Electrical Connection Environmental Report

Abergelli Power Project

August 2018

CONTENTS

TABLES

FIGURES

Within this document	Alternative Reference within ES Submitted within the DCO
Figure 4.12: Historic assets in the 1 km Study Area	*Updated Figure 13.1*
Figure 4.13: Designated historic assets in the 5 km Study Area	*Updated Figure 13.2*
Figure 4.14: Local Highway Network	*Figure 12.2*
Figure 4.15: Traffic Flows – 2014 Observed: Weekday AM Peak Hour	*Figure 12.3*
Figure 4.16: Traffic Flows – 2014 Observed: Weekday PM Peak Hour	*Figure 12.4*
Figure 4.17: Traffic Flows – 2017 Base Year: Weekday Am Peak Hour	*Figure 12.5*
Figure 4.18: Traffic Flows – 2017 Base Year: Weekday PM Peak Hour	*Figure 12.6*
Figure 4.19: Pedestrian and Cycle Routes and Public Rights of Way	*Figure 12.7*
Figure 4.20: Mine Abandonment Plan	*Figure 10.2*
Figure 4.21: Potential Sources of Contamination and Locations of Interest	*Figure 10.3*
Figure 4.22: UDP Mineral Resources Plan	*Figure 10.1*

APPENDICES

Within this document	Alternative Reference within ES Submitted within the DCO
Appendix 1: EIA Screening Request and Matrix	*NEW*
Appendix 2.1: Mitigation Register	*A3.1 Appendix A*
Appendix 2.2: Outline Construction Environment Management Plan (CEMP)	*Appendix 3.1*
Appendix 2.3: Outline Landscape & Ecology Mitigation Strategy (LEMS)	*Appendix 3.4*
Appendix 2.4: Outline Surface Water Management Plan	*Appendix 3.2*
Appendix 2.5: Construction Traffic Management Plan (CTMP)	*Appendix 3.3a*
Appendix 2.6: Construction Staff Travel Plan (CSTP)	*Appendix 3.3b*

Within this document	Alternative Reference within ES Submitted within the DCO
Appendix 3.1: Preliminary Ecological Appraisal Report.	*Appendix 8.1*
Appendix 3.2: NVC Survey Report 2014	*Appendix 8.2*
Appendix 3.3: Invertebrate Survey Report	*Appendix 8.3*
Appendix 3.4: Great Crested Newt Survey Report	*Appendix 8.4*
Appendix 3.5: Reptile Survey Report	*Appendix 8.5*
Appendix 3.6a: Breeding Bird Survey Report	*Appendix 8.6*
Appendix 3.6b: Breeding Bird Survey UPDATE Report	*NEW*
Appendix 3.7a: Bat Roost and Walked Activity Transect Survey Report	*Appendix 8.7*
Appendix 3.7b: Bat Roost and Walked Activity Transect Survey UPDATE Report	*NEW*
Appendix 3.8: Bat Survey Report 2014	*Appendix 8.8*
Appendix 3.9: Dormouse Survey Report	*Appendix 8.9*
Appendix 3.10: Otter and Water Vole Survey Report	*Appendix 8.10*
Appendix 3.11: Badger Survey Report (Confidential)	*Appendix 8.11*
Appendix 3.12: Arboricutural Survey Report 2014	*Appendix 8.12*
Appendix 3.13: Preliminary Ecological Appraisal 2014	*Appendix 8.13*
Appendix 3.14: Otter and Water Vole Survey Report 2014	*Appendix 8.14*
Appendix 3.15: Final Dormouse Survey Report 2014	*Appendix 8.15*
Appendix 3.16: Breeding Bird Survey Report 2014	*Appendix 8.16*
Appendix 3.17: Great Crested Newt Survey Report 2014	*Appendix 8.17*
Appendix 3.18: Reptile Survey Report 2014	*Appendix 8.18*
Appendix 3.19: Invasive Plant Species Survey Report	*Appendix 8.19*
Appendix 3.20: Hedgerow Survey	*NEW*
Appendix 4.1: Flood Consequence Assessment (FCA)	*Appendix 9.1*
Appendix 4.2: Water Framework Directive (WFD) Screening Assessment	*Appendix 9.2*
Appendix 5: Noise Survey	*Appendix 7.1*
Appendix 6: Cultural Heritage Gazetteer	*Updated Appendix 13.1*

Within this document	Alternative Reference within ES Submitted within the DCO
Appendix 7.1: Traffic Survey	*Appendix 12.1*
Appendix 7.2: Capacity Assessment Output Report	*Appendix 12.2*
Appendix 8.1: Landmark Envirocheck report	*Appendix 10.2*
Appendix 8.2: Preliminary Geo-Environmental Risk Assessment	*Appendix 10.1*
Appendix 8.3: British Geological Survey Borehole Log SN65200160 Abergelli-fach Farm	*Appendix 10.3*
Appendix 8.4: Coal Authority Mining Report	*Appendix 10.4*

GLOSSARY

Abbreviation	Description
Access Road	From the B4489 which lies to the west, formed by upgrading an existing access road between the B4489 junction and the Substation and constructing a new section of road from the Substation to the Generating Equipment Site.
AIS	Air-Insulated Switchgear
AOD	Above ordnance datum
AONB	Area of Outstanding Natural Beauty
APL	Abergelli Power Limited
associated development	development associated with the NSIP
ATC	Automatic Traffic Count
AURN	Automatic Urban Rural Network
BAI	Bat Activity Index
Bailey Bridge	A type of portable, pre-fabricated, truss bridge
BGS	British Geological Survey
BOP	Balance of Plant
BS	British Standard
CCS	City and County of Swansea Council
CEMP	Construction Environment Management Plan

Abbreviation	Description
CMS	Continuous Monitoring Stations
CO	Carbon Monoxide
CSM	Conceptual Site Model
CSTP	Construction Staff Travel Plan
CTMP	Construction Traffic Management Plan
DAM	Development Advice Map
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
Drax	Drax Group plc
DVLA	Driver and Vehicle Licensing Agency
Ecological Mitigation Area	Area for ecological enhancement within the Project Site Boundary
EIA	Environmental Impact Assessment
Electrical Connection	An underground electrical cable to export power from the Generating Equipment to the NETS.
Electrical Connection Site	The area required for the construction and operation of the Electrical Connection.
Electrical Connection Site Boundary	The boundary of the Electrical Connection Site.
FCA	Flood Consequence Assessment
FRMP	Flood Risk Management Plan
Ft	Feet
GCN	Great Crested Newt
Generating Equipment	One Gas Turbine Generator with one exhaust gas flue stack and BOP
Generating Equipment Site	The area containing the Generating Equipment
GIS	gas-insulated switchgear
Ha	Hectares
HDD	Horizontal Directional Drilling
HGV	Heavy Goods Vehicle
Km	kilometres

Abbreviation	Description
Kv	kilovolt
LAQM	Local Air Quality Monitoring
Laydown Area	A temporary construction compound for the storage of materials, plant and equipment as well as containing site accommodation and welfare facilities, temporary car parking and temporary fencing.
LEMS	Landscape and Ecology Mitigation Strategy
LDP	Local Development Plan
LOAEL	Lowest observable adverse effect level
L_W	Sound Power Levels
M	Metres
Maintenance Compound	A small area within the Laydown Area will be retained permanently.
MBGL	metres below ground level
Mph	Miles per hour
MW	Megawatts
NETS	National Grid Electricity Transmission System
New Section of Access Road	A new section of Access Road from the Substation to the Generating Equipment Site.
NO_2	nitrogen dioxide
NRW	Natural Resource Wales
NSIP	Nationally Significant Infrastructure Project
N/S/L	Noctule, serotine and Leisler's bat species
NSR	Noise Sensitive Receptors
OCGT	Open Cycle Gas Turbine
Oil Pipeline	A decommissioned underground oil pipeline that crosses the Electrical Connection Site.
OS	Ordnance Survey
PA 2008	The Planning Act 2008
PCB	Polychlorinated biphenyls
PFRA	Preliminary Flood Risk Assessments
PIC	Personal Injury Collision

Abbreviation	Description
PM	Particulate Matter
Power Generation Plant	Peaking power generating station
PRoW	Public Right of Way
RBMP	River Basin Management Plan
SAC	Special Area for Conservation
Schedule 1 species	Species listed in schedule 1 of the Wildlife and Countryside Act 1981
SEWBReC	South East Wales Biodiversity Records Centre
SINC	Sites of Nature Conservation Interest
SLA	Special Landscape Area
SOS	Secretary of State
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
Stag Energy	Stag Energy Development Company Ltd
Substation	Swansea North Substation
TAN	Technical Advice Note
TCPA 1990	The Town and Country Planning Act 1990
The Project	The OCGT, Power Generation Plant and new connections to the gas and electricity networks on land adjacent to the Felindre Gas Compressor Station at Abergelli Farm, Felindre, Swansea SA5 7NN.
Project Site Boundary	The Boundary of the Project.
TRL	Transport Research Laboratory
UDP	Unitary Development Plan
Watt Power	Watt Power Limited
WFD	Water Framework Directive
WSI	Written Scheme of Investigation

1. Introduction

1.1 Overview

1.1.1 This Environmental Report has been prepared on the behalf of Abergelli Power Limited (APL) for a planning application for an Electrical Connection from the proposed Abergelli Power Station to the existing Swansea North substation (hereafter referred to as the “Electrical Connection”). The location of the Electrical Connection can be viewed on Figure 1: Site Location Plan.

1.1.2 A screening request was submitted pursuant to Regulation 6(1) of the *Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017* (the ‘EIA Regulations’) to City and County of Swansea Council (CCS) regarding the need for an Environmental Impact Assessment (EIA) for the Electrical Connection on the 15th June 2018.

1.1.3 On the 19th July 2018, CCS confirmed that the Electrical Connection was not EIA Development. This Environmental Report therefore provides detailed Environmental Information to support this planning application under the Town and Country Planning Act 1990 ("TCPA 1990").

1.2 Background

1.2.1 APL proposes to construct and operate an Open Cycle Gas Turbine (“OCGT”) peaking power generating station (the "Power Generation Plant") and new connections to the gas and electricity networks on land adjacent to the Felindre Gas Compressor Station at Abergelli Farm, Felindre, Swansea SA5 7NN (the “Project”).

1.2.2 APL's project is split into three different elements which are described below, which together form the "Abergelli Power Project". These elements are referred to as the Power Generation Plant, the Gas Connection, and the Electrical Connection.

1.2.3 The three main elements of the Project comprise:

- An Open Cycle Gas Turbine (OCGT) peaking power generating station, fuelled by natural gas and capable of providing a rated electrical output of up to 299 Megawatts (MW). The Power Generation Plant comprises:
    - Generating Equipment including one Gas Turbine Generator with one exhaust gas flue stack and Balance of Plant (BOP) (together referred to as the “Generating Equipment”) which are located within the “Generating Equipment Site”;
    - An Access Road to the Generating Equipment Site - from the B4489 which lies to the west, formed by upgrading an existing access road between the B4489 junction and the Swansea North Substation (the “Substation”) and constructing a new section of access road from the Substation to the Generating Equipment Site; and

- A temporary construction compound for the storage of materials, plant and equipment as well as containing site accommodation and welfare facilities, temporary car parking and temporary fencing (the “Laydown Area”). A small area within the Laydown Area will be retained permanently (the “Maintenance Compound”).
- Ecological Mitigation Area – area for ecological enhancement within the Project Site Boundary;
- Permanent parking and drainage to include: a site foul, oily water and surface water drainage system.

