential to impact on the local area's: labour market; community facilities and tourism sector.

15.1.2 Work completed for this PEIR includes a socio-economic policy review and baseline profile. A description of the proposed approach to the socio-economic assessment will be sent to key consultees. A preliminary assessment of anticipated impacts is outlined in this PEIR based on the initial analysis. Further work is planned and findings will be reported in the final socio-economic chapter as part of the ES.

15.2 Legislative and Policy Context

National Policy Statements

15.2.2 As explained in Section 2, NPS EN-1 explains the assessment principles to which the SoS will have regard in the examination of an energy NSIP (such as the proposed Project), and explains the generic socio-economic impacts with regard to energy infrastructure. Specific considerations for fossil fuel generating stations are provided in the NPS for Fossil Fuel Generating Infrastructure (EN-2). The NPSs for Gas and Oil Pipelines (EN-4) and Electricity Networks Infrastructure (EN-5) provide specific considerations potentially relevant to the Gas Connection and Electrical Connection Compound and Electrical Connection respectively.

15.2.3 NPS EN-1 acknowledges that "the construction, operation and decommissioning of energy infrastructure may have socio-economic impacts at local and regional levels". At paragraph 4.2.2 it states that in addition to an ES prepared in accordance with the European Environmental Impact Assessment Directive "the IPC will find it helpful if the applicant sets out information on the likely significant social and economic effects of the development, and show how any likely significant negative effects would be avoided or mitigated. This could include employment, equality, community cohesion and well-being."

15.2.4 NPS EN-1 states that where the proposed Project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of relevant socio-economic impacts, which may include the creation of jobs and training opportunities; the provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities; effects on tourism; and the impacts of

a changing influx of workers during the different phases of the energy infrastructure.

15.2.5 It further notes that in making a decision on an energy NSIP the SoS may attribute limited weight to assertions of socio-economic impact that are not supported by evidence and may take into account mitigation such as planning obligations and particular options as to phasing the development in relation to impacts.

15.2.6 NPS EN-2 Fossil Fuel Electricity Generating Infrastructure should be considered alongside NPS EN-1. It emphasises the benefits of a low carbon economy including the likely "positive effects on the Economy and Skills, and Health and Well-being as secondary benefits and positive effects in the medium/long term on climate change."

15.2.7 NPS EN-4 Gas Supply Infrastructure and Gas and Oil Pipelines sets out policy for route selection for gas supply infrastructure and gas pipelines, along with likely impacts of their construction, commissioning and operation.

15.2.8 NPS EN-5 factors that should be taken into account related to route selection for developers, along with likely impacts of their construction, commissioning and operation.

15.2.9 While only a number of the impacts raised in the NPSs are considered likely to be relevant to the proposed Project, the socio-economic assessment may also take into account any relevant positive provisions the developer has made or is proposing to make to mitigate impacts (for example through planning obligations) and any legacy benefits that may arise as well as any options for phasing development in relation to the socio-economic impacts, to enable them to be considered by the SoS for the purposes of decision-making.

Other National and Local Policy

15.2.10 Whilst the Planning Act 2008 is clear as to the primacy of the relevant NPS, other national and local planning policy can be considered important and relevant by the SoS in the determination of an energy NSIP.

15.2.11 The 2012 Gas Generation Strategy highlights that gas-fired power stations are relatively cost effective and quick to build. It states that these plants can "offer employment opportunities throughout the country".

15.2.12 The UK Low Carbon Transition Plan states, "Coal and gas will remain important to ensure our electricity supply is reliable and secure as we

move towards greater dependence on intermittent renewable sources like wind"

15.2.13 Chapter 12 of Planning Policy Wales[30] (PPW) is concerned with the provision of infrastructure and services. It emphasises the importance of infrastructure projects to Wales:

> "Adequate and efficient infrastructure, including services such as education and health facilities along with water supply, sewers, waste management, electricity and gas (the utilities) and telecommunications, is crucial for the economic, social and environmental sustainability of all parts of Wales. It underpins economic competitiveness and opportunities for households and businesses to achieve more socially and environmentally desirable ways of living and working".

15.2.14 The Project is efficient in that it provides energy when renewable resources are in short supply. Gas resources are an efficient and reliable way to move towards a low carbon economy.

15.2.15 Energy Wales: A Low Carbon Transition (2012:10) places importance on gas supply "in order to compensate for the intermittency in supply from renewable resources". In addition, "Gas is a flexible, responsive and reliable source of energy which can play a key role in the transition to a genuinely low carbon energy system".

15.2.16 Economic Renewal: A New Direction (July 2010) recognises the need, in these challenging economic conditions, to improve energy resources and productivity. The need for a secure energy supply is highlighted as being of importance. The proposed development will provide increased security in the energy supply.

15.2.17 Rhondda Cynon Taf Local Development Plan up to 2021 notes that the Project Site is in the Northern Strategy area. Hirwaun Industrial Estate is designated as an important employment site (NSA 14.2). Therefore, the council will support the employment use of the site in order to promote economic growth of the area. The area is also designated as a strategic waste site in the Plan (CS9.2). However, the investment and construction of a gas-fired power station is substantially higher than most waste infrastructure projects. Moreover, gas-fired power stations have employment densities, during construction and operation, which are generally higher than waste projects. Therefore, the economic benefits of gas-fired power stations are usually greater than waste infrastructure schemes.

[30] Edition 5, November 2012

15.3 Realistic Worst Case Scenario for Assessment

15.3.1 In respect of Socio-economics, the realistic worst case scenario from within the proposed Project parameters (which are described in Section 4 of the PEIR) are set out in Table 15.1 below.

Table 15.1 - Worst case parameters for the proposed Project considered within this assessment

Parameters	Details
Power Generation Plant	
Number of gas turbine units	1 (~ 299 MWe)

15.3.2 The different options for the configuration of the Power Generation Plant have little bearing on the impact to socio-economics. However, it is recognised that installing only 1 gas turbine generator at this site will have a marginally lower construction and operational workforce than installing a greater number of units.

15.3.3 A preliminary assessment of both options for the Gas Connection and the Electrical Connection is presented in this section. A decision on the preferred option for each will be taken following consultation.

15.4 Assessment Methodology and Significance Criteria

15.4.1 The approach adopted in undertaking this preliminary assessment of potential impacts on socio-economics, tourism and community infrastructure is summarised below.

Guidance

15.4.2 The assessment follows UK Government guidelines and best practice. The methodology used to estimate impacts follows guidance set out in the HM Treasury's Green Book[31] and English Partnerships (EP) Additionality Guide, as well as taking into account the Department for Business Innovation and Skills research on additionality.[32]

Study Areas

31 http://www.hm-treasury.gov.uk/d/green_book_complete.pdf

32 Additionality Guide – A Standard Approach to Assessing the Additional Impacts of Projects: English Partnerships (2008)

15.4.3 The following study areas have been used in this assessment, which have been defined in the methodology consultation exercise with consultees:

- **Socio-economic study area** - The study area for 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.

- **Tourism study area** - The study area for the tourism assessment is defined by a 15 km radius from the Project Site. 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.

- **Community Infrastructure study area** - As proximity is likely to be the main determinant of impacts and their scale, the status (or catchment) of the community facility receptors in an area determines the scale and significance of any impacts. Hirwaun is classed as a Key Settlement in the local plan[33]. Although in recent years there has been growth, this growth has not been supported by an increase in local services and facilities. The community facilities in Hirwaun are of small scale and are limited[34]. Its community facilities therefore are likely to only serve a restricted area, not extending to settlements of similar or larger size, effects will tend to be limited to receptors within the local area. For this assessment, this is taken to be within a 5km radius of the Project Site.

Approach

15.4.4 The main stages of the approach are as follows:

Review available data/information

15.4.5 Data and information from national, regional and local databases has been reviewed, identifying information gaps and requirements for data gathering e.g. business, supply chain and other surveys.

[33] http://www.rctcbc.gov.uk/en/relateddocuments/publications/developmentplanning/localdevelopmentplan2006-2021/adoptedldp2011.pdf

[34] http://www.rctcbc.gov.uk/en/relateddocuments/publications/developmentplanning/evidencebase/eb119-hirwaunvillagestudy.pdf

Comparative analysis

15.4.6 Data and information regarding the predicted and/or experienced socio-economic effects of similar projects was examined.

Baseline

15.4.7 The Study Area's socio-economic position has been described using standard indicators. This provides a baseline from which potential impacts can be assessed:

- **Economic:** the area has been described 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.
- **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).

<u>Assessment of potential economic impacts</u>

15.4.8 A detailed assessment of likely effects on the local, regional and national economy during construction / demolition, operation and decommissioning of the proposed Project is being prepared. This will assess the scale of:

- Direct economic impacts: jobs and GVA that are wholly or largely related to construction, decommissioning, and operation and maintenance of 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 proposed Project in influencing economic activities (including wider socio-economic effects).

Assessment of potential tourism impacts

15.4.9 Tourism and recreational behaviour will only be detrimentally affected by a development where the effects of that proposed development either changes 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 to understanding tourism impacts.