- A Gas Connection in the form of a new Above Ground Installation (AGI) and underground gas connection (the “Gas Pipeline”) to bring natural gas to the Generating Equipment from the National Gas Transmission System; and
- An Electrical Connection in the form of a new underground electrical cable to export power from the Generating Equipment to the National Grid Electricity Transmission System (NETS).

1.2.4 The Electrical Connection is the focus of this Environmental Report.

1.3 Development Consent under the Planning Act 2008

a) Power Generation Plant

1.3.1 The Power Generation Plant described above would have a rated electrical output of up to 299 MW of electricity and is therefore classified as a Nationally Significant Infrastructure Project (“NSIP”) under section 15 of the Planning Act 2008 (as amended) (“PA 2008”).

1.3.2 As such, APL is applying to the Secretary of State (“SoS”) for Business, Energy and Industrial Strategy under section 31 of the PA 2008 for a Development Consent Order (“DCO”) for powers to construct, operate and maintain the Power Generation Plant. The DCO Application was submitted on 25th May 2018.

b) Associated Development

1.3.3 The Gas Connection and Electrical Connection comprise development associated with the NSIP (“associated development”).

1.3.4 The PA 2008 restricts associated development for which consent can be sought under a DCO in Wales to development that is associated with a generating station with a capacity in excess of 350 MW. As the Power Generation Plant would have rated electrical output of up to 299 MW, associated development to the Power Generation Plant cannot be included in any application for DCO under the PA 2008. The application for a DCO therefore only includes the Power Generation Plant and related mitigation as "authorised development" and does not seek development consent for the Gas Connection or the Electrical Connection.

c) Town and Country Planning Act 1990

1.3.5 APL is seeking for planning permission for the Electrical Connection under the Town and Country Planning Act 1990.

d) Abergelli Power Project Environmental Statement

1.3.6 The Abergelli Power Project is a Schedule 1 development as it is a thermal generating station with a heat output of 300 MW or more as listed in Schedule 1, paragraph 2(1) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. As such, an EIA has been carried out in respect of the development.

1.3.7 Mitigation has been identified within the EIA carried out for the Abergelli Power Project which is applicable to the Electrical Connection. This mitigation includes both embedded mitigation (mitigation inherent in to the design of the Project and also specifically to the Electrical Connection), or additional mitigation (which is required to mitigate any residual adverse effects of the Project). This has been identified in this Environmental Report for clarity using notation with the Project EIA where appropriate.

1.4 The Developer

1.4.1 The Applicant is APL, an energy development company established for the Abergelli Power Project and owned by Drax Group plc (Drax).

1.4.2 Drax is responsible for generating 6% of the UKs electricity, predominantly via Drax power station in Selby. Drax is one of the UK's largest energy producers and is committed to helping to reduce carbon emissions, displacing more coal off the system and providing additional system support to plug the gaps created by intermittent renewables and boost security of supply.

1.4.3 Drax acquired APL from Watt Power Limited (Watt Power) in 2016. Stag Energy Development Company Ltd (Stag Energy) previously provided management services to Watt Power in relation to APL. Stag Energy continues to provide resources to APL through a management services agreement. Stag Energy was founded in 2002 and the company draws on a depth of experience within a team that has created and delivered over 10,000 MW of power generation and related infrastructure projects across the globe, of which 2,500 MW has been delivered in the UK.

1.4.4 APL is committed to the development of assets to support the UK Government's drive to a low carbon economy. APL recognises the need to balance commercial issues with the environmental benefits and concerns relating to energy projects and believes this balance can be responsibly delivered. The Electrical Connection as part of the Abergelli Power Project will be designed and developed to high quality, safety and environmental standards.

1.4.5 Further information on the companies referred to above is provided at www.abergellipower.co.uk or www.drax.com.

1.5 Structure of Report

1.5.1 The remainder of this report is structured as follows:

- **Section 2** presents a detailed description of the Electrical Connection;
- **Section 3** presents a description of the current land use at the Electrical Connection and surrounding area;
- **Section 4** provides an overview of the potential environmental effects associated with the Electrical Connection;
- **Section 5** presents a summary of effects; and
- **Section 6** presents the Report conclusions.

1.5.2 An EIA Screening Request and Screening Matrix have been completed for the Electrical Connection and are included in Appendix 1 of this Report. A Mitigation Register has been prepared that outlines all the embedded and additional mitigation which has been identified to avoid, reduce or remedy any significant residual effects from the Project as a whole, but specifically for the Electrical Connection. The Mitigation Register is included in Appendix 2.1 of this Report and has been abbreviated from the wider Abergelli Power Project Mitigation Register to include mitigation required for the Electrical Connection only. The Electrical Connection Mitigation Register is cross-referenced throughout this Report for consistency and ease of reference.

1.5.3 The Report summarises the environmental assessments conducted as part of the Abergelli Power Project Environmental Statement and provides technical conclusions based on those assessments in relation to the likely significant effects of the Electrical Connection.

2. Project Description

2.1.1 The Electrical Connection will enable power to be exported from the Abergelli Power Station to the NETS. The connection will be approximately 900 metre (m) in length. It will consist of a 400 kilovolt (kV) underground cable to the Substation and associated works inside the Substation to connect to a gas-insulated switchgear (GIS) bay. The GIS bay will be consented and owned by National Grid with APL providing and installing a 400 kV cable for termination into the GIS bay as well as installing feeder protection and settlement metering for the GIS Bay.

2.1.2 The Substation is proposed to be extended by National Grid at the eastern end of the building to house the GIS bay. National Grid is responsible for securing any necessary planning permissions for this work and therefore this is not considered as part of this project description or application.

2.1.3 The Electrical Connection route (see Figure 2: Site Layout Plan) will run immediately adjacent to the alignment of the new section of Access Road for the Abergelli Power Project. At the eastern extent, the Electrical Connection leaves the Abergelli Power Project Generating Equipment Site, passing underground through open land to the east and south-east of the National Grid Gas Transmission System. The route crosses into National Grid's land to the east of tower 4YW251 heading towards the Substation. Once within National Grid's land the Electrical Connection turns to the north-west to run outside the Substation and parallel with

the Substation fence line. The Electrical Connection then turns into the Substation close to the northern corner.

2.1.4 The Electrical Connection passes twice under one 400 kV overhead lattice tower mounted transmission line and once under one wooden pole mounted 11 kV overhead distribution line. The route crosses two ditches and a Local Transmission System pipeline within the field to the east of tower 4YW251. The Electrical Connection will be drilled (for example using drilling techniques such as Horizontal Directional Drill (HDD)) under a Water Main and a decommissioned oil pipeline (referred to as the “Oil Pipeline” throughout) with at least 2 m clearance from the underside of the Water Main.

2.2 Construction

2.2.1 The Electrical Connection will be constructed within the curtilage of the new section of Access Road within a 5 m working width adjacent to the road. A cable duct will be installed adjacent to the new section of Access Road to allow the cable to be pulled through at a later date. Short sections of open cut trench will be required at either end of the cable route where it does not coincide with the Access Road. The installation of the cable within the Substation is anticipated to be in cable ducts, although National Grid has recently started using direct buried cables within the Substation.

2.2.2 The Electrical Connection will require temporary bridges to the south of the Generating Equipment Site (for example a temporary Bailey Bridge) over the Water Main and Oil Pipeline during the construction phase to enable access from the new section of Access Road and Laydown Area to the Generating Equipment Site. The temporary Bailey Bridge will be approximately 5 m in height from the anchor points on the existing ground level.

2.3 Operation and Maintenance

2.3.1 No regular maintenance is anticipated to be carried out on the underground electrical cable. Maintenance of the electrical cable will be limited to repair in the event of a fault in the cable, in which case the cable will be isolated for repair in line with industry good practice.

2.3.2 The electrical equipment would be subject to periodic inspection. To perform such inspections, pedestrian access is adequate.

2.3.3 The route would be regularly checked to ensure that there are no excavation or construction works in the direct vicinity of the cables, that mounds of soil are not deposited above the cables and that trees are not planted above the cables; this should normally require little more than a drive past.

2.3.4 In addition, periodic inspection of any above ground equipment associated with the cable system would be required. The above ground equipment would include cable terminations, and structures, and bonding system link housings; this would require access to the equipment. In some case dirt and debris can deposit on cable

termination insulators which may therefore require cleaning. It is also recommended that the integrity of the cable oversheath be tested at least once every two to three years; this would require access to the cable terminations and the bonding system link housings. In the event that the oversheath is found degraded or damaged then a repair may be required which would necessitate some excavation along the cable route (in most cases, oversheath damage results from the actions of third parties).

2.4 Decommissioning

2.4.1 It is assumed that the Electrical Connection would be decommissioned after 25 years, which is the design life of the Power Generation Plant. However, it is important to note that elements of the Connection (such as the GIS bay) would be owned and operated by National Grid. In accordance with its statutory duties, National Grid may use these assets in the future as part of its wider network.

2.4.2 As such, though the date of decommissioning of some elements of the Electrical Connection cannot be certain, a 25 year working assumption has been used to allow for a reasonable assessment of decommissioning effects in this Report.

2.4.3 Finally, it is assumed that elements of the Electrical Connection may be left in situ at the point of decommissioning, as this approach is likely to cause less environmental effects than removal. Any potential effects linked to decommissioning elements of the Electrical Connection are considered to be either less than or comparable with the construction phase, and are therefore not discussed separately.

2.5 Embedded Mitigation

2.5.1 Mitigation which is either implicit in the design of the Electrical Connection or its construction and operation through standard control measures routinely used, such as working within best practice guidance during construction, is known as embedded mitigation. The embedded mitigation implemented on the Electrical Connection is summarised as follows but is outlined in greater detail within the Mitigation Register in Appendix 2.1 (using the notation for ease of reference):

- Production of an Outline Construction Environment Management Plan (CEMP) (ref GEN01) which includes waste management (OE01) (Appendix 2.2);
- Production of an Outline Landscape & Ecology Mitigation Strategy (LEMS) (GEN02) (Appendix 2.3);
- Management of dust and air quality mitigation (AQ01 – AQ04);
- Management of noise, noise generation and vibration management (N01 – N08);
- Protection of sensitive habitats, sensitive ecological features, protected species and designated sites (E01 – E02);
- Production of an Outline Surface Water Management Plan (WQ01) (Appendix 2.4), and drainage (WQ08 and WQ09);

- Protection of groundwater and hydrogeology features, peat management, identification and management of unexpected contamination (G01 – G06);
- Landscape and visual mitigation from Public Rights of Way (PRoW) and other amenity viewpoints (LV01);
- Production of a Construction Traffic Management Plan (CTMP) (Appendix 2.5) (including safety, severance and traffic management such as speed restrictions) in addition to a Construction Staff Travel Plan (CSTP) (Appendix 2.6) (T01 – T05); and
- Archaeological investigation including a Written Scheme of Investigation (WSI) (CH01 and CH02).

2.5.2 This embedded mitigation applies to the Electrical Connection and has been assumed for Environmental Report to be in place from the outset. The assessments included in this Report therefore consider the likely significant effects of the Electrical Connection including embedded mitigation.