15.4.10 A business survey will be carried out to gain a more detailed understanding of the local tourism economy and its current performance. Businesses that will be contacted include key visitor accommodation providers, leisure activity providers and other relevant tourism businesses.

15.4.11 Facilities or notable points of focus in the Study Area have been identified. Based upon the proposed Project's anticipated visibility, comment is provided on the likelihood of the proposed Project influencing visitor and tourist attitudes and behaviour towards these visitor facilities and locations.

15.4.12 The significance of tourism impacts will be determined through an understanding of the sensitivity of a receptor and the anticipated magnitude of effect.

Assessment of potential community infrastructure impacts

15.4.13 An assessment of the likely significant effects on local, regional and national community receptors during construction, operation and decommissioning of the proposed Project is being 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).

Mitigation measures

15.4.14 Where impacts are assessed as significant adverse, mitigation measures are outlined. As with impact identification, mitigation measures will be described discretely to address construction, operation and decommissioning impacts.

15.4.15 For the purposes of the assessment, moderate impacts and above are considered as significant.

Conclusions on cumulative and residual effects

15.4.16 An initial assessment of cumulative effects is presented in Section 16 of this PEIR. A preliminary assessment of residual impacts is presented in Section 15.10.

15.4.17 In addition to quantitative and qualitative assessment, impact significance is defined by the combination of the sensitivity of receptors and the magnitude of impacts on them. Criteria specific to socio-economic factors have been adopted in defining the hierarchies of receptor sensitivity and impact magnitude.

Determining socio-economic sensitivity of effect

15.4.18 For economic impacts and effects (including employment), the availability of labour and skills is critical in accommodating the demands, needs and requirements of the proposed development. Adequate capacity results in a low sensitivity, while limited capacity results in a high sensitivity.

15.4.19 The key socio-economic indicators in relation to the criteria include:

- the proportion of skilled workforce in the study area relative to national averages;
- educational attainment levels in relation to national 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

Table 15.2 - Socio-economics Sensitivity Criteria

Sensitivity	Example
Very High	There is no availability of labour and skills in the area's workforce (this is dependent on specific project requirements and the degree to which they can be met in the Study area). The Project would lead to labour market pressure and distortions (i.e., skills and capacity shortages, import of labour,wage inflation).
High	There is low/limited availability of labour and skills in the area's workforce (The Project would lead to labour market pressure and distortions (i.e., skills and capacity shortages, import of labour, wage inflation).

Sensitivity	Example
Medium	The area has a constrained supply of labour and skills. The Project may lead to labour market pressure and distortions.
Low (or lower)	The receptor has a readily available labour force: some skill deficits. The Project is unlikely to lead to labour market pressure and distortions
Negligible	Where an effect would not be discernible; and/or where fewer than 10 jobs would be created or lost within the Study Area. and/or Effects would be temporary (i.e. experienced for less than one year).

Determining socio-economic magnitude of effect

15.4.20 A level of impact magnitude has been ascribed based on the information on the Project's socio-economic outputs and the baseline structure of the area. In economic terms, the key socio-economic receptors are: participants in the labour force; and the level of occupational skills available in the study area.

15.4.21 The magnitude of the effect of potential socioeconomic impacts is assessed against the thresholds shown in Table 15.3.

Table15.3 - Socio-economics Magnitude criteria

Magnitude		***Example***
Major	Adverse	Effects would be observed on an international, national or regional scale; where the number of jobs lost in the Study Area would be greater than 250 (based upon EU definition of small and medium enterprises). and/or Effects would be of long-term duration (i.e. greater than 5 years).
	Beneficial	Effects would be observed on an international, national or regional scale; where the number of jobs created in the Study Area would be greater than 250 (based upon EU definition of small and medium enterprises). and/or

Magnitude		***Example***
		Effects would be of long-term duration (i.e. greater than 5 years).
Moderate	Adverse	Noticeable effects would 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 would be greater than 50, but fewer than 250. and/or Effects would be medium-term (i.e. 3-5 years).
	Beneficial	Noticeable effects would 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 would be greater than 50, but fewer than 250. and/or Effects would be medium-term (i.e. 3-5 years).
Minor	Adverse	Small scale effects would arise, with a limited number of affected receptors; and/or where the number of jobs lost in the Study Area would be greater than 10, but fewer than 50. and/or Effects would be short-term (i.e. 1-2 years).
	Beneficial	Small scale effects would arise, with a limited number of affected receptors; and/or where the number of jobs created in the Study Area would be greater than 10, but fewer than 50. and/or Effects would be short-term (i.e. 1-2 years).
Negligible	Adverse	Very minor loss
	Beneficial	Very minor benefit
No Change		No change would be perceptible, either

Magnitude		*Example*
		positive or negative.

Sensitivity of tourism receptor

15.4.22 Impact significance is determined through an understanding of the sensitivity of a receptor and the anticipated magnitude of effect. 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 Projects' 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.

15.4.23 The main factors relevant to the consideration of tourism receptor sensitivity are outlined in Table 15.4.

Table 15.4- Tourism Receptor Sensitivity

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 (or lower)	Local status and/or few visitor numbers.
Negligible	Sub local and/or r minimal numbers.

Magnitude of tourism effect

15.4.24 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 in Table 15.5.

Table 15.5 - Tourism Magnitude of Effect

Magnitude		Example
Major	Adverse	A permanent or long term adverse impact on the value of the 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 would be no impact on its integrity.
	Beneficial	Minor benefit to, or addition of key characteristics, features or elements; some beneficial impact on receptor or a reduction in the risk of a negative impact occurring.
Negligible	Adverse	Very minor loss
	Beneficial	Very minor benefit
No Change		No change would be perceptible, either positive or negative.

Sensitivity of community infrastructure receptor

15.4.25 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. This is further outlined in Table 15.6.

Table 15.6 – Sensitivity of Community Infrastructure

Sensitivity	Example
Very High	Facility is of international importance e.g. Major research or academic centre

Sensitivity	Example
High	Facility is of national importance e.g. University, Centre of Excellence for health care
Medium	Facility is of regional importance e.g a hospital
Low (or Lower)	Facility is of local importance e.g. GP facility, local schools, community centre

Magnitude of community infrastructure effect

15.4.26 Magnitude of effect will be gauged by estimating the amount of change on the receptor arising from the Project. The magnitude of change will be evaluated in line with the criteria in Table 15.7 below.

Table 15.7 –Community Infrastructure Magnitude of Effect

Magnitude		Example
Major	Adverse	A permanent or long term adverse impact on the value of a facility
	Beneficial	Large scale or major improvement of a facility's quality; extensive restoration or enhancement; major improvement of a facility's 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 facility's quality.
Minor	Adverse	An adverse impact on the value of a facility, but recovery is expected in the short- term and there would 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

Magnitude		Example
		reduction in the risk of a negative impact occurring.
Negligible	Adverse	Very minor loss
	Beneficial	Very minor benefit
No Change		No change would be perceptible, either positive or negative.

Significance of Impact

15.4.27 In line with standard EIA practice, the sensitivity of receptors (Tables 15.2, 15.4 and 15.6) are considered against the Magnitude of Effect (Tables 15.3, 15.5 and 15.7) to determine the significance of effect (Table 15.8).

Table 15.8 – 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**

15.4.28 Impact significance is the term used to categorise the impact, e.g. negligible, minor, moderate and major; and can be positive, neutral or negative. It takes into account the sensitivity of the receptor and the magnitude of effects.

15.4.29 Impacts of moderate significance and above are considered to be significant for the purposes of the EIA Regulations.

15.5 Consultations

15.5.1 The consultation process will involve the development of a technical consultation framework (involving local authorities, LEP representatives, business organisations, education and training providers etc.) to agree or refine methodology, to secure relevant data; to ensure accurate interpretation of relevant policy; and to enable stakeholder views to inform the assessment.

15.5.2 Consultation responses received to date relating to Socio-economics, and how these responses have been considered in this assessment are summarised in Table 15 presented in Appendix A.

15.6 Baseline Conditions and Receptors

Socio-economic baseline

15.6.2 This socio-economic profile examines the key indicators and measures of socio-economic activity in the Study Area. It sets a context for the assessment and highlights key economic issues.

Population

15.6.3 The local and wider area has experienced an increase in population since 2001, a trend which is expected to continue until 2021. The population has increased more significantly in the wider region and at a national level as shown in Table 15.9.

Table 15.9 - Population*

	Local Area	Wider Area	Wider Region	United Kingdom
Population (2001)	192,908	621,710	1,410,931	58,791,895
Population (2012)	195,213	638,845	1,481,530	63,077,494
Population (2021)	199,357	662,479	1,570,883	66,980,590
% change				
2001-2012	1.19%	2.76%	5.00%	7.29%
2012-2021	2.12%	3.70%	6.03%	6.19%

*Source: Experian 2013

Age Structure

15.6.4 The local area has a declining proportion of working age people and an increasing dependency ratio[35] which is likely to put additional pressure on services in the area. By 2021 over a fifth of the local areas population is expected to be of retirement age. This is higher than the projected UK average.

[35] 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

Table 15.10 Age Structure*

	Local Area	Wider Area	Wider Region	United Kingdom
2001				
Children (0-15)	21%	21%	20%	20%
Working age (16-64)	62%	62%	63%	64%
Retirement age (65+)	18%	17%	17%	16%
2012				
Children (0-15)	18%	19%	18%	18%
Working age (16-64)	62%	63%	64%	64%
Retirement age (65+)	19%	19%	18%	17%
2021				
Children (0-15)	19%	19%	19%	19%
Working age (16-64)	59%	60%	62%	62%
Retirement age (65+)	22%	21%	20%	19%

*Source: Experian 2013

Economic Activity

15.6.5 The economic activity rate is a useful measure of the labour market opportunities available in the area[36]. The local area's level of economic activity is lower than the national average as outlined in Table 15.11.

Table 15.11 Economic Activity (2011)*

	Local Area	Wider Area	Wider Region	United Kingdom
Total people (16-74)	142,878	467,307	1,102,458	41,126,561
Economically Active (%)	61%	63%	64%	70%
Economically Inactive (%)	39%	37%	36%	30%

*Source: Experian 2013

15.6.6 The Projects local area is characterised by relatively high levels of unemployment. The local area has high levels of permanently sick or disabled people relative to the national average. However, the proportion of retired people in the local area is lower than the national average.

[36] 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.

Table 15.12 Economic Activity by Type*

	Local Area	Wider Area	Wider Region	United Kingdom
Economically Active				
Employees Part Time (%)	22%	22%	21%	20%
Employees Full Time (%)	56%	56%	56%	55%
Self-employed (%)	9%	10%	10%	14%
Unemployed (%)	9%	8%	7%	6%
Full-time student (%)	4%	4%	6%	5%
Economically Inactive				
Retired (%)	44%	44%	42%	46%
Student (economically inactive) (%)	12%	13%	19%	19%
Looking after home/family (%)	11%	11%	11%	14%
Permanently sick/disabled (%)	26%	25%	21%	14%
Other economically inactive	7%	6%	6%	7%

*Source: Experian 2013

Employment Structure

15.6.7 Health and social work is the main employment category in the local area, and is above the national average. Employment in retail, manufacturing and construction is also high. The proportion of people who work in professional, scientific and technical jobs is low.

Table 15.13 Employment Structure*

	Local Area	Wider Area	Wider Region	United Kingdom
Agriculture; hunting; forestry, fishing	0%	0%	0%	1%
Mining, Quarrying and Construction	10.6%	10%	8%	7.9%
Manufacturing	14.5%	13%	11%	8.9%
Electricity; gas and water supply	2%	2%	2%	1%
Wholesale and retail trade	15%	16%	15%	16%
Accommodation and catering	5%	5%	6%	6%
Transport storage and communication	5%	6%	6%	9%
Financial and insurance activities	2%	3%	3%	4%
Real estate activities	1%	1%	1%	1%
Administrative and support service activities	4%	4%	4%	5%

	Local Area	Wider Area	Wider Region	United Kingdom
Professional, scientific and technical activities	2.9%	3%	4%	6.6%
Public administration and defence	8%	9%	9%	6%
Education	9%	9%	10%	10%
Health and social work	16.1%	15%	15%	12.5%
Other	4%	4%	4%	5%

*Source: Experian 2013

Tourism Employment

15.6.8 The level of tourism employment in Rhondda Cynon Taff has declined in recent years. The proportion of tourism related jobs in Rhondda Cynon Taff is lower than the national average, which has remained more consistent in recent years.

Table 15.14 Tourism Employment*

	2006		2007		2008 [37]	
	No.	%	No.	%	No.	%
Rhondda Cynon Taff	5,500	7.1%	5,300	6.9%	4,800	6.6%
Great Britain	-	8.3%	-	8.2%	-	8.2%

*Source: NOMIS 2013

Social Grade

15.6.9 NRS social grades are a system of demographic classification widely used in market research[38]. Compared to the national average the local area has a significantly lower proportion of people in the highest social grades (AB). It also has a higher proportion of people in lowest social grades (DE) compared to the national average. The local areas social grade characteristics are generally comparable to the wider area and region. However, the local area does have a significantly higher proportion of people employed in skilled manual labour work compared with larger geographies.

[37] Most recent data available as at July 2013

[38] Originally developed by the National Readership Survey (NRS). Now used by many other organisations for wider applications and a standard for market research.

Table 15.15 NRS Social Grade*

	Local Area	Wider Area	Wider Region	United Kingdom
AB - High/intermed mgr/admin/prof	11.2%	12%	17%	22.7%
C1 - Supervis/clerical/jr mgr/admin/prof	25%	27%	30%	31%
C2 - Skilled manual	24%	24%	22%	21%
DE - Semi-skilled/unskilled manual/State benefit/unempl/lowest grade	39%	36%	32%	26%

*Source: Experian 2013

Qualifications

15.6.10 The local area's educational attainment rate is lower than regional and national levels, with a lower proportion of people achieving the highest levels of qualifications and a higher proportion of people with no qualifications.

Table 15.16 Qualifications*[39]

	Local Area	Wider Area	Wider Region	United Kingdom
Level 4/5	17%	18%	23%	27%
Level 3	10%	11%	12%	12%
Apprenticeship	4%	4%	4%	4%
Level 2	16%	16%	15%	15%
Level 1	14%	14%	13%	13%
Other qualifications	4%	4%	4%	6%
No Qualifications	35%	32%	28%	23%

*Source: Experian 2013

Socio-economic Summary

15.6.11 The local area surrounding the Project Site is characterised by:

39 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.

- an increasing population (2001-2012), which is proportionally lower than the wider area, regional and national level;
- lower than average projected population increase of 2% between 2012 and 2021;
- a high and growing retirement age population;
- a lower economic activity rate than the wider area, region and national level;
- slightly higher levels of unemployment;
- a high proportion of people working in health and social work;
- a higher than average proportion of people who are sick or disabled
- lower than average proportion of people in the higher class social grades compared to the UK figures; and
- Below average education attainment levels.

Socio Economic and Labour Market Sensitivity

15.6.12 The socio-economic profile outlined above indicates that there is a constrained supply of labour and skills. The Project may lead to labour market pressure and distortions (i.e. wage inflation, skills and capacity shortages, import of labour).

15.6.13 The overall sensitivity of the labour market is considered to be low/ medium.

Tourism Context

15.6.14 This section provides a tourism profile of Wales specifically the South East in terms of visitor and tourist trends, tourism volume and value, visitor patterns, visitor accommodation occupancy rates and expenditure patterns. The most up-to-date sources of information have been used. Where possible, figures for RCTCBC have been provided in preference to the wider South East area as the Project is located in this council area.

Wales Key Visitor Attractions and Activities

15.6.15 The Welsh Government carries out an annual survey of patronage popular visitor attractions in Wales. Table 15.17 details the top 10 unpaid and paid visitor attractions, with The LC and the Wales Millennium Centre the most popular paid and unpaid attractions respectively. Only one attraction, the Cyfarthfa Castle Museum, is located within close proximity (i.e. within 15km) of the Project.

Table 15.17 Top 10 Paid & Unpaid Visitor Attractions 2012

Wales Top 10 Unpaid & Paid Visitor Attractions (2012)[40]		
	Attraction Name	**Visitors 2012**
Unpaid	Wales Millennium Centre	1,144,628
	St Fagans: National History Museum	615,855
	Cyfarthfa Castle Museum	545,006
	National Museum Wales	459,806
	National Waterfront Museum	267,362
	St Davids Cathedral	258,000
	Cosmeston Lakes Country Park	250,000
	Cwmcarn Forest Drive & Visitor Centre	203,662
	Oriel Plas Glyn-Y-Weddw	180,548
	Cardiff Museum Project	167,413
Paid	The LC	736,949
	Pembrey Country Park	388,416
	Cardiff Castle	251,860
	Portmeirion	195,276
	Caernarfon Castle	176,454
	Conwy Castle	162,665
	Great Orme Tramway	153,004
	Bodnant Garden	152,439
	Erddig	150,818
	Techniquest	148,561

15.6.16 In 2009 a staying visitors report commissioned by Visit Wales found most popular attractions/activities included nature attractions and visiting castles/stately house/historic sites[41].

15.6.17 The following visitor attractions are located within 15km of the Project Site:

- **Dare Valley Country Park**: 500 acres of countryside walks and trails situated near Aberdare.
- **Cyfarthfa Castle Museum & Art Gallery**: a castle located in Merhyr Tydfil which was built in 1824 during the industrial revolution. The castle is open to the public, hosting a museum and art gallery.

[40] http://wales.gov.uk/docs/drah/publications/Tourism/130603attractions2012en.pdf

[41] http://wales.gov.uk/docs/drah/publications/Tourism/100125stayingvisitor09eng.pdf

- **Penderyn Distillery Visitor Centre**: distillery open to visitors to educate and inform people about distilling whisky.
- **Garwnant Visitor Centre**: 400 acres of woodland with trails and kids mountain bike course
- **Cynon Valley Museum & Gallery:** film shows and exhibitions about history of Aberdare
- **Brecon Mountain Railway**: situated 3 miles north of Merthyr Tydfil. Railway suited on the edge of Breacon Beacons National Park with restaurant, play area and walks.