2.5.3 Any required additional mitigation is set out within the relevant assessment in Section 4 of this Report and cross referenced within the Mitigation Register in Appendix 2.1. The management plans committed to as embedded mitigation are also referenced where relevant.

3. Site Description

3.1 Electrical Connection Location

3.1.1 The Electrical Connection Site (see Figure 1: Site Location Plan) is located on open agricultural land approximately 2 kilometres (km) north of Junction 46 on the M4, approximately 3 km to the north of the city of Swansea, 1 km southeast of Felindre and 1.4 km north of Llangyfelach. The current land use is improved grazing for sheep and horses on improved grassland (Agricultural Land Classification (ALC) Grade 4).

3.1.2 The western extent of the Electrical Connection encompasses parts of the Swansea North Substation ("Substation") (comprising a 400 kV and 132 kV substation), a car park owned by National Grid between the Substation and Felindre Gas Compressor Station, as well as the existing Access Road from the B4489. There are no residential dwellings located within the Electrical Connection Site.

3.1.3 Ground levels vary from approximately 93.8 m above ordnance datum (AOD) at the highest point to the east and approximately 77.1 m AOD along the southern extent, with ground levels generally falling in a southerly and south easterly direction. The CCS Unitary Development Plan (UDP) Proposals Map (Ref.3.1 and included in Figure: 4.22) identifies mineral deposits within the Electrical Connection Site including coal and sand and aggregates. There is a groundwater body below the Electrical Connection of poor current and projected *Water Framework Directive* (WFD) (Ref.3.2) status.

3.1.4 The Electrical Connection coincides with an area classified as Ancient Woodland as the route enters the Substation. This is part of a wider area of Ancient Woodland surrounding the Substation and Felindre Gas Compressor Station, and the existing Access Road leading to these facilities from the B4489. The woodland is also partially within the Lletty-Morfil Site of Nature Conservation Interest (SINC) (no. 106). The Lletty-Morfil SINC is comprised of five distinct areas, the closest of which is immediately adjacent to the north of the Electrical Connection Site.

3.1.5 The Electrical Connection crosses two drainage ditches that discharge into the Afon Llan. The Afon Llan links with the Afon Lliw and the River Loughor, which discharges into Carmarthen Bay through Bury Inlet, 7 km west of the Abergelli Power Station Site. Carmarthen bay and its estuaries are designated as a Special Area of Conservation (SAC) and Bury Inlet is designated as a Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and as a wetland of international importance under the Ramsar Convention. There are no Main Rivers within the Electrical Connection Site.

3.2 Surrounding Area

3.2.1 The area surrounding the Electrical Connection is, at present, predominantly rural in character, although there is the Felindre Park and Share facility to the south and a substantial amount of utility infrastructure in the area, some of which the Electrical Connection will cross.

3.2.2 The Electrical Connection crosses underground utilities and overhead lines which lead to and from the Substation. The Felindre Water Treatment Works is located to the northwest, while the Cefn Betingau Solar Park and Abergelli Solar Farm are located to the east of the Electrical Connection. A further three solar parks are built in the vicinity; Lletty-Morfil Solar Farm, Brynwhilach Solar Park and Gelliwern Isaf Solar Park.

3.2.3 Other features of the area include public footpaths, bridleways and tracks that link the Electrical Connection Site to the wider area. Of particular note is the LC117 which crosses the Electrical Connection at its western end. There are a number of residential properties between 180 m and 875 m from the Electrical Connection. These include Cefn-betingau to the east, Feline Wen Farm and Llwynhelig to the south east, Maes-eglwys to the south, and Lletty-Morfil Farm to the west and Abergelli Farm to the north west.

3.2.4 There is a paintball activity centre located to the west of the Electrical Connection off the B4889. Other tourist attractions and resources include the Cwm Clydach Nature Reserve woodland and nature reserve at Clydach, 3 km east of the Electrical Connection and the National Cycle Route 43, which passes through Clydach on route to Swansea from Builth Wells.

3.2.5 In addition to the Lletty-Morfil SINC, there is another SINC, Rhos Fawr (no.316), 1.2 km north of the Electrical Connection across the Rhyd-Y-Pandy road. The Rhyd-Y-Pandy SINC (no. 315) is 883 m to the east and Waun Garn Wen SINC (no.

105) 637 m to the north. There is also a Wildlife Trust Reserve (Coed Barcud) to the north east and an area of Ancient Woodland 150 m to the north. The Mawr Uplands Special Landscape Area (SLA) is located within 5 km of the Electrical Connection, extending from the north-west round to the east.

4. Potential Environmental Effects

4.1.1 The following sections describe the potential effects from the construction, operation and decommissioning of the Electrical Connection. Throughout the topic specific sections, reference will be made to both the Electrical Connection Site and the wider Project Site Boundary; the former is the subject of this Environmental Report but where surveys or data collection has been made on the Project Site Boundary, this has been made clear.

4.1.2 In addition, reference will also be made to study areas. These may change in size and proximity to the Electrical Connection, and in some topics, relate to the Project Site Boundary. Where relevant, this has been clearly set out.

4.1.3 In the interests of aiding the reader, these definitions are repeated for ease of reference:

- Electrical Connection - An underground electrical cable to export power from the Generating Equipment to the NETS.
- Electrical Connection Site - The area required for the construction and operation of the Electrical Connection.
- Electrical Connection Site Boundary - The boundary of the Electrical Connection Site.
- Project Site Boundary - The boundary of the Project Site to contain the 'Project'; The OCGT, Power Generation Plant and new connections to the gas and electricity networks on land adjacent to the Felindre Gas Compressor Station at Abergelli Farm, Felindre, Swansea SA5 7NN.

4.2 Ecology

a) Baseline Conditions

4.2.1 Previous ecological surveys have been undertaken by BSG Ecology in 2014 and have been repeated by AECOM in 2017 and 2018. The baseline reports are contained within the Appendices referred to throughout this section. Given the time between initial 2014 surveys and submission of the DCO Application for the Project, ecology surveys have been repeated to provide more recent ecological survey information to support the Project.

4.2.2 It should be noted that the Electrical Connection fits entirely within the Project Site Boundary (used in the AECOM Reports), and the 2014 study areas (used by BSG Ecology and Parsons Brinckerhoff) are more extensive than the 2017/2018 survey extents as the Project Site Boundary was larger in 2014. The Project Site Boundary has since been further refined to that shown on Figure 1 and Figure 2, and the study areas reduced as required.

4.2.3 The Project Site Boundaries for both 2014 and 2017/2018 surveys are shown on Figure 4.1: Ecological Study Area, and therefore references to study areas and any associated buffer zones or extents required for species specific surveys should be understood in the context of these boundaries.

4.2.4 A summary of the baseline conditions has been provided in the following sections using the results of the surveys undertaken by BSG Ecology and AECOM. Detailed information such as survey data has been provided for each element in Appendices 3.1 – 3.19.

- Appendix 3.1: Preliminary Ecological Appraisal Report, 2017 (See section 4.2.7);
- Appendix 3.2: NVC Survey Report, 2014;
- Appendix 3.3: Invertebrate Survey Report, 2017 (See section 4.2.13);
- Appendix 3.4: Great Crested Newt Survey Report, 2017 (See section 4.2.18);
- Appendix 3.5: Reptile Survey Report, 2017 (See section 4.2.21);
- Appendix 3.6a: Breeding Bird Survey, 2017 Report (See section 4.2.28);
- Appendix 3.6b: Breeding Bird Survey, 2018 UPDATE Report (See section 4.2.28);
- Appendix 3.7a: Bat Roost and Walked Activity Transect Survey, 2017 Report (See section **Error! Reference source not found.**);
- Appendix 3.7b: Bat Roost and Walked Activity Transect Survey, 2018 UPDATE Report (See section 4.2.35);
- Appendix 3.8: Bat Survey Report, 2014 (See section 4.2.35);
- Appendix 3.9: Dormouse Survey Report, 2017 (See section 4.2.67);
- Appendix 3.10: Otter and Water Vole Survey Report, 2017 (See section 4.2.68 and 4.2.72);
- Appendix 3.11: Badger Survey Report, 2017 (Confidential) (See section 4.2.79);
- Appendix 3.12: Arboricutural Survey Report, 2014;
- Appendix 3.13: Preliminary Ecological Appraisal, 2014;
- Appendix 3.14: Otter and Water Vole Survey Report, 2014 (See section 4.2.68 and 4.2.72);
- Appendix 3.15: Final Dormouse Survey Report, 2014 (See section 4.2.67);
- Appendix 3.16: Breeding Bird Survey Report, 2014 (See section 4.2.28);
- Appendix 3.17: Great Crested Newt Survey Report, 2014 (See section 4.2.18);
- Appendix 3.18: Reptile Survey Report, 2014 (See section 4.2.21); and
- Appendix 3.19: Invasive Plant Species Survey Report, 2014(See section 4.2.12).

i. Statutory Designated Sites

4.2.5 Using the MAGIC website three internationally designated sites were identified within 10 km and one nationally designated site within 2 km of the Electrical Connection Site Boundary. The details of the sites are presented below in Table 4.1. The location of these sites in relation to the Electrical Connection Site Boundary is shown on Figure 4.2: Designated Sites 1 and 4.3: Designated Sites 2.

Table 4.1: Statutory Designated Sites

Statutory Designation and approximate distance/direction at nearest point	Summary Designating Features
Crymlyn Bog SAC and Ramsar 6.9 km south-east	**SAC** Annex I habitats that are a primary reason for selection of this site: Transition mires and quaking bogs, and Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*. Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: Alluvial forests with Alnus glutinosa *and Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion albae*). **Ramsar** Designated under Ramsar Criterion 1: Largest example of valley floodplain topogenous mire in South Wales, and one of the largest surviving fens in the west of Britain. Very few other sites are known to support a comparable complexity and diversity of vegetation. Designated under Ramsar Criterion 2: Supports a substantial population of the nationally-rare slender cotton-grass *Eriophorum gracile*, and a rich invertebrate fauna including many rare and highly localised species. Designated under Ramsar Criterion 3: The site supports 199 vascular plant species including 17 regionally-uncommon and one nationally rare.
Carmarthen Bay SAC 6.7 km west	A component part of the Carmarthen Bay and Estuaries/Bae Caerfyrddin ac Aberoedd European Marine Site. Partially overlaps Burry Port SPA and Ramsar. Annex I habitats that are a primary reason for selection of this site: Sandbanks which are slightly covered by sea water all the time; Estuaries; Mudflats and sandflats not covered by seawater at low tide; Large shallow inlets and bays;

Statutory Designation and approximate distance/direction at nearest point	Summary Designating Features
	Salicornia and other annuals colonizing mud and sand; and, Atlantic salt meadows (Glauco-Puccinellietalia maritimae). Annex II species that are a primary reason for selection of this site: Twaite shad Alosa fallax. Annex II species present as a qualifying feature, but not a primary reason for site selection: Sea lamprey Petromyzon marinus; River lamprey Lampetra fluviatilis; Allis shad *Alosa alosa*; and, Otter.
Burry Inlet SPA and Ramsar 7.8 km south-west	A component site of the Carmarthen Bay and Estuaries/Bae Caerfyrddin ac Aberoedd European Marine Site. Partially overlaps the Carmarthen Bay SAC. Burry Inlet is a large estuarine complex located between the Gower Peninsula and Llanelli in South Wales. It includes extensive areas of intertidal sand- and mud-flats, together with large sand dune systems at the mouth of the estuary. The site contains the largest continuous area of saltmarsh in Wales (2,200 ha). The estuary experiences large tidal fluctuations (about 8 m), which has the consequence of exposing a large extent of intertidal sediments on a regular basis. These are mostly sandy, but muddy substrates are to be found in more sheltered areas. The Burry Inlet regularly supports large numbers of overwintering wildfowl and waders that feed in the saltmarshes and on the intertidal areas. **SPA** This site qualifies under Article 4.2 of the Birds Directive (2009/147/EC) by supporting populations of European importance of the following migratory species: Over winter: Oystercatcher *Haematopus ostralegus*, 13,590 individuals representing at least 1.5% of the wintering Europe& Northern/Western Africa population (5 year peak mean 1991/2 - 1995/6); and, Pintail *Anas acuta*, 1,772 individuals representing at least 3.0% of the wintering Northwestern