Domestic Staying Trips Nights and Spend

15.6.18 The South East region between 2008 and 2010 has been in significant decline in regard to domestic tourism. Between 2008 and 2010 the number of trips fell by 24%. The number of nights stayed was down by 30% and overall domestic spend reduced by 26%. Whereas, the other regions in Wales all experienced an increase trips, nights stayed and spend over the same period.

15.6.19 In 2010 North Wales was the most popular and significant domestic tourism destination. It accounted for over a third of trips, nights stayed and spend whereas the South East region accounted for less than a fifth in all these categories. The neighbouring South West region also accounted for more trips, nights and spend than the South East.

Table 15.18 Domestic Trips, Nights and Spend (Millions)

	2008 Trips	2009 Trips	2010 Trips	2008 Nights	2009 Nights	2010 Nights	2008 Spend	2009 Spend	2010 Spend
Wales	8.49	8.95	8.69	31.9	32.88	32.88	1,411	1,413	1,450
North Wales	3.18	2.99	3.4	11.98	12.17	13.03	500	517	518
Mid Wales	1.42	1.75	1.59	5.7	6.57	6.53	242	251	269
South West Wales	1.64	2.13	1.84	6.72	8.2	7.29	262	357	330
South East Wales	2.22	1.96	1.68	6.77	4.99	4.77	386	243	284

Source: Domestic Tourism to Wales in 2008, 2009 and 2010 Overseas Visitor Trips

15.6.20 The breakdown for the purpose of these domestic trips in 2010 is detailed in Table 15.19. Going on holiday is the most popular reason for visiting Wales and it accounts for the majority of spend.

Table 15.19 Wales Purpose of Domestic Visits (Millions) 2010

	Trips	Nights	Spend
All holidays	6.92	28.02	1204
VFR	1.02	3.34	100
Business/work	0.65	1.36	133
Total	8.69	32.88	1450

Source: Domestic Tourism to Wales in 2008, 2009 and 2010 Overseas Visitor Trips

Domestic Day Trips

15.6.21 In terms of day visits the local authority of Rhondda Cynon Taff accounts for 3% of visits and 2% of expenditure when compared with other local authorities in Wales – as shown by Table 15.20.

Table 15.20 Wales Purpose of Domestic Day trips by local authority (Millions) 2011-2012 2 year averages

Area	Visits	Expenditure
Blaenau Gwent	0.54	9.43
Bridgend	4.48	113.5
Caerphilly	1.77	35.44
Cardiff	19.28	1048.13
Carmarthenshire	5.28	114.93
Ceredigion	3.58	84.65
Conwy	6.89	238.48
Denbighshire	4.85	101.59
Flintshire	2.77	50.15
Gwynedd	6.31	179.02
Isle of Anglesey	2.95	167.94
Merthyr Tydfil	1.04	26.01
Monmouthshire	2.98	94.67
Neath Port Talbot	2.65	61.24
Newport	3.35	139.21
Pembrokeshire	5.9	161.18
Powys	6.14	221.98
Rhondda, Cynon, Taff	3.26	78.86
Swansea	8.48	286.24
The Vale of Glamorgan	3.46	80.21
Torfaen	2.72	53.32
Wrexham	2.39	50.66

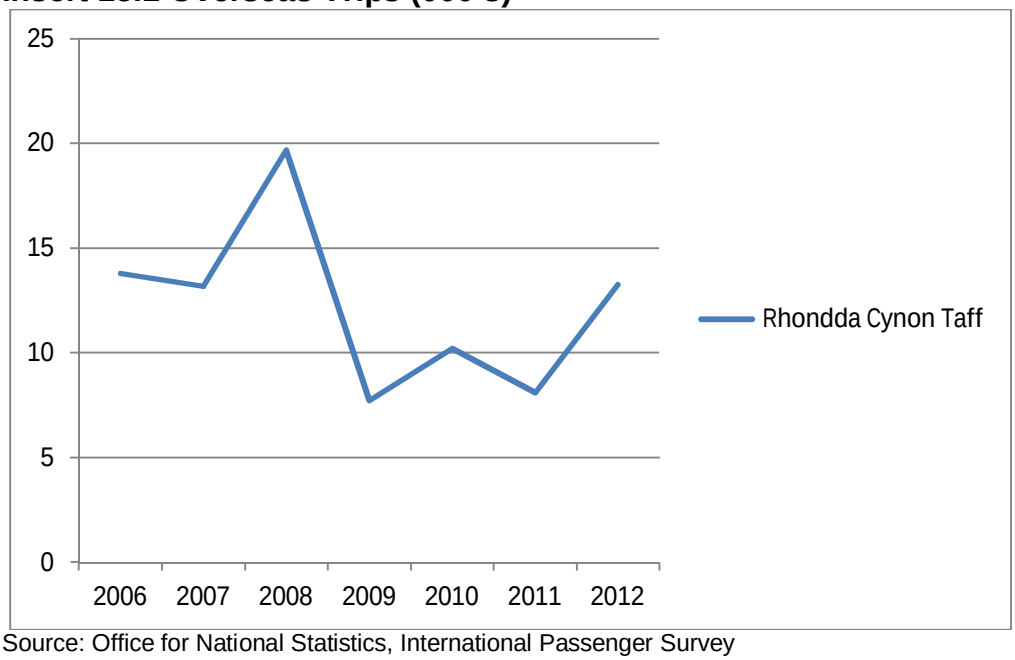
Source: 2012 Great Britain Day Visits Survey

Overseas Trips Nights and Spend

15.6.22 Insert 15.1 shows that in terms of overseas tourism, visitor numbers to Rhondda Cynon Taff have fluctuated between 2006 and 2012. In this period the area went from a high of 20,000 visitors in 2008 to a low of 7,700 visitors in 2009. This fall in visitor number can be expected due to the economic climate at the time and more people choosing to holiday at home. However, the area has noted an increase in visitor numbers in the most recent recorded period of 2012.

15.6.23 In 2012 Rhondda Cynon Taff only accounted for 3% of trips in the South East region. The majority of trips in the region are to Cardiff which accounts for 70% of trips. The area of Newport accounts for a tenth of trips. This shows that other areas in the South East are more popular for overseas tourists.

Insert 15.1 Overseas Trips (000's)



Source: Office for National Statistics, International Passenger Survey

15.6.24 The breakdown for the purpose of these overseas trips is detailed in Table 15.21. Visiting friends and relatives is the most popular reasons for overseas trips in Rhondda Cynon Taff.

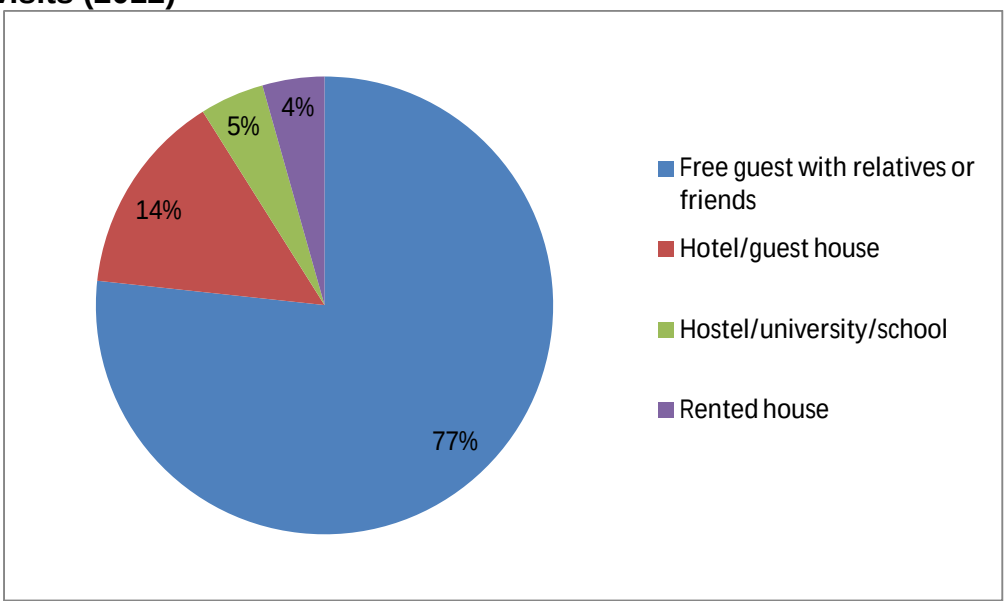
Table 15.21 Rhondda Cynon Taff Purpose of Overseas Visits (000's)

	Holiday	VFR	Business
Rhondda Cynon Taff	19%	76%	5%

Source: Office for National Statistics, International Passenger Survey

15.6.25 In Rhondda Cynon Taff, the total number of overseas trips in 2012 was recorded at over 13,000. Accommodation used for these staying visits is recorded in Insert 15.2. The majority of visitors stayed in the homes of relatives or friends. Over a tenth stayed in hotels.