Statutory Designation and approximate distance/direction at nearest point	Summary Designating Features
	Europe population (5 year peak mean 1991/2 - 1995/6). Assemblage qualification: A wetland of international importance. The area qualifies under Article 4.2 of the Directive (2009/147/EC) by regularly supporting at least 20,000 waterfowl. Over winter, the area regularly supports 34,962 individual waterfowl (5 year peak mean 1991/2 – 1995/6) including: curlew *Numenius arquata*, black-tailed godwit *Limosa limosa islandica*, dunlin *Calidris alpina alpina*, knot *Calidris canutus*, shoveler *Anas clypeata*, shelduck *Tadorna tadorna*, oystercatcher *Haematopus ostralegus*, pintail *Anas acuta*, whimbrel *Numenius phaeopus*. **Ramsar** Designated under Ramsar Criterion 5: *Assemblages of international importance.* Species with peak counts in winter: 41,655 waterfowl (5 year peak mean 1998/99-2002/2003). Designated under Ramsar Criterion 6: *Species/populations occurring at levels of international importance.* Qualifying Species/populations (as identified at designation): Species with peak counts in spring/autumn: Common redshank, *Tringa totanus*, 857 individuals, representing an average of 0.7% of the GB population (5 year peak mean 1998/9 – 2002/3). Species with peak counts in winter: Northern pintail, *Anas acuta*, NW Europe 2,687 individuals, representing an average of 4.4% of the population (5 year peak mean 1998/9 – 2002/3); Eurasian oystercatcher, *Haematopus ostralegus*, Europe & NW Africa – wintering 14,861 individuals, representing an average of 1.4% of the population (5 year peak mean 1998/9 – 2002/3); and, Red knot, *Calidris canutus islandica*, W & Southern Africa (wintering) 3618 individuals,

Statutory Designation and approximate distance/direction at nearest point	Summary Designating Features
	representing an average of 1.2% of the GB population (5 year peak mean 1998/9 – 2002/3). Species/populations identified subsequent to designation for possible future consideration under Criterion 6. Species with peak counts in winter: Northern shoveler, *Anas clypeata*, NW & C Europe 467 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9 – 2002/3).
Nant Y Crimp SSSI 1.9 km north west	Nant y Crimp is of special interest for its wet pastures, species-rich neutral grasslands and semi-natural woodland as well as associated scrub, which are host to several uncommon plant species. Notable plant species recorded at the site include petty whin Genista anglica, cranberry Vaccinium oxycoccos, narrow buckler fern Dryopteris carthusiana and whorled caraway Carum verticillatum, the latter an Atlantic species characteristic of unimproved pastures in the South Wales coalfield. In addition, there is also a colony of the marsh fritillary butterfly Euphydryas aurinia at the site. This is a declining species confined, in South Wales to wet agriculturally unimproved pastures where its food plant, devil's bit scabious Succisa pratensis, grows in profusion.

ii. Non-Statutory Designated Sites

4.2.6 The desk study identified 10 non-statutory designated sites within 2 km of the Electrical Connection Site Boundary, one is a Wildlife Trust Reserve and 9 are SINCs. Details of the sites are presented below in Table 4.2. The location of these sites in relation to the Electrical Connection Site is shown on Figures 4.2 – 4.3.

Table 4.2: Non-statutory Designated Sites

Non-Statutory Designation	Distance and Direction from the Electrical Connection	Summary Designating Features
Lletty-Morfil SINC	The closest of the five areas is immediately adjacent to the	Supporting the habitats: native wet woodland, ancient woodland, structurally-diverse and species-rich scrub, and

Non-Statutory Designation	Distance and Direction from the Electrical Connection	Summary Designating Features
	north, a second area of the SINC is 379 m to the south-west.	purple moor-grass and rush pasture; and the Section 7 listed butterfly, wall Lasiommata megera.
Coed Barcud Wildlife Trust Reserve	1.3 km north	A previously improved grassland field, planted up to become future woodland. Within the boundary of Rhoas Fawr SINC.
Rhos Fawr SINC	1.2 km north	Supporting the habitats: woodland containing ancient woodland indicator species, structurally-diverse and species-rich scrub, species-rich neutral grassland, purple moor-grass and rush pasture, and watercourse with exposure/erosion features; and a number of Section 7 listed bird species.
Felindre Grasslands SINC	1.1 km southwest	Native wet woodland, lowland mixed deciduous woodland, structurally-diverse and species-rich gorse scrub, and purple moor-grass and rush pasture; and a number of Section 7 listed invertebrate and bird species, and the Schedule 1 listed birds barn owl Tyto alba and Northern goshawk Accipiter gentilis.
Middle Llan SINC	374 m south	Supporting the habitats: Continuous semi-natural linear vegetation and watercourse with exposure/erosion features.
Rhyd-Y-Pandy Valley and Grasslands SINC	883 m east	Supporting the habitats: native wet woodland, woodland containing ancient woodland indicator species, gorse stands, lowland meadow, species-rich neutral grassland, structurally-diverse and species-rich scrub, purple moor-grass and rush pasture, reedbeds, and watercourse with exposure/erosion features; and a number of Section 7 listed invertebrate and bird species, and the Schedule 1 listed birds barn owl and red kite Milvus milvus.
Waun Garn Wen SINC	637 m north	Supporting the habitats: native wet woodland, structurally-diverse and species-rich scrub, purple moor-grass and rush pasture, and watercourse with exposure/erosion features; and a

Non-Statutory Designation	Distance and Direction from the Electrical Connection	Summary Designating Features
		number of Section 7 listed invertebrate and bird species.
Pant Lasau SINC	349 m south	Supporting the habitats: native wet woodland, lowland mixed deciduous woodland, gorse stands, lowland fen, structurally-diverse and species-rich scrub, purple moor-grass and rush pasture, and watercourse with exposure/erosion features; and a number of Section 7 listed invertebrate and bird species.
Lower Lliw Resivoir SINC	2.1 km north	Supporting the habitats: woodland containing ancient woodland indicator species, gorse stands, species-rich bracken, structurally-diverse and species-rich scrub, purple moor-grass and rush pasture, and watercourse with exposure/erosion features; and a number of Section 7 listed invertebrate and bird species, and the Schedule 1 listed birds kingfisher Alcedo atthis, merlin Falco columbarius and red kite.
Cefn Forest Stream SINC	1.4 km west	Supporting the habitats: woodland containing ancient woodland indicator species, upland mixed ash woodland, native wet woodland, lowland mixed deciduous woodland, lowland meadow, species-rich neutral grassland, structurally-diverse and species-rich scrub, degraded lowland heath, lowland fen, purple moor-grass and rush pasture, ponds, and watercourse with exposure/erosion features; and a number of Section 7 listed invertebrate and bird species, and the Schedule 1 listed barn owl.
Cilfaen SINC	1.5 km north	Supporting the habitats: wet woodland, woodland containing ancient woodland indicator species, and purple moor-grass and rush pasture.
Middle Lliw SINC	2.3 km north	Supporting the habitats: ancient semi-natural woodland, woodland containing ancient woodland indicator species, structurally-diverse and species-rich scrub, gorse stands, species-rich neutral grassland, semi-improved lowland dry acid

Non-Statutory Designation	Distance and Direction from the Electrical Connection	Summary Designating Features
		grassland, acid grassland with anthills, purple moor-grass and rush pasture, watercourse with exposure/erosion features, and species-rich bracken; and a number of Section 7 listed invertebrate species.
Ancient Woodland 1	267 m north-east	Ancient Semi Natural Woodland.
Ancient Woodland 2	Immediately adjacent north	Ancient Woodland Site of Unknown Category.
Ancient Woodland 3	271 m north	Restored Ancient Woodland Site.
Ancient Woodland 4	370 m south	Restored Ancient Woodland Site.
Ancient Woodland 5	588 m north	Restored Ancient Woodland Site.
Ancient Woodland 6	887 m west	Restored Ancient Woodland Site.
Ancient Woodland 7	1.1 km north	Ancient Semi Natural Woodland.
Ancient Woodland 8	1 km north	Ancient Semi Natural Woodland.
Ancient Woodland 9	764 m north-west	Restored Ancient Woodland Site.
Ancient Woodland 10	1.5 km north-east	Ancient Semi Natural Woodland.

Non-Statutory Designation	Distance and Direction from the Electrical Connection	Summary Designating Features
Ancient Woodland 11	1.5 km north	Ancient Semi Natural Woodland.
Ancient Woodland 12	887 m west	Plantation on Ancient Woodland Site.
Ancient Woodland 13	1.9 km north-east	Ancient Semi Natural Woodland.
Ancient Woodland 14	1.6 km north	Ancient Semi Natural Woodland.
Ancient Woodland 15	1.8 km north-east	Ancient Semi Natural Woodland.
Ancient Woodland 16	1.9 km south-east	Ancient Semi Natural Woodland.
Ancient Woodland 17	1.7 km north-west	Ancient Semi Natural Woodland.
Ancient Woodland 18	2 km north-east	Restored Ancient Woodland Site.
Ancient Woodland 19	2.1 km north	Ancient Semi Natural Woodland.
Ancient Woodland 20	2.1 km south-east	Ancient Semi Natural Woodland.
Ancient Woodland 21	2.2 km north-east	Ancient Semi Natural Woodland.
Ancient Woodland 22	2.1 km north	Ancient Semi Natural Woodland.

iii. Protected Species Records

4.2.7 A wide range of historical records of protected and/or notable species were received from SEWBReC. Relevant records are reported in the Preliminary Ecological Assessment and corresponding technical baseline reports (Appendices 3.1 – 3.19). Historic records and survey results are considered together in the evaluation of ecological features below.

Phase 1 Habitat Survey

4.2.8 The land within the Electrical Connection Site supports woodland, rows of trees, standalone trees, dense and scattered scrub, improved grassland, semi-improved grassland, marshy grassland, tall ruderal vegetation, running water, fences and bare ground (hard standing).

4.2.9 A summary of data collected during the Phase 1 Habitat survey is presented in Table 4.3.

Table 4.3: Phase 1 Habitats within the Electrical Connection Site

Habitat Type	Description	Extent
Scrub – Dense/ Continuous	There is an area of dense/ continuous scrub that the Electrical Connection intersects between the Substation and the Felindre Gas Compressor Station.	54 m^2
Rows of Trees – Broadleaved	Rows of trees are predominantly located in between grassland fields and along road edges. The majority of these are located on top of earth banks constructed with stone and earth and covered in grass.	15 m
Standalone Trees	There is one standalone oak tree within the Electrical Connection Site.	1
Semi-Improved Neutral Grassland	There is semi-improved neutral grassland present on road and track sides and around the Substation and within a field at the eastern end of the Electrical Connection.	700 m^2
Marshy Grassland	The fields along the eastern extent of the Electrical Connection are predominantly marshy grassland.	1500 m^2

Invasive Plant Species

4.2.10 During the 2014 survey, BSG Ecology did not identify any invasive plant species subject to legal controls within the Electrical Connection Site. Similarly the Phase 1 Habitat survey in 2017 found no invasive plant species within the Electrical Connection Site.

4.2.11 Both surveys did however identify invasive species within the wider Project Site Boundary including Rhododendron (*Rhododendron ponticum*), Japanese knotweed (*Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*). In addition the BSG Ecology survey in 2014 also identified floating pennywort (*Hydrocotyle ranunculoides)* and montbretia (*Crocosmia* × *crocosmiiflora*).

4.2.12 The closest identified invasive plant species to the Electrical Connection Site, in both surveys were Rhododendron and Japanese knotweed present at the end of the Substation, approximately 250 m to the west.

Invertebrates

4.2.13 Invertebrate surveys were carried out by BSG Ecology in 2014 for moths, beetles, and aquatic macroinvertebrates (in ponds and watercourses) (Appendix 3.3). The survey covered the Electrical Connection Site as an area within the wider Project Site Boundary.

4.2.14 Several records of notable moths and the protected marsh fritillary butterfly (*Euphydryas aurinia*) were returned from the local records centre. However, there is no habitat with the potential to support marsh fritillary within the study area (shown on Figure 4.1) and they are considered to be absent from the Electrical Connection Site.

4.2.15 As part of the invertebrate survey, one watercourse (listed as watercourse 8 in Appendix 3.3) was surveyed within the Electrical Connection Site. No rare species were identified and the assemblage of invertebrate species present suggested good biological and water quality.

4.2.16 Thirteen Section 7 species of moth and two notable or priority beetles were recorded during the invertebrate survey and are listed in Table 4.4 below. Although they were identified within the wider Project Site Boundary, their habitat requirements fit with the habitats present within the Electrical Connection Site, and as such it is likely they are present.

Table 4.4: Notable and Priority beetle, butterfly and moth species from within the Survey Site

Species	Status	Notes
Nitulid beetle *Epuraea distincta*	Nationally Scarce	This saproxylic species is associated with fungi (notably bracket fungi) on trees, especially in wet woodland. Samples were taken from two pitfall traps in woodland to the north of the Electrical Connection Site.
Melandryid beetle *Orchesia micans*	Nationally Scarce	This saproxylic species was found on the remnants of fungus on a single birch tree in woodland to the north east of the Electrical Connection Site.
Small heath butterfly *Coenonympha pamphilus*	Section 7 species	Widespread and common, and found in a fairly wide variety of habitats with its main food plants being grasses. Specific location not given, although majority of butterflies were recorded in a narrow strip of flower-rich habitat in the southern-most part of the area that was surveyed.
Dusky brocade moth *Apamea remissa*	Section 7 species	The moth is associated with grasses, and there are patches of tall grassland along tracks, roads and on waste ground within the Project Site

Species	Status	Notes
		Boundary.
Garden tiger moth *Arctia caja*	Section 7 species	This species has become scarce in eastern Glamorgan, but remains common in the south and west.
Latticed heath moth *Chiasmia clathrata*	Section 7 species	Common and widespread in southern Glamorgan.
Broom moth *Melanchra pisi*	Section 7 species	Locally, the favoured larval food plant is bracken.
Shoulder-striped wainscot moth *Mythimna comma*	Section 7 species	The larvae feed on a range of grasses.
White ermine moth *Spilosoma lubricipeda*	Section 7 species	The larvae feed on a range of herbaceous plants.
Buff ermine moth *Spilosoma luteum*	Section 7 species	The larvae have wide ranging feeding preferences.
Blood vein moth *Timandra comae*	Section 7 species	Common across England and Wales. The moth is associated with a variety of herbaceous plants, but docks in particular, so it would have been well suited to the field margins and woodland within the Electrical Connection Site.
Cinnabar moth *Tyria jacobaeae*	Section 7 species	The moth is almost exclusively associated with common ragwort (*Jacobaea vulgaris*) and there are some small patches of this plant within the Project Site Boundary, many of which support larvae of this species.
Ear moth agg. moth *Amphipoea oculea*	Section 7 species	The three ear moths that have been recorded in Glamorgan are all either uncommon or rare in the county.
Small phoenix moth *Ecliptopera silaceata*	Section 7 species	Common, widespread resident in Glamorgan, and found in a range of habitats.
Dusky thorn moth *Ennomos*	Section 7 species	Occurs wherever the food plant, ash is found.

Species	Status	Notes
fuscantaria		
Rosy rustic moth *Hydraecia micacea*	Section 7 species	Occurs in a wide range of habitats including gardens, waste ground, pasture, fens, marshes and woodland rides.

Amphibians

4.2.17 Records of common toad (*Bufo bufo)*, palmate newt (*Lissotriton helveticus)* and common frog (*Rana temporaria)* were returned from the local records centre. The habitat in the Electrical Connection Site is suitable for common amphibians.

4.2.18 The potential for great crested newts (GCN) to be present on the Electrical Connection Site was assessed as part of the Habitat Suitability Assessment conducted in 2017 (Appendix 3.4). The survey identified twenty-six ponds within the study area, which was defined as the wider Project Site Boundary with a 500 m buffer (Figure A8.4.1 of Appendix 3.4). Three of the identified ponds were within the wider Project Site Boundary; none were located within the Electrical Connection Site.

4.2.19 From the results of the Habitat Suitability Assessment and where access allowed seven ponds were subject to further surveys for GCN including eDNA analysis. No GCNs were recorded during the surveys and the eDNA analysis returned negative results for GCN for each of the ponds. A number of the ponds were found to support common toads, smooth newts (*Lissotriton vulgaris)*, and/or palmate newts.

4.2.20 It is considered unlikely that GCN will be present along the Electrical Connection due to the absence of GCN from ponds within 500 m of the Electrical Connection Site.

Reptiles

4.2.21 The desk study confirmed the presence of slow-worm (*Anguis fragilis)*, grass snake (*Natrix helvetica helvetica)*, adder (*Vipera berus)* and common lizard (*Zootoca vivipara)* within 2 km, and the presence of grass snake and common lizard within the Electrical Connection Site.

4.2.22 During the 2017 reptile survey (study area as shown on Figure 2 of Appendix 3.5), a total of 51 adult and juvenile common lizard observations were recorded, with a peak count of six adults recorded on one survey visit. Observations of common lizard were recorded from across the reptile study area within the Project Site Boundary. The majority of records were from the verges either side of the grassy track running through the centre of the Project Site and from the semi-improved neutral grassland present around the Substation.

4.2.23 During the course of the reptile survey, male, female, and juvenile common lizards were recorded, which confirmed that there was a breeding population present within the Project Site Boundary.

4.2.24 Based on the survey results and the criteria laid out in Froglife Advice Sheet 10 (Ref.3.1), the Site supports a 'Good population' of common lizard.

4.2.25 The Electrical Connection and the area within the wider Project Site Boundary do not meet the criteria for a 'Key Reptile Site'.

4.2.26 No grass snakes were identified within the 2017 reptile study area although the species was recorded in a survey in 2014. However, there is the potential for grass snake to be present within the Electrical Connection Site and to have gone unrecorded since:

- Grass snake are wide ranging;
- The pond, outside of the Electrical Connection, where the majority of the 2014 records were from, was mostly dry throughout the 2017 reptile survey period, making the areas less suitable for supporting grass snake; and,
- The area in the north of the reptile study area where grass snake was recorded in 2014 could not be accessed for survey in 2017 due to grazing livestock.

4.2.27 As such, it should be assumed grass snake is likely to be present at low densities within the Electrical Connection Site and surrounding habitat.

Breeding Birds

4.2.28 Breeding bird surveys were undertaken in 2014 (BSG Ecology report, Appendix 3.16) and in 2017/2018 (AECOM, Appendix 3.6a and Appendix 3.6b). The study areas are as shown on Figure 4.1, the area is more extensive in 2014 as the Project Site Boundary was larger. The 2017/2018 surveys were undertaken on a refined Project Site Boundary but covered the same core areas which make up the Project.

4.2.29 The BSG Ecology surveys identified nine Section 7 bird species (previously referred to as species of principal importance for nature conservation in S42 of the Natural Environment and Rural Communities Act 2006, now repealed by Environment (Wales) Act 2016) comprising cuckoo (*Cuculus canorus)*, grasshopper warbler (*Locustella naevia)*, dunnock (*Prunella modularis)*, house sparrow (*Passer domesticus)*, linnet (*Carduelis cannabina)*, lesser redpoll (*Acanthis cabaret)*, skylark (*Alauda arvensis)*, song thrush (*Turdus philomelos)*, and tree pipit (*Anthus trivialis)* were considered likely to breed within the wider Project Site Boundary.

4.2.30 All nine Section 7 species recorded are also red-listed species of conservation concern in Wales, with the exception of dunnock (which is amber-listed). An additional seven amber-listed species, bullfinch (*Pyrrhula pyrrhula)*, mistle thrush (*Turdus viscivorus)*, meadow pipit (*Anthus pratensis)*, reed bunting (*Emberiza schoeniclus)*, common redstart (*Phoenicurus phoenicurus)*, whitethroat (*Sylvia communis)* and willow warbler (*Phylloscopus trochilis)* were also considered to have bred.

4.2.31 No territories of species listed under Schedule 1 Part 1 of the Wildlife and Countryside Act 1981 (as amended) ("Schedule 1 species") were recorded, although two Schedule 1 species were recorded during the surveys, as follows. A

pair of red kite was recorded mobbing a peregrine falcon (*Falco peregrinus)* in May. A pair of red kite was also recorded flying over the breeding bird study area on the same survey day. Given the timing of the records, and that at least one pair were recorded during survey it is likely that red kite breed locally but that the single record of peregrine referred to a transient bird. No evidence was found to suggest breeding of either species occurred within the breeding bird study area during 2014.

4.2.32 The single breeding bird survey undertaken in 2017 revealed the same nine Section 7 bird species as recorded during the 2014 survey (cuckoo, grasshopper warbler, dunnock, house sparrow, linnet, lesser redpoll, skylark, song thrush and tree pipit). Nine further species listed on the Amber List were also recorded (bullfinch, common redstart, meadow pipit, mistle thrush, meadow pipit, reed bunting, stock dove, whitethroat and willow warbler) although no species listed on Schedule 1 were recorded within the Project Site Boundary. The survey results from 2017 are largely found to be in line with what was identified in 2014 and there is no significant difference in species breeding within the Project Site Boundary between the two surveys.

4.2.33 A survey for goshawk was undertaken in February 2018 of habitats suitable for supporting the species and with the potential to be impacted by the Project. During the survey there were no observations of goshawk.

4.2.34 Four further breeding bird surveys were conducted between April and May 2018. Due to the progressed stage of the Project design, a more targeted study area was implemented that covered a smaller area than the earlier surveys discussed above. The 2018 surveys recorded similar species assemblages as for 2014 and 2017, but the numbers of birds were lower, in line with the smaller study area.