Insert 15.2 Rhondda Cynon Taff accommodation used for staying visits (2012)



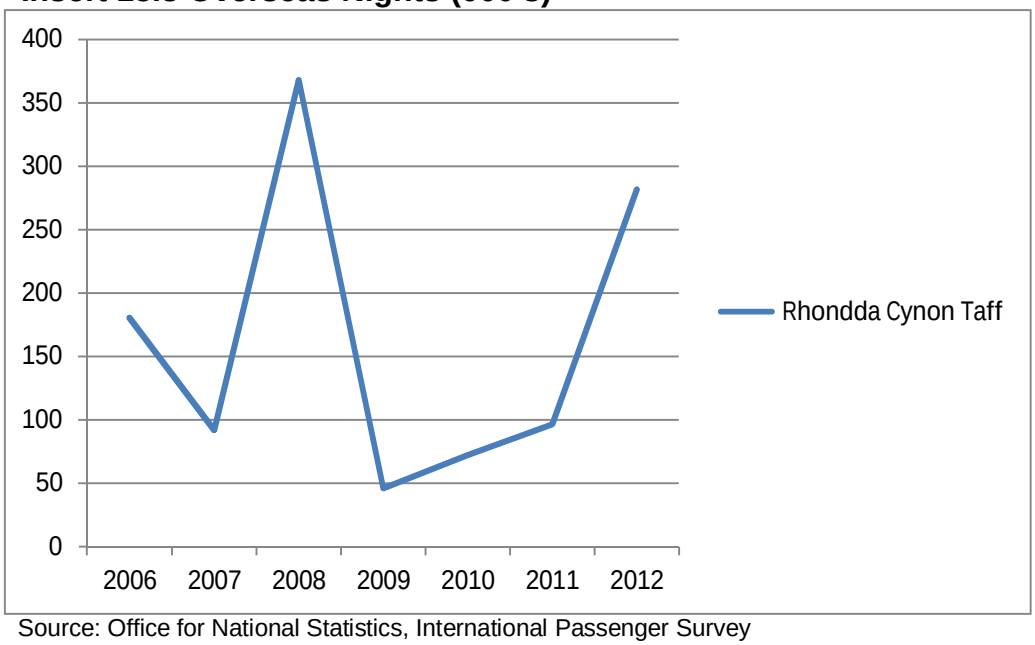
Source: Office for National Statistics, International Passenger Survey

Overseas Visitor Nights

15.6.26 After falling from a high of 368,000 nights in 2008 to a low of 46,000 nights in 2009, more recently the number of overseas visitor nights has started to increase again in Rhondda Cynon Taff.

15.6.27 In 2012 overseas visitors nights in the South East of Wales totalled 3.5 million. In total Rhondda Cynon Taff accounts for under a tenth of trips in the South East region. Overseas visitors preferred to stay in locations in Cardiff and Newport who accounted for 63% and 12% respectively of overseas nights.

Insert 15.3 Overseas Nights (000's)



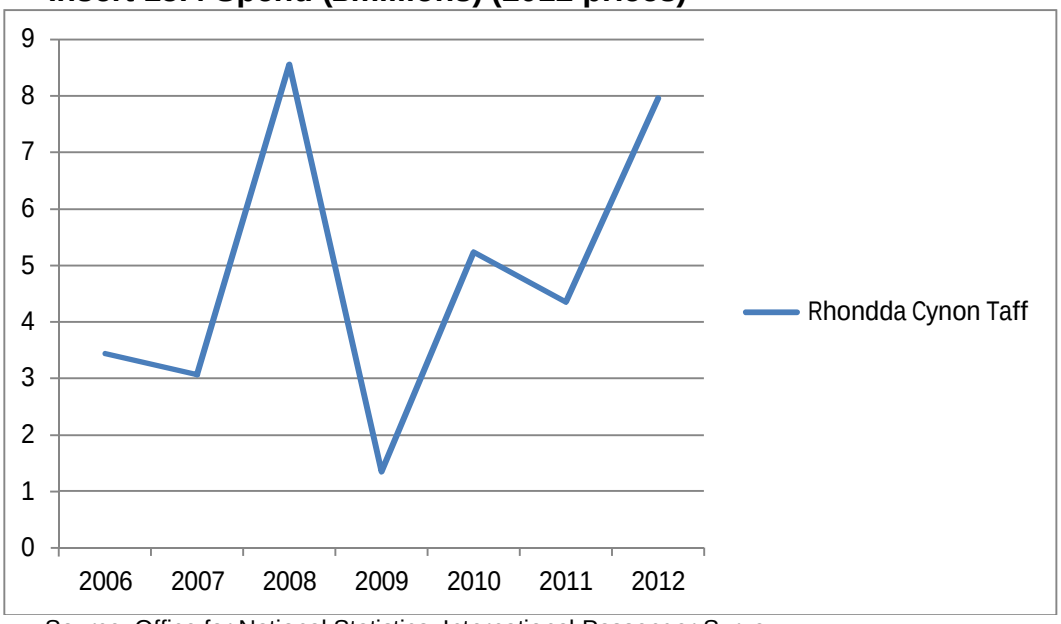
Source: Office for National Statistics, International Passenger Survey

Overseas Visitor Spend

15.6.28 Overseas visitor spend in Rhondda Cynon Taff has fluctuated between 2006 and 2012. Spend fell significantly from a high of £8.5 million in 2008 to a low of £1.3 million the next year. Most recently overseas visitor spend has been rising in the area.

15.6.29 In total visitor spend in the South East Wales region in 2012 was £167 million. Rhondda Cynon Taff accounts for only 5% of spend in the wider region. Whereas Cardiff (£113 million), Monmouthshire (£14 million), Newport (£13 million) and Bridgend (£9 million) all account for more overseas visitor spend in the South East region. This again highlights the fact that Rhondda Cynon Taff is not one the main overseas visitor destinations in the South East area.

Insert 15.4 Spend (£millions) (2012 prices)



Source: Office for National Statistics, International Passenger Survey

Profile of Tourism Business

15.6.30 Table 15.22 shows the number of tourism related businesses within 5km and 15km of the Project Site by category in 2003 (earliest year available) and 2008. The composition of tourism businesses remained relatively constant within 5km of the Project Site whilst there has been an increase in wider 15km area. In the 5km area there has been a 3% increase in tourism related businesses between 2003 and 2008. In the 15km area there has been a 12% increase in tourism related businesses. This suggests that the area closest to the Project Site is not as tourism orientated as the wider 15km area.

15.6.31 As of 2008, there were 724 tourism related businesses in the 15km study area and 103 businesses within 5km of the Project Site. The majority of businesses in these areas were either bars or restaurants.

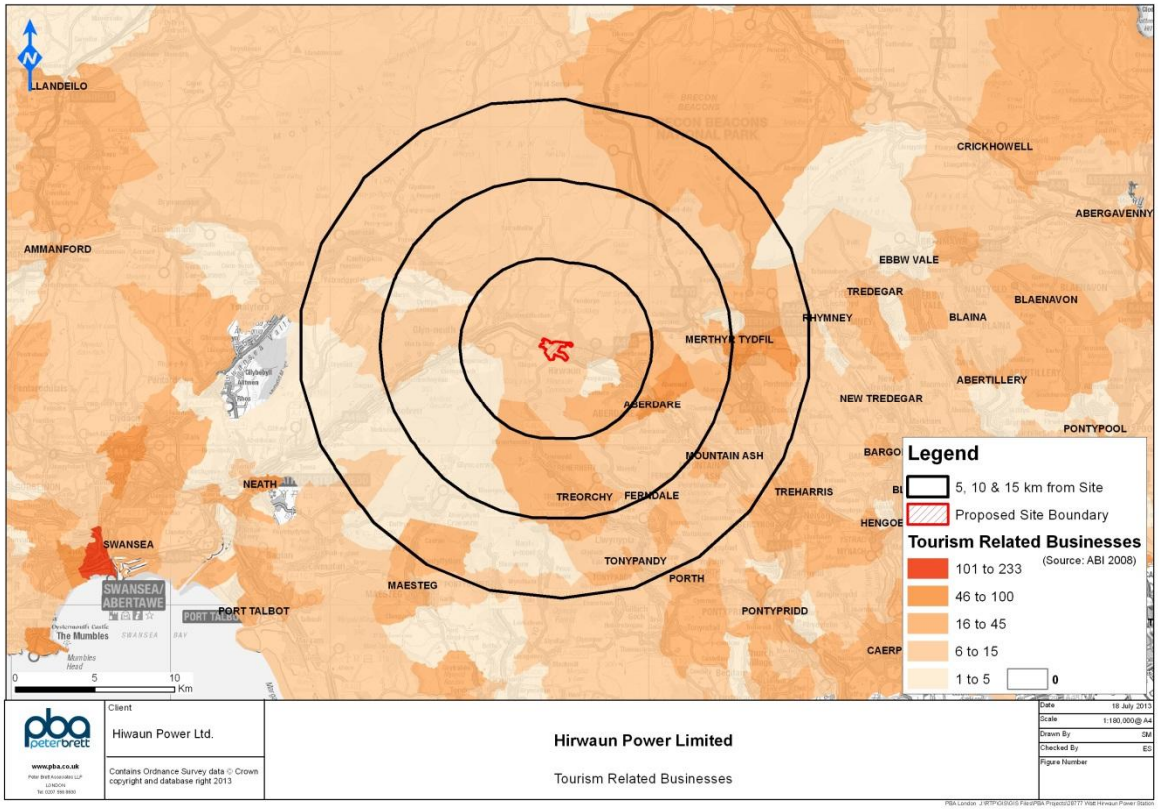
Table 15.22 Profile of Tourism Businesses within 15km of proposed development (2003 & 2008)

	Hotels	Other Accom-modation	Restaurants	Bars	Tour ope-rators	Enter-tainment	Library, museum, cultural activities	Sporting activities	Arts	Other recreational activities	Total
5km											
2003	3 (3%)	1 (1%)	18 (18%)	48 (48%)	3 (3%)	0 (0%)	4 (4%)	12 (12%)	2 (2%)	9 (9%)	100
2008	3 (3%)	2 (2%)	17 (17%)	42 (41%)	1 (1%)	0 (0%)	4 (4%)	13 (13%)	6 (6%)	15 (15%)	103
15km											
2003	20 (3%)	11 (2%)	155 (21%)	324 (45%)	26 (4%)	6 (1%)	29 (4%)	74 (10%)	21 (3%)	58 (8%)	724
2008	20 (2%)	14 (2%)	169 (21%)	344 (43%)	29 (4%)	6 (1%)	30 (4%)	86 (11%)	27 (3%)	84 (10%)	809

Source: ABI, NOMIS 2003,2008

15.6.32 Insert 15.5 shows the concentration of tourism businesses per super output area[42] within a 15 km radius from the proposed Project Site. Merthyr Tydfil and Aberdare have the highest concentrations of tourism related businesses (46-100) within the 15km radius of the Project Site. These consist of businesses such as restaurants, bars as well as recreational activities. Areas to the west and south west of the Project Site have low concentrations of tourism businesses. To the north tourism businesses are present in the area, but not at a large scale. Nearby areas outside the 15km radius such as Swansea have much higher concentrations of tourism-related businesses.

Insert 15.5 Tourism Business Density Map



Tourism Summary

- The Cyfarthfa Castle Museum: one of the top 10 unpaid visitor attractions in Wales is located within 15km of the Project Site;

[42] Super Output Areas (SOAs) are a national geography created by the Office for National Statistics (ONS) for collecting, aggregating and reporting statistics.

- In terms of domestic tourism, the South East Region has recently been in decline. Domestic visitor numbers, nights and spend have fallen by a least a quarter between 2008 and 2010. Whereas all other regions in the South East have experienced growth in their domestic tourism markets;
- North Wales attracts significantly more visits, nights and spend than the South East;
- Rhondda Cynon Taff accounts for only a small proportion of domestics day trips and spend when compared to other local authority areas in Wales;
- Despite having a recent increase in overseas visitor trips, nights and spend, the Rhondda Cynon Taff area is not a major overseas tourist destination in South East Wales. Areas such as Cardiff and Newport attract more visitors;
- The immediate 5km area around the Development has approximately 100 tourism related businesses. The majority of which are bars and restaurants; and
- Overall there is a fairly low tourism business density in the 15km area around the development. Other neighbouring areas outside the 15km, such as Swansea, have higher tourism densities. This implies that the area in relative close proximity to the Development is not a primary tourist destination in the South East of Wales.

Tourism Sensitivity

15.6.33 The tourism profile outlined above indicates that tourism is not a significant sector in the local area. Therefore, tourism is considered to be of low sensitivity to the proposed Project.

Community infrastructure audit

15.6.34 Within 5km of the Project Site there are a range of community infrastructure such as schools, libraries, care homes, hospitals, community centres and parks. This includes the following facilities.

Education

- 1 Nursery School
- 7 Primary Schools
- 2 Special Schools
- 2 Secondary Schools
- 1 College

Healthcare

- 3 care homes
- 1 Hospital
- 3 GP surgeries
- 4 Pharmacies

Emergency Services

- 1 Police Station
- 1 Fire Station

Transport

- 6 local bus routes

Recreation and Arts

- 1 Community Sports Hall
- 2 Parks
- 1 Library

Community Infrastructure Sensitivity

15.6.35 The community infrastructure audit above shows that all receptors serve local catchments and are therefore of low sensitivity.

15.7 Preliminary assessment of Potential Impacts

Socio-economic

15.7.2 The Project will deliver positive socio-economic impacts through:

- employment creation; and
- capital expenditure and worker spending in the local economy.

15.7.3 These effects, with the exception of decommissioning employment (negligible) have been assessed to be of minor positive significance (Table 15.23). No adverse socio-economic impacts or effects are identified through the assessment.

Table 15.23 Socio-economic Impact Significance

Development Effect	Magnitude	Sensitivity	Impact Significance	Likelihood
Construction / demolition Full Time Equivalents (FTEs)	Minor positive	Low/ medium	Slight positive	Up to 250 construction workers.
Operational FTEs	Minor positive	Low	Slight positive	Up to 15 operational staff
Decommissioning FTEs	Negligible positive	Low	Not significant	No information available. Assumed to be similar to construction
Construction, operating and decommissioning expenditure in the local economy	Minor positive	Low	Slight positive	Likely to be at least £500,000 p.a. for operational phase
Gas Connection route corridor option 1				
Construction FTEs	Negligible positive	Low	Not significant	The gas connection corridor crosses the A4061 and Rhigos Road to the south of the Power Generation Plant Site. As the main trunk road between Hirwaun and Bridgend, businesses may experience some delays during the construction period, although with the

				development of a traffic management plan these should be minimal.
Maintenance FTEs	Negligible positive	Low	Not significant	No access restrictions envisaged. Awaiting detail of maintenance programme for employment impacts
Decommissioning FTEs	Negligible positive	Low	Not significant	As for construction
Construction, operating and decommissioning expenditure in the local economy	Negligible positive	Low	Not significant	Awaiting detail of construction programme information for employment and expenditure impacts
Gas Connection Option 2				
As above				
Electrical Connection 1				
Construction FTEs	Negligible adverse	Low	Not significant	Connection corridor may affect areas where business activity takes places, as route corridor runs directly through an industrial estate with business units. Site access be affected temporarily during construction. However, with

				the development of a traffic management plan these impacts should be minimal. Awaiting detail of construction programme information for employment impacts
Maintenance FTEs	Negligible positive	Low	Not significant	No access restrictions envisaged. Awaiting detail of maintenance programme for employment impacts
Decommissioning FTEs	Negligible neutral	Low	Not significant	Connection infrastructure may be left in place with no attendant impacts. Detail of decommissioning approach to be received.
Construction, operating and decommissioning expenditure in the local economy	Negligible positive	Low	Not significant	Awaiting detail of construction programme information for employment and expenditure impacts
Electrical Connection 2				
As above				

Tourism

15.7.5 The following impacts may potentially affect the local tourism economy in the local area:

Table 15.24 Tourism Impact Significance

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Visual	Minor	Low	Slight	The likelihood of significant impact reduces with distance. The majority of tourism related-businesses within 15km are located 5-10km away from the Project Site. The probability of the proposed HPP significantly affecting tourism in terms of visual impact is considered low.
Noise	Minor	Low	Slight	Any noise impacts are expected to be restricted to the immediate area of the proposed Project Site. There is not a significant cluster of tourism-related activity in this area. Noise is not therefore expected to be a significant issue for tourism activity in the area.
Traffic/ Accessibility	Minor	Low	Slight	While there may be some occasional, temporary and short term delays on the local road network during the construction phase as a result of abnormal load movements, the

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
				implementation of an appropriate Traffic Management Plan should ensure that no tourism-related business is affected significantly.
Air Quality	Minor	Low	Slight	Any air quality impacts are expected to be restricted to the immediate local area around the proposed Project Site. As stated above there is not a significant cluster of tourism-related activity around the Project Site. Therefore, air quality is not expected to be a significant issue for tourism in the area.

Table 15.25 Gas Connection Route Corridor Option 1 Tourism Impact Significance

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Visual	Minor	Low	Slight	Visual impacts may only be experienced during the construction phase of the route corridor and are therefore temporary and not considered significant. Moreover, the route corridor will not be located close to any visitor attractions.
Noise	Minor	Low	Slight	Noise impacts may only be experienced during the construction phase and are therefore temporary and not considered significant. As stated above there are no tourism receptors located in close enough proximity to experience noise impacts.