Bats

4.2.35 All of the distances specified in this section are relative to the wider Project Site Boundary not just the Electrical Connection Site. In addition, bat features are explained in the wider context of the Project Site Boundary where relevant due to the connectivity of features for commuting, foraging and roost, and therefore may be outside the Electrical Connection Site Boundary.

4.2.36 Bat surveys were undertaken by BGS in 2014 (Appendix 3.8), AECOM in 2017 (Appendix 3.7a) and completion of remaining surveys in 2018 to provide an updated report (Appendix 3.7b).

4.2.37 The desk study identified no sites designated for bats within 10 km of the Project Site Boundary. The desk study confirmed the presence of the following species from within 2 km of the Project Site Boundary: Daubenton's *Myotis daubentonii*, Natterer's *Myotis nattereri*, Noctule *Nyctalus noctule*, pipistrelle species *Pipistrellus sp*., common pipistrelle *Pipistrellus pipistrellus,* soprano pipistrelle *Pipistrellus pygmaeus,* long-eared species *Plecotus sp.,* brown long-eared *Plecotus auritus* and generic records of bat species *Chiroptera*. None of these records of bats were from within the Project Site.

4.2.38 The desk study identified the following records of known roost sites within 2 km of the Project Site:

- A noctule tree roost approximately 1 km north-west of the Project Site Boundary;
- Common pipistrelle roost approximately 1.3 km east of the Project Site Boundary;
- A common pipistrelle roost approximately 1.8 km south-east of the Project Site Boundary;
- A common pipistrelle roost approximately 1 km southeast of the Project Site Boundary;
- A common pipistrelle roost approximately 1 km north-west of the Project Site Boundary;
- A soprano pipistrelle roost approximately 2 km south-west of the Project Site Boundary;
- A soprano pipistrelle roost approximately 2 km north-west of the Project Site Boundary;
- A long-eared bat and brown-long-eared bat roost approximately 1.6 km east of the Project Site Boundary; and,
- A long-eared bat and brown long-eared bat roost approximately 1.1 km north-west of the Project Site Boundary.

4.2.39 The specific locations of the bat roosts are confidential.

Bat Roosts

4.2.40 There are no buildings suitable for supporting bats within the Electrical Connection Site, or the within the wider Project Site Boundary.

4.2.41 Buildings adjacent to the Project Site Boundary were assessed, and summarised below. Building locations can be found in Appendix 3.7b, Figure 2.

- AECOM Building 1: Unknown Roost Status. Not surveyed by AECOM or BSG Ecology, Building is approximately 125m from the Project Site Boundary;
- AECOM Building 2: Confirmed as a long-eared and pipistrelle roost by BSG in 2014 (Appendix 3.8). Not surveyed by AECOM. It is approximately 120 m outside of the Project Site Boundary;
- AECOM Building 3: No Roost;
- AECOM Building 4: No Roost;
- AECOM Building 5: No Roost;
- AECOM Building 6: No Roost;
- AECOM Building 7: Confirmed as a lesser horseshoe, long-eared and pipistrelle roost by BSG Ecology in 2014 (Appendix 3.8). Surveyed by AECOM in 2018 (Appendix 3.7b) and confirmed summer, non-maternity roost for at least two lone roosting common pipistrelle bats, a summer roost, possibly maternity, for at least 8 long-eared bats and a suspected roost for at least one Myotis sp.
- AECOM Building 8: BSG Ecology internal inspection did not find evidence of bats but not all areas were accessible (Appendix 3.8). Due to the bat roost features identified by BSG Ecology an internal inspection only is not sufficient to determine if this building is being used as a bat roost. Therefore it was

surveyed in 2018 by AECOM (Appendix 3.7b) and confirmed as a summer non-maternity roost for at least two lone roosting common pipistrelle bats.

4.2.42 Tree 19 is a lone male or non-breeding female common pipistrelle summer roost. No other trees were identified as bat roosts. A photograph of Tree 19 is shown in Appendix 3.7b, Plate 1.1.

4.2.43 A trial shaft (mining feature) and a mine adit are located within the Project Site Boundary. A safety investigation confirmed that the trial shaft has been filled in. The respective landowner has confirmed that the mine adit, located next to Building 4, is an underground feature that has been capped and is now covered by grass. Therefore, there is no likelihood of hibernating bats or any suitable bat habitat being present in either of the mine related features within the Project Site Boundary.

Bat Activity – Walked Transects

4.2.44 At least 13 species of bat were recorded foraging and/or commuting in close proximity of and within the Project Site Boundary. The following species have been identified during bat surveys at the Project Site Boundary during the bat surveys undertaken in 2017/2018:

- Greater horseshoe;
- Lesser horseshoe;
- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius' pipistrelle;
- Daubenton's;
- Natterer's;
- Mytois species; (including calls with characteristics of Bechstein's, Brandt's Myotis brandtii and Whiskered Myotis mystacinus);
- Noctule;
- Serotine;
- Leisler's;
- Long-eared species; and,
- Indeterminate species.

4.2.45 Common and soprano pipistrelles were the most commonly recorded species in the Project Site (Appendix 3.7b). Overall pipistrelle species comprised 87.3% of all passes recorded on the walked transect surveys and 93.8% of the static detector surveys. They were also the most commonly recorded species during the emergence/re-entry surveys. Pipistrelle species comprised of 89.9% of the passes recorded on the North Transect and 85.6% of the passes recorded on the South Transect.

4.2.46 Similarly, pipistrelle species were the most commonly recorded species during the BSG 2014 transect and static detector surveys (Appendix 3.8).

4.2.47 Two passes of Nathusius' pipistrelle were recorded during the July 2017 transect surveys, one record from the South Transect and one record from the North Transect, making up 0.2% of total bat passes.

4.2.48 Overall Myotis species comprised 9.5% of the total calls recorded on the transect surveys. Myotis species comprised 7.7% of the passes recorded on the North Transect and 10.8% of the calls recorded on the South Transect.

4.2.49 Activity levels for Myotis species during the transect surveys were comparable with the activity levels recorded during the BSG 2014 transect surveys (Appendix 3.8).

4.2.50 Noctule, serotine and Leisler's (N/S/L) bats comprised 1.8% of the passes recorded on walked transect surveys. N/S/L bats comprised of 1.6% of the passes recorded on the North Transect and 2.0% of the passes recorded on the South Transect. The percentages by species within Appendix 3.7a and 3.7b are not comparable to 2014 surveys as the species were not split by species (Appendix 3.8).

4.2.51 Long-eared and possible long-eared bat comprised a total of 0.4% of the passes recorded on the North Transect and 0.4% recorded on the South Transect surveys. BSG Ecology did not breakdown these species into percentages but figures are comparable between years (Appendix 3.8).

4.2.52 There was a single lesser horseshoe bat pass, recorded on the South Transect, equating to 0.2% of the total passes for the South Transect and 0.1% of the total passes for the Project Site Boundary. This was recorded in August 2017 (Appendix 3.7a). BSG Ecology also recorded a single pass of lesser horseshoe on the South Transect (Appendix 3.8).

4.2.53 Higher levels of activity were recorded in the Southern Transect (713 bat passes; 15.4 Bat Activity Index (BAI)), compared to the Northern Transect (555 bat passes, 12.3 BAI). The bat activity levels across the Project Site Boundary however are broadly similar.

4.2.54 Bat activity was recorded across the Project Site (Appendix 3.7a.b, Figure 5.1). Vegetated stream or wet ditch corridors appear to be important for bats within the Project Site Boundary. The distribution of bat calls suggests the following general patterns of activity. This is a qualitative assessment only:

- Pipistrelle bats were recorded across the Project Site;
- Myotis species showed some association with mature tree lines and/or areas near water;
- Noctule, serotine and Leisler bats were primarily recorded at height over open fields across the Project Site;
- Long-eared bats showed some association with mature tree lines and are focused more towards the centre and south-east of the Project Site. The passes recorded are within approximately 315m to 700m of the confirmed long-eared roost in Building 7 and approximately 270m and 850m of the BSG confirmed long-eared roost in Building 2;
- The single lesser horseshoe was recorded on the South Transect along a mature tree line approximately 900m south of the closest known lesser horseshoe roost in Building 2.

4.2.55 Bat activity was recorded at the Project Site between June and October 2017 and April and May 2018 (Appendix 3.7a,b).

4.2.56 August had the highest BAI for both transects. The North Transect had a BAI of 17.2 and the South Transect had a BAI of 24.9.

4.2.57 May had the second highest BAI for both transects. The North Transect had a BAI of 15.1 and the South Transect had a BAI of 20.4.

4.2.58 For the static detector surveys, July had the highest BAI of 456.8; the second highest BAI was 428.3 in May and third highest BAI was 423.0 in August.

4.2.59 As seen in Plate 1.4 the month of August has a greater level of species richness than April and September. This was a statistically significant result as seen in Appendix 3.7b, Appendix 4A: Tables 2.3 and 2.4.

4.2.60 The statistical analysis of the first night of static detector data showed that there is no significant difference between the bat activity in each month sampled (Appendix 3.7b, Plate 1.2 and Appendix 4A: Table 2.2) as there was not statistically significant results between any of the months.

4.2.61 Young bats are typically born in June and July and during August the young are starting to leave the roosts to fly and feed. October is part of the bat mating period and a time when bats are extensively foraging for food as they are looking to store fat for the winter hibernation period. The general ecology of bat species is likely to influence the temporal activity for the Project Site.

Bat Activity – Static Detectors

4.2.62 Static detector locations are presented in Appendix 3.7b, Figure 3.4.

4.2.63 In total 83,329 bat passes were recorded during the static detector surveys. Appendix 3.7b, Table 1.22 gives the bat activity by the Static Detector Location Groups. Higher levels of activity were recorded in the Southern Static Detector Locations (20,470 total bat passes; 264.1 BAI), compared to the Northern Static Detector Locations (21,492 total bat passes, 231.1 BAI), reflecting the pattern of the walked transect.

4.2.64 Using the first night data from static detector surveys, the species richness recorded across different locations was not statistically significant (Appendix 3.7b, Appendix 4A: Table 2.3), i.e. one location did not support a significantly different diversity of bats than any other location.

4.2.65 The distribution of bat echolocation calls detected during the static detector surveys suggests the following general patterns of activity. This is a qualitative assessment only:

- Pipistrelle bats were recorded across the Project Site;
- Myotis species were recorded across the Project Site;
- Noctule, Serotine and Leisler bats were recorded across the Project Site;
- Long-eared bats were recorded across the Project Site, with highest numbers recorded at Lane 3, followed by South 3 and North 2;

- Greater horseshoe bats were recorded across the Project Site, with the South having the highest number of passes; and,
- Lesser horseshoe bats were recorded across the Project Site within the highest number recorded in the south and south-west of the Project Site at South 2, South 3, Lane 1 and Lane 2.

4.2.66 The highest level of activity was recorded in the Lane Static Detector Locations (41,367 total bat passes, 537.23 BAI). The Lane Static Detector Locations (even with the equipment malfunctions, see Limitations) had higher levels of activity compared to both the North and South Static Detector Locations combined. This may be because the Lane is likely used for foraging, along the sheltered woodland edge, and detectors may have been recording multiple passes by the same bats up and down the Lane.

Dormouse

4.2.67 No records of dormouse were returned from the local records centre. No evidence of dormouse was identified during the field surveys.

Water Vole

4.2.68 No records of water vole were returned during the desk study.

4.2.69 A water vole survey was conducted in 2017, the full results are available in Appendix 3.10. The water vole study area was identified as the area within the wider Project Site Boundary plus a 100 m buffer (shown in Figure 1.1. of Appendix 3.10).

4.2.70 Four watercourses that had potential for supporting water vole were recorded within the water vole study area, none of which were inside the Electrical Connection Site. Two of the four had limited potential for water vole due to the relative isolation of these watercourses within the landscape (i.e. not connected to watercourses with potential to support water vole). Burrows suitable for water vole were found along the other two watercourses, but there was no evidence of current occupancy. It was therefore not possible to determine if the burrows had been excavated by brown rat or water vole. It is likely that water vole is absent from the Electrical Connection Site as part of the water vole study area.

4.2.71 These findings are consistent with a Water Vole study conducted by BSG Ecology in 2014 (Appendix 3.14).

Otter

4.2.72 Three watercourse suitable for otter commuting were identified within the Electrical Connection Site.

4.2.73 Outside of the Electrical Connection Site, but within the wider Project Site Boundary plus a 100 m buffer; a further ten watercourses were identified as being suitable for supporting commuting otter and two watercourses were suitable for supporting foraging otter, holt and couch creation. One potential couch was identified with a trampled vegetation track leading to it which suggested occasional use by a

mammal. Two mammal tracks were identified; these may have been fox or another mammal. No spraints, holts, footprints, anal jelly or other signs were identified during the otter surveys.

4.2.74 One couch and slide next to a watercourse with a pathway leading from an area of marshy grassland, and feeding remains and a spraint were identified during the badger survey. These were recorded outside of the otter study area Figure 1.1. of Appendix 3.10) but adjacent to a watercourse that flows through and immediately adjacent to the wider Project Site Boundary.

4.2.75 Due to the confirmed presence of otter upstream from the Electrical Connection Site in 2015, the presence of spraints and a footprint from a nearby pond in May 2017 and the presence of a couch, slide pathway, feeding remains and a spraint from a watercourse that flows through and immediately adjacent to the Project Site Boundary it can be concluded that otters are still active in the locality. As such it is likely that otters use the suitable watercourses within the Electrical Connection Site for occasional commuting and potentially other activities although no evidence was found during survey.

Brown Hare

4.2.76 No records of brown hare Lepus europaeus were returned from the local records centre.

4.2.77 Sightings of brown hare were made during surveys for other species. A targeted survey for brown hare was not undertaken.

4.2.78 Scrub, woodland edge and grassland habitat present along the Electrical Connection are suitable for supporting the species.

Badger

4.2.79 A badger survey was conducted in November 2017. The badger study area encompassed all suitable habitats accessible within the wider Project Site Boundary and within a 100 m radius from the Project Site Boundary (shown on Figure 1 of Appendix 3.11) including the Electrical Connection Site.

4.2.80 The scrub, woodland edge and grassland habitat present along the Electrical Connection are suitable for supporting the species. Five setts were identified during the badger survey, all of which were well outside of the Electrical Connection Site Boundary.

4.2.81 The survey also identified signs of badger activity including a latrine and a dung pit within the Electrical Connection Site. It is therefore likely that badger use the Electrical Connection Site on a regular basis for foraging and to commute between foraging areas within the wider landscape.

b) Potential Environmental Effects

i. Construction

4.2.82 Table 4.5 presents a summary of the likely ecological effects from the Electrical Connection during construction. The receptor/s likely to be affected are identified and the proposed mitigation listed as detailed within the LEMS (Appendix 2.3, (GEN02)) and illustrated in the Landscape and Mitigation Plan in Figure 4.4: Landscape and Ecology Mitigation Plan.

Table 4.5: Ecology Summary of Effects Arising During Construction Phase

Receptor	Description of Effect	Additional Mitigation
Rows of Trees – Broadleaved	Temporary loss of approximately 15 m.	Temporarily removed habitats will be reinstated.
Standalone Trees	Potentially be a loss of up to a single tree	None
Invertebrates	Temporary reduction of suitable habitat, this has the potential to have an impact on the Section 7 species of moth and butterfly.	None.
Amphibians	Temporary reduction of suitable habitat, this has the potential to have an impact on common amphibians.	Temporarily removed habitats will be reinstated.
Reptiles	Temporary reduction of suitable habitat.	None
Breeding Birds	Localised disturbance from night time illumination in winter months.	None
	Birds will adapt to localised construction noise.	None
Bats	Temporary removal of habitats - severance of connectivity and fragmentation.	Temporarily removed habitats will be reinstated.
Otter	There is the potential harm or kill individual otters during construction within 10 m of the three watercourses that are suitable for otter commuting.	A pre-construction check for otter holts/couches and activity of will be undertaken where construction is present within 100 m of watercourses as identified as suitable for supporting the species during the 2017 field surveys. Habitat management will be undertaken to help reduce the quality of the habitats for holt/couch creation for the period leading up to and for the duration of construction in that area. Additional mitigation may be required as a result of the survey.

ii. Operation

4.2.83 No effects are anticipated through the operation phase of the Electrical Connection.

4.3 Flood Risk and Water Quality

a) Baseline Conditions

4.3.1 For this section, a 1 km study area from the wider Project Site Boundary has been adopted based on a potential "zone of influence", which is defined as a distance over which significant effects on important water receptors/features can reasonably have the potential to occur. The Electrical Connection Site sits completely within the study area.

4.3.2 This section is supported by the assessment demonstrated in:

- Appendix 4.1: Flood Consequence Assessment (FCA); and
- Appendix 4.2: WFD Screening Assessment.

i. Topography and Land Use

4.3.3 The topography of the study area is reasonably elevated and steeply sloping. Ground levels across the Electrical Connection Site vary from approximately 93.8 m AOD at the highest point to 77.1 m AOD at the lowest. The Felindre Gas Compressor Station is located immediately to the north of the Access Road and is constructed on raised ground at a level of approximately 87 m AOD. This is approximately 5-8 m above the flood plain of the field drainage and ordinary watercourse to the south of the existing Access Road, which drains to the Afon Llan.

4.3.4 The land within the Electrical Connection Site is currently used for sheep and horse grazing with existing development consisting of the National Grid car park between the Substation and Felindre Gas Compressor Station and access roads. The area surrounding the Electrical Connection Site is, at present, predominantly rural, although there is Felindre Park and Share to the south and a substantial amount of utility infrastructure in the area, some of which cross the Electrical Connection Site. There are a number of solar farms in fields to the north east of the Electrical Connection Site. In addition, there are some springs and drainage channels/ditches within the Electrical Connection Site that drain the land and discharge into the Afon Llan River. The current land uses are considered "Less vulnerable" to flooding according to the classifications within the Welsh Government's Technical Advice Note (TAN) on Development and Flood Risk (Ref.4.2).

ii. Ground Conditions and Hydrogeology

4.3.5 The British Geological Survey (BGS), online mapping data, provides details of both the regional and local geology of the study area. The data indicates that the study area is underlain by bedrock of the Grovesend Formation, comprising mudstone, siltstone and sandstone (Figure 4.5: Bedrock Geology). Superficial deposits across the study area are quite variable. However, they primarily comprise till and

glaciofluvial deposits (sands and gravels) with a smaller area of peat, to the north of the Electrical Connection Site (Figure 4.6: Superficial Geology). The thickness of the superficial deposits beneath the Electrical Connection Site is currently unknown. Groundwater occurs in both the superficial and bedrock beneath the study area.

4.3.6 Natural Resource Wales (NRW) has designated the bedrock geology beneath the study area as a Secondary A aquifer with the superficial deposits designated a mixture of Secondary A aquifer and unproductive strata. Secondary A aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale and, in some cases, can form a vital source of base flow to rivers. Unproductive strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow. Soils in the study area are variable, designated to have high, intermediate and low leachate potential.

4.3.7 Groundwater movement within the underlying geology is likely to be limited considering the aquifer designations as discussed above. Although the Electrical Connection Site is elevated, shallow or perched groundwater within the superficial deposits is expected to be reasonably close to the surface and in hydraulic connectivity with the surface watercourses present within the Electrical Connection Site and immediate surroundings.

4.3.8 The objectives of the WFD have been used to assess the groundwater quality in the study area. The Carmarthen Carboniferous Coal Measures (Waterbody ID GB41002G200600) and Swansea Carboniferous Coal Measures (Waterbody ID GB410002G201000) are two WFD groundwater bodies within the study area (as shown on Figure 4.7: Groundwater Bodies). Information on their status regarding water quality is available from NRW Rivers and Waterbodies website (accessed October 2017). According to the NRW website, the current quantitative water quality for both the Carmarthen and Swansea water bodies is good and predicted to remain so beyond 2015, based on the most recent available data from 2015.

4.3.9 However, the overall 2015 Cycle 2 Status and current chemical quality for both Carmarthen Carboniferous Coal Measures and Swansea Carboniferous Coal Measures groundwater bodies are reported to be poor and are expected to remain so beyond 2015. There are no identified designated groundwater SPZs or drinking water Safeguard Zones with regards to agricultural activities within the study area. Furthermore, information on the status of the Carmarthen and Swansea Carboniferous WFD groundwater bodies shows that they are not targeted for improvement within the Western Wales River Basin Management Plan (RBMP).

4.3.10 The Landmark Envirocheck Report (Appendix 8.1) has identified no groundwater abstraction licences associated with the Electrical Connection Site. The Landmark report identified only one licence located within 100 m of the wider Project Site Boundary, recorded 56 m to the north-east for a well at Abergelli Farm, licence number 22/59/4/0027 dated February 1993, for general farming and domestic use. Recent date (received on 9 October 2017) on private groundwater and abstraction

licences received from CCS and NRW respectively did not identify this licence or any other licences within 4 km of the Electrical Connection Site Boundary.

iii. Contaminated Land

4.3.11 No intrusive site investigation has been completed to inform this Report. However, as the majority of the Electrical Connection Site is undeveloped, it is unlikely to have experienced significant potentially contaminative activities. Figure 4.8: Potential Pollution Sources shows current or historical potential pollution point/aerial sources within the study area. It also includes historic landfill and industrial land use activities that have a higher potential for ground contamination such as the disused (inert) landfill site located approximately 605 m north of the Electrical Connection Boundary, a coal mine north of Abergelli Farm and the Substation.

4.3.12 A mine spoil dump covered approximately three-quarters of the landfill area from the former Abergelli Colliery (Figure 4.8: Potential Pollution Sources). This mine waste was largely removed leaving a layer of well compacted mine waste over the majority of the landfill area. Part of the ground that was covered by mine spoil was formerly used for drying out of water treatment sludge (aluminium sulphate) though this ceased when the landfill became operational. No further information regarding potential impacts to the water environment from this operation is known.

iv. Surface Water and Groundwater Features

4.3.13 There are both designated "ordinary" and "main" surface water bodies within the study area (Figures B2 and B3, Appendix B of FCA provided in Appendix 4.1). Within the Electrical Site, there are springs and spring-drainage rivulets and drainage ditches that drain into the Afon Llan River. The Afon Llan River and its tributaries are the closest surface water features in the vicinity of the Electrical Connection Site. The Afon Llan River catchment includes all of the Electrical Connection Site. The Loughor Estuary, alongside other ecological statutory designated sites more distant from and downstream of the Electrical Connection Site, are also discussed.