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Traffic/ Accessibility	Minor	Low	Slight	The electrical connection corridor crosses the A4061 and the Rhigos Road to the south of the Project Site. As the main trunk road between Hirwaun and Bridgend, visitors may experience some delays during the construction period, although with the development of a traffic management plan these should be minimal. The route corridor is designed to avoid particularly sensitive tourism and recreation locations. It route corridor runs through an industrial estate and there are no known key promoted walking/cycling paths/routes running through the proposed route corridor. Therefore, no significant effects are expected. However, if any key routes were later highlighted as being affected, the contractors would ensure ongoing safe access and provide an alternative were any recreational routes temporarily closed due to construction activities, or where obstruction or diversions was required.

Table 15.26 Gas Connection Route Corridor Option 2 Tourism Impact Significance

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Visual	Minor	Low	Slight	As stated under Gas Connection Route Corridor 1, Table 15.25.
Noise	Minor	Low	Slight	As stated under Gas Connection Route Corridor 1, Table 15.25.
Traffic/ Accessibility	Minor	Low	Slight	As stated under Gas Connection Route Corridor 1, Table 15.25.

Table 15.27 Electrical Connection Route Corridor Option 1 Tourism Impact Significance

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Visual	Minor	Low	Slight	Any visual impacts would be restricted to the construction phase of the connection. These would be temporary and not considered significant. The route corridor is located on an industrial estate and not close to any visitor attractions
Noise	Minor	Low	Slight	As noise impacts will be limited to the construction phase, they would be temporary and not considered significant. As stated above there are no tourism receptors sufficiently close to experience noise impacts

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Traffic/ Accessibility	Minor	Low	Slight	While occasional, temporary and short term delays on the A4061 and other nearby roads may be possible during the construction phase as a result of abnormal load movements, the implementation of an appropriate Traffic Management Plan should ensure that no tourism-related business is affected significantly. The route corridor is designed to avoid particularly sensitive tourism and recreation locations. It route corridor runs through an industrial estate and there are no known key promoted walking/cycling paths/routes running through the proposed route corridor. Therefore, no significant effects are expected. However, if any key routes were later highlighted as being affected, the contractors would ensure ongoing safe access and provide an alternative were any recreational routes temporarily closed due to construction activities, or where obstruction or diversions was required.

Table 15.28 Electrical Connection Route Corridor Option 2 Tourism Impact Significance

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Visual	Minor	Low	Slight	The electrical connection route will be overhead and therefore permanently visible. However, as the route corridor will be located on an industrial estate and not close to any visitor attractions, no significant impacts are expected.
Noise	Minor	Low	Slight	As stated under Electrical Connection Route Corridor 1, Table 15.27.
Traffic/ Accessibility	Minor	Low	Slight	As stated under Electrical Connection Route Corridor 1, Table 15.27.

Community Infrastructure

15.7.7 The following impacts may be experienced by local community infrastructure facilities/receptor:

Table 15.29 Community Infrastructure Impact Significance

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Visual	Minor	Low	Slight	It is considered unlikely that the operation or effectiveness of community facilities would be affected by the appearance of the development. Patronage of recreation based community facilities is primarily driven by demand for the activity they host. As long as services or facilities can be provided from the receptor the visual appearance of the development should not affect levels of patronage or its operation.
Noise	Minor	Low	Slight	Any noise impacts are expected to be restricted to the immediate local area of the Project Site.

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
				There are no community facilities located within the Project Site. Noise is therefore not expected to be a significant issue for community infrastructure.
Traffic/ Accessibility	Minor	Low	Slight	Whilst there may be some occasional, temporary and short term delays on the local road network during the construction phase as a result of abnormal load movements, the implementation of an appropriate Traffic Management Plan should ensure that no community facilities are significantly affected.
Air Quality	Minor	Low	Slight	Any air quality impacts are expected to be restricted to the immediate local area around the Project Site. As stated above there are no community facilities situated within the proposed Project Site.

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
				Therefore, air quality is not expected to be a significant issue for community facilities in the area.

Table 15.30 Gas Connection Route Corridor Option 1 Community Infrastructure Impact Significance

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Visual	Minor	Low	Slight	Visual impacts may only be experienced during the construction phase of the route corridor and are therefore temporary and not considered significant. Moreover, the route corridor will be located in an industrial estate and not located close to any community infrastructure.

Noise	Minor	Low	Slight	Noise impacts may only be experienced during the construction phase and are therefore temporary and not considered significant. As stated above there are no community infrastructure located in close enough proximity to experience noise impacts.
Traffic/ Accessibility	Minor	Low	Slight	The electrical connection corridor crosses the A4061 and the Rhigos Road to the south of the Power Generation Plant Site. As the main trunk road between Hirwaun and Bridgend, community facility users may experience some delays during the construction period, although with the development of a traffic management plan these should be minimal.

Table 15.31 Gas Connection Route Corridor Option 2 Community Infrastructure Impact Significance

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Visual	Minor	Low	Slight	As stated under Gas Connection Route Corridor 1, Table 15.30
Noise	Minor	Low	Slight	As stated under Gas Connection Route Corridor 1, Table 15.30
Traffic/ Accessibility	Minor	Low	Slight	As stated under Gas Connection Route Corridor 1, Table 15.30

Table 15.32 Electrical Connection Route Corridor Option 1 Community Infrastructure Impact Significance

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Visual	Minor	Low	Slight	Any visual impacts would be restricted to the construction phase of the connection. These would be temporary and not considered significant. The route corridor is located mainly on an industrial estate and not close to any community facilities.
Noise	Minor	Low	Slight	As noise impacts will be limited to the construction phase, they would be temporary and not considered significant. As stated above there are no community facilities sufficiently close to experience noise impacts.

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Traffic/ Accessibility	Minor	Low	Slight	While occasional, temporary and short term delays on the A4061 and other nearby roads may be possible during the construction phase as a result of abnormal load movements, the implementation of an appropriate Traffic Management Plan should ensure that no community facility is affected significantly.

Table 15.33 Electrical Connection Route Corridor Option 2 Community Infrastructure Impact Significance

Potential Impact	Magnitude	Sensitivity	Impact Significance	Likelihood of Effect
Visual	Minor	Low	Slight	The electrical connection route will be overhead and therefore permanently visible. However, as the route corridor will be located on an industrial estate and not close to any community infrastructure, no significant impacts are expected.
Noise	Minor	Low	Slight	As stated under Electrical Connection Route Corridor 1, Table 15.32.
Traffic/ Accessibility	Minor	Low	Slight	As stated under Electrical Connection Route Corridor 1, Table 15.32.

15.8 Mitigation Strategy

15.8.1 As no significant adverse socio-economic, tourism and recreation and community infrastructure effects have been identified during this initial assessment, there is no requirement for any mitigation measures at this stage.

15.9 Preliminary Assessment of Residual Effects

15.9.1 On the basis of the preliminary environmental information and assessment described above there are not predicted to be likely significant effects on socio-economics, tourism and recreation and community infrastructure as a result of the proposed Project.

15.10 Next Steps

15.10.1 Building from this initial assessment the following steps be undertaken in the next phase of socio-economic analysis:

- 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;
- Detailed estimates of the economic impact of the construction and operation of the proposed Project and the construction of the gas and electricity components; and
- An impact assessment of the community facilities.

SECTION 16

CUMULATIVE IMPACTS

16 CUMULATIVE IMPACTS

16.1 Introduction

16.1.1 This section provides a preliminary assessment of the potential cumulative impacts associated with the Project based on the preliminary assessments which have been undertaken to date and an understanding of other developments currently planned for the area. It draws on the assessment of impacts provided in sections 6 to 15.

16.1.2 A more detailed assessment of these impacts will be provided in the ES that will accompany the proposed DCO Application.

16.1.3 Cumulative impacts can be defined as either:

- **Type 1 Cumulative Impacts**: These are combined effects of different types of impact on a single receptor. For example: dust, noise and visual impacts resulting from construction and operation of the proposed Project and other reasonably foreseeable future developments; or

- **Type 2 cumulative impacts:** These are the same type of impact from the proposed Project and reasonably foreseeable future developments which may individually be insignificant, but could be cumulatively significant. For example: cumulative traffic impacts during construction.

16.1.4 This section presents the current and reasonably foreseeable future developments considered as part of this preliminary cumulative impact assessment. They are listed and described in Table 16.1.

16.1.5 For the purposes of this assessment, reasonably foreseeable future developments have been defined as those which;

- are consented but not yet built;
- are not yet consented but in the planning system; and
- are committed to come forward (i.e. supported in a development plan)

Table 16.1 - Description of Developments Considered in the Preliminary Cumulative Impact Assessment

Name of Development	Status	Description of Development
Enviroparks Hirwaun	Consented	Energy from Waste Facility which will be located approximately 500m north of the Power Generation Plant Site.
Hirwaun Energy Centre	Consented	A waste wood fuelled biomass plant.
Rhigos Substation	In Construction	New substation located approximately 250m west of the Power Generation Plant Site. The substation is being constructed to support the development of the Pen Y Cymoedd Wind Farm.
Supermarket at Ferraris Bakery	Not yet determined	Application to construct a supermarket connected to the Ferraris Bakery site at Bryngelli Estate.
Solar PV proposal	Not yet determined	INRG 11.6MW solar PV proposal south of Rhigos
Residential housing	Not yet determined	Residential scheme at land west of Broniestyn Terrace

16.1.6 The potential for cumulative impacts with these developments during construction / decommissioning of the proposed Project is provided in Table 16.1. (note that the preliminary assessment of cumulative construction impacts is considered to be broadly equivalent for cumulative decommissioning impacts) The potential for cumulative impacts with these developments during operation of the proposed Project is provided in Table .