4.3.14 There are three WFD classified surface water bodies (Figure 4.9: Surface Water Bodies) within the study area: the Afon Llan (Water body ID GB110058032070 to the south of the Electrical Connection Site), the Afon Lliw (Water body ID GB110059032100 to the north) and the Loughor Estuary (Burry Inlet Inner) (Water body ID GB531005913500 located approximately 7 km south) into which these water bodies discharges.

4.3.15 The Afon Llan River is the closest WFD designated surface watercourse that traverses the immediate vicinity of the Electrical Connection Site. It flows in a south-westerly direction and is designated as a Main River by NRW. The Afon Llan links with the Afon Lliw and the River Loughor, which discharges into Carmarthen Bay. The rivers will not be directly altered by the Electrical Connection.

4.3.16 There is one WFD groundwater body (i.e. the Carmarthen Carboniferous Coal Measures Water body ID GB41002G200600) in the vicinity of the Electrical Connection Site. This WFD water body is not targeted for improvements within the Western Wales RBMP.

4.3.1 Information about the current and predicted status of the Afon Llan River and the other designated WFD water bodies within the study area are available from NRW Cycle 2 River and Waterbodies websites (Ref.4.3) and is summarised in Table 4.6. Details of groundwater bodies are provided in Table 4.7.

Table 4.6: Surface water bodies WFD Cycle 2 status WFD status of Afon Llan, Afon Lliw and Loughor Estuary

Status			
Water Body	**Afon Llan**	**Afon Lliw**	**Loughor Estuary (Burry Inlet Inner)**
Overall Status	Good	Moderate	Poor
Chemical Status	Good	Fail	Good
Ecological Status	Good	Good	Poor
Driving Ecological Quality Elements	Fish, Invertebrates, Macrophytes and Phytobenthos Combined	Fish, invertebrates	Phytoplankton blooms
Mitigation Measures by NRW	Not yet applied	Not yet applied	Not yet applied
Typology	Low, Small, Siliceous	Low, Small, Siliceous	Mixed, Macro, Extensive

Table 4.7: Groundwater body WFD Cycle 2 status

Status	
Water Body	**Carmarthen Carboniferous Coal Measures**
Overall 2015 Cycle 2 Status	Poor
2015 Cycle 2 Quantitative Status	Good
2015 Cycle 2 Chemical Status	Poor

4.3.2 The Afon Lliw is located approximately 1.3 km north of the Electrical Connection Site and has been assessed under the WFD.

4.3.3 There are other smaller watercourses in the vicinity of the Electrical Connection Site that drain to the Afon Llan, along with some springs and small ponds. These have not been individually assessed previously under the WFD due to lack of data

and because their small size means their overall importance to the river basin district is reduced.

4.3.4 Both the Afon Llan and Afon Lliw discharge to the Loughor Estuary west of Swansea, approximately 7 km from the Electrical Connection Site Boundary. The Electrical Connection Site lies outside of the Afon Lliw topographic catchment and therefore it is expected that any direct hydraulic connectivity will be limited. The Afon Llan does, however, join with the Afon Lliw approximately 9 km downstream of the Electrical Connection Site Boundary. There may also be some potential for the cross-transfer of shallow groundwater flows between the two catchments. The Loughor Estuary has been assessed under the WFD. NRW has identified that the Loughor Estuary contains designated Shellfisheries.

4.3.5 No surface water abstraction points have been identified within the Electrical Connection Site. The closest surface water abstractions, assumed to be from a tributary of the Afon Llan, have been identified approximately 1.6 km northeast and upstream of the Electrical Connection Site Boundary. Accordingly, no impact to this receptor is envisaged and it is not considered further.

4.3.6 There are also a number of small drainage ditches and land drains which output into the ordinary watercourses and then the Afon Llan.

v. Flood Risk

4.3.7 There are no flood defence structures in the study area including within the Electrical Connection Site.

4.3.8 The Lle Geo-Portal Development Advice Map (DAM) (Ref.4.4) determines that the Electrical Connection Site is outside of the DAM Zones and considered to be at very low risk of flooding i.e. DAM Zone A. Figure D1 in Appendix 4.1 displays the flood zones and Project Site Boundary.

4.3.9 During a site visit, the area between the Felindre Gas Compressor Station and the eastern end of the Electrical Connection Site was notably saturated. It is assumed that this area and the lower lying area to the south east of the Electrical Connection Site Boundary may be susceptible to groundwater or surface water flooding. This is consistent with BGS groundwater flooding susceptibility mapping showing the area to the south east of the Electrical Connection Site as potential groundwater flooding at surface.

4.3.10 The literature review has not identified any historic incidents of flooding affecting the Electrical Connection Site from any source.

4.3.11 The CCS Preliminary Flood Risk Assessments (PFRA) (2011) (Ref.4.5), Level 1 (2010) and Level 2 (2012) Strategic Flood Consequence Assessment (SFCA's) do not report any recorded flood events from groundwater sources within the CCS region. The Flood Risk Management Plan (FRMP) (2015) indicates that there is a low risk of groundwater flooding across the CCS region (Ref.4.6).

4.3.12 NRW online maps show that reservoir flooding is not predicted to affect the Electrical Connection Site. This is relevant with respect to the upstream Lliw Reservoir.

vi. Drainage

4.3.13 Most of the Electrical Connection Site is undeveloped and surface water run-off flows overland and through field drains discharging into the Afon Llan. These field drains and drainage ditches can be seen to cross the Electrical Connection Site and flow to the ordinary watercourses. The largest ordinary watercourse flows south along the east perimeter of the Electrical Connection Site before discharging to the Afon Llan.

4.3.14 It has been identified that there are no foul sewers within the Electrical Connection Site, and therefore assumed that the foul effluent from the nearby farm and residential properties discharge to cess pits and septic tanks.

b) Potential Environmental Effects

4.3.15 For water quality and resources and flooding, no impact is expected to arise from the construction and operation of the Electrical Connection.

4.3.16 Good practice management measures for the reduction and control of water pollution including works near water will be set out in the Surface Water Management Plan (WQ01) (Appendix 2.4) and Drainage Strategy, WQ08 and WQ09 of the Mitigation Register (Appendix 2.1). No additional mitigation measures have been proposed.

4.4 Air Quality

a) Baseline Conditions

i. CCS Air Quality Monitoring and Reporting

4.4.1 A review of existing baseline air quality has been undertaken using information presented within the CCS Progress Report 2016 (Ref.4.7), information published on an official CCS Air Quality website (Ref.4.8) and Department for Environment, Food and Rural Affairs (DEFRA) website (Ref.4.9).

4.4.2 There are a number of Continuous Monitoring Stations (CMS) in the administrative area of CCS. A summary of the monitoring stations and last five years of monitoring data from each, are presented in Table 4.8 to Table 4.11.

Table 4.8: CMS Site Details

CMS name	Type	Location		Relative Location to the Electrical Connection Site
		X	Y	
Swansea Automatic Urban Rural Network (AURN)	Roadside	265299	194470	5.5 km south
Morriston Groundhog	Roadside	267210	197674	3.5 km south east
Cwm Level Park	Urban Background	265912	195890	4.7 km south

Table 4.9: CMS Monitored Nitrogen Dioxide (NO_2) Concentrations (µg/m3)

CMS name	Annual Mean NO_2 Concentration (µg/m^3) / Number of Daily Means > 200 µg/m^3 in Parentheses				
	2012	2013	2014	2015	2016
Swansea AURN	26.0 (0)	26.8 (0)	25.0 (0)	23.0 (0)	26.3 (0)
Morriston Groundhog	23.4 (0)	23.2 (0)	21.1 (0)	20.5 (0)	26.6 (0)
Cwm Level Park	19.6 (0)	18.5 (0)	17.1 (0)	14.8 (0)	14.5 (0)

Table 4.10: CMS Monitored Particulate Matter (PM10) Concentrations (µg/m3)

CMS name	Annual Mean PM_{10} Concentration (µg/m^3) / Number of Daily Means > 50 µg/m^3 in Parentheses				
	2012	2013	2014	2015	2016
Swansea AURN	17.8 (4)	19.0 (2)	20.3 (2)	20.2 (2)	20.3
Morriston Groundhog	13.9 (0)	15.3 (0)	13.2 (1)	-	-

Table 4.11: CMS Monitored PM2.5 Concentrations (µg/m3)

CMS name	Annual Mean $PM_{2.5}$ Concentration (µg/m^3)				
	2012	2013	2014	2015	2016
Swansea AURN	11.5	11.9	12.8	12.8	16.0

4.4.3 Additionally CCS managed a network of diffusion tube monitoring sites focused on roadside locations mainly at busy junctions and along narrow and congested roads. The Project Site Boundary is at a rural location and therefore monitoring data from the NO_2 diffusion tube network are not considered relevant to inform the air quality baseline at the Electrical Connection Site.

ii. Defra Mapped Background Data

4.4.4 Defra has produced maps of background pollutant concentrations covering the whole of the UK for use by local authorities and consultants in the completion of

Local Air Quality Monitoring (LAQM) reports and Air Quality Assessments where local background monitoring is unavailable or inappropriate for use. The current maps are based on a background year of 2015 and provide background pollutant concentrations for NO_2, PM_{10} and $PM_{2.5}$ for each 1 km grid square within the UK for all years between 2015 and 2030. Defra also provides historic mapped estimates from 2001 for Carbon Monoxide (CO). The mapped Defra NO_2, PM_{10} and $PM_{2.5}$ concentrations at the Electrical Connection Site are presented in Table 4.12 for 2016.

Table 4.12: Defra Mapped Annual Background Pollutant Concentrations (µg/m³) at the Electrical Connection Site in 2016.

Pollutant	Mapped Grid Square		Annual Mean Concentrations (µg/m³)
	X	Y	
NO_2	265500	201500	6.8
PM_{10}			10.8
$PM_{2.5}$			7.2
CO			220

4.4.5 Table 4.13 presents a comparison of measured concentrations at the CCS Cwm Level Park urban background CMS site, presented in Table 4.9, versus Defra mapped background concentration for the corresponding grid square.

Table 4.13: 2016 Mapped vs Monitored Annual Mean Background NO2 Concentrations (µg/m3)

Monitoring Site	Monitored NO_2 Concentration (µg/m³)	Mapped Grid Square		Mapped NO_2 Concentration (µg/m³)
		X	Y	
Cwm Level Park	14.5	265500	195500	12.5

Note: The DEFRA background concentrations were downloaded in November 2017 from the 2015 reference year background maps.

b) Potential Environmental Effects

i. Construction

4.4.6 The dust emission potential for construction of the Electrical Connection is assessed as being small during earthworks and construction considering that the earthworks are confined to small area and construction emissions will be moderated by the largely prefabricated nature of the installation. Emissions from trackout have a small dust potential due to the number of vehicles operating and the fact there will be minimal amount of excavation/trenching needed. There is no demolition associated with this phase of the works.

4.4.7 Table 4.14 sets out the assessment of dust emission class from demolition activities, earthworks, construction and trackout as a function of the works associated with the Electrical Connection.

Table 4.14: Summary Assessment of Dust Emissions Class

Phase	Magnitude	Dust Risk		
		Nuisance (Low Receptor Sensitivity)	Human Health (Low Receptor Sensitivity)	Ecology (Low Receptor Sensitivity)
Demolition	N/A	N/A	N/A	N/A
Earthworks