Table 16.1 - Potential Cumulative Impacts During Construction / Demolition and Decommissioning of the Project

Impact Section	Enviroparks Hirwaun	Hirwaun Energy Centre	Rhigos Substation	Ferraris Bakery	Solar PV	Residential Housing
Air Quality	×	×	×	×	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	The construction phases of the Project with the other listed developments are unlikely to co-incide. Construction of the Project and operation of the other developments may give rise to air quality impacts, although these will be very different in nature (e.g. construction dust vs emissions) and therefore, there are unlikely to be cumulative impacts.					
Noise and Vibration	√	√	√	√	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	Cumulative impacts may arise due to: noise and vibration generating equipment / plant which is used during the construction the Project - together with noise and vibration emissions from nearby operation of Enviroparks Hirwaun, the Hirwaun Energy Centre and Ferraris Bakery. There are not anticipated to be any significant sources of noise from operation of the Rhigos Substation, Solar PV development or residential housing development. This will be investigated within the ES. It is noted here that the preliminary assessment of construction noise impacts from the Project alone was judged to be minor.					
Ecology	×	×	×	×	×	×

Impact Section	Enviroparks Hirwaun	Hirwaun Energy Centre	Rhigos Substation	Ferraris Bakery	Solar PV	Residential Housing
Description, Proposed Mitigation and Likely Residual Cumulative Impact	No cumulative impacts on ecology are anticipated. The construction phase of the Project and construction phase of other developments are unlikely to coincide.					
Water Quality and Resources	×	×	×	×	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	Water use during construction is likely to be from the mains water supply which currently supplies the International Greetings UK site. There are therefore not anticipated to be any impacts to water quality. Although both Gas Connection route corridor options cross minor field drains, it is not anticipated that any of the other developments listed will impact on these field drains.					
Geology, Ground Contamination and Agriculture	×	×	×	×	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	As the main impact on geology, contamination and agriculture from the construction of the proposed Project would be the sterilisation of Agricultural Land, the only cumulative impact would be an increased loss of greenfield land in the area following the construction of the Rhigos substation. However, neither land on which the Gas Connection route corridor options, nor the Rhigos Substation are sited is considered to be land of the best quality. Additionally, the developments together would only take relatively small quantities of land. Therefore, any cumulative impacts are considered minor.					

Impact Section	Enviroparks Hirwaun	Hirwaun Energy Centre	Rhigos Substation	Ferraris Bakery	Solar PV	Residential Housing
Landscape and Visual Impacts	×	×	×	×	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	Landscape and visual impacts from construction of the Project are likely to be minor. There are not anticipated to be any cumulative impacts from construction of the Project and other projects as the construction phases are unlikely to run in parallel. However, this will be further refined as part of the ES should it be the case.					
Waste Management and Health	×	×	×	×	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	None of the other identified developments are considered likely to result in any negative impacts on human health in combination with the Project. Although construction of the Project will produce waste, the waste produced from the other developments is not anticipated to be significant. As it is unlikely that the construction phases of the Project and other developments will run in parallel, no cumulative impacts are anticipated.					
Traffic, Transport and Access	√	√	×	√	×	√

Impact Section	Enviroparks Hirwaun	Hirwaun Energy Centre	Rhigos Substation	Ferraris Bakery	Solar PV	Residential Housing
Description, Proposed Mitigation and Likely Residual Cumulative Impact	Although the construction phase of the developments listed above are unlikely to coincide with the construction of the Project, cumulative impacts could arise between the construction phase of the Project and the operational phase of Enviroparks Hirwaun (which requires deliveries of waste) Hirwaun Energy Centre (also requiring deliveries of fuel), Ferraris Bakery (requiring deliveries of food) and the residential housing development (from increased traffic from residents). These impacts will be further investigated as part of the ES. It is noted here that the preliminary assessment of construction traffic impacts from the Project alone was judged to be minor.					
Archaeology and Cultural Heritage	×	×	×	×	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	None of the identified developments are considered likely to impact upon buried archaeology. Additionally, as the construction phase is relatively short term, there are unlikely to be cumulative impacts on the setting of above ground archaeology.					
Socio-economics	√	√	√	√	√	√

Impact Section	Enviroparks Hirwaun	Hirwaun Energy Centre	Rhigos Substation	Ferraris Bakery	Solar PV	Residential Housing
Description, Proposed Mitigation and Likely Residual Cumulative Impact	Construction of the Project is unlikely to coincide with any of the other developments listed above. However, it may be that construction staff could move directly from one development to another, thereby creating a minor positive impact on employment continuity in the area. It is noted here that the preliminary assessment of construction socio-economic impacts from the Project alone was judged to be minor.					

TABLE 16.3 - Potential Cumulative Impacts during Operation of the Project

Impact Section	Enviroparks Hirwaun	Hirwaun Energy Centre	Rhigos Substation	Ferraris Bakery	Solar PV	Residential Housing
Air Quality	√	√	×	×	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	There is the potential for cumulative impacts to arise from the operation of the Power Generation Plant in conjunction with the operation of the Enviroparks Hirwaun development and the Hirwaun Energy Centre development. For example, these could include the cumulative impact from the simultaneous release of stack emissions. These will be fully investigated at the EIA stage. Operation of Rhigos substation, Ferraris' Bakery, the solar PV development and the residential housing development will not give rise to air quality impacts, therefore, there will be no cumulative impacts. It is noted here that the preliminary assessment of operational air quality impacts from the Project alone was judged to be minor.					
Noise and Vibration	√	√	√	√	×	√

Description, Proposed Mitigation and Likely Residual Cumulative Impact	Cumulative impacts may arise due to noise and vibration generating equipment / plant which is used during the operation the Power Generation Plant - together with noise and vibration emissions from nearby operation of all developments listed above (apart from the solar PV development which is unlikely to generate noise during operation). This will be investigated fully within the ES. It is noted here that the preliminary assessment of operational noise impacts from the Project alone was judged to be not significant following mitigation.					
Ecology	×	×	×	×	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	No cumulative impacts on ecology are anticipated. The operational phase of the Project and the other proposed developments are unlikely to give rise to any impacts on ecology.					
Water Quality and Resources	×	×	×	×	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	No cumulative impacts on water quality are anticipated. The operational phase of the Project and the other proposed developments are unlikely to give rise to any impacts on water quality.					
Geology, Ground Contamination and Agriculture	×	×	×	×	×	×

Description, Proposed Mitigation and Likely Residual Cumulative Impact	No cumulative impacts on geology are anticipated. The operational phase of the Project and the other proposed developments are unlikely to give rise to any impacts on geology as there will be no requirement for ground disturbance. The potential for spillages will be limited by adhering to best practice working methods at all of the developments listed.					
Landscape and Visual Impacts	√	√	√	√	√	√
Description, Proposed Mitigation and Likely Residual Cumulative Impact	Cumulative impacts may arise due to the presence of large and visible structures (e.g. stacks from the Power Generation Plant and Electrical Connection route corridor option 1) - together with large structures present from operation of the developments listed above. This will be investigated fully within the ES. It is noted here that the preliminary assessment of operational landscape and visual impacts from the Project alone was judged to be not significant.					
Waste Management and Health	×	×	×	×	×	×
Description, Proposed Mitigation and Likely Residual Cumulative Impact	Along with the operation of the Project, none of the identified developments are considered likely to result in any negative impacts on human health.					
Traffic, Transport and Access	√	√	×	√	×	√

Description, Proposed Mitigation and Likely Residual Cumulative Impact	There may be cumulative traffic impacts as a result of operation of the Project together with the Enviroparks Hirwaun development, the Hirwaun Energy Centre, Ferraris Bakery and residential housing development. However, these are likely to be minor given the anticipated number of operational traffic movements. These will be fully investigated in the ES.					
Archaeology and Cultural Heritage	√	√	√	√	√	√
Description, Proposed Mitigation and Likely Residual Cumulative Impact	None of the identified developments are considered likely to impact upon buried archaeology during operation. However, cumulative impacts may arise due to: the presence of large and visible structures (e.g. stacks from the Power Generation Plant and Electrical Connection route corridor option 1) - together with large structures present from operation of the developments listed above. This will be investigated fully within the ES. It is noted here that the preliminary assessment of operational impacts on archaeology from the Project alone was judged to be minor.					
Socio-economics	√	√	√	√	√	√
Description, Proposed Mitigation and Likely Residual Cumulative Impact	Operation of the Project together with the other developments listed is anticipated to have a minor positive cumulative impact from the perspective of job creation and subsequent knock on benefits to the local community and economy. It is noted here that the preliminary assessment of operational socio-economics impacts from the Project alone was judged to be minor positive.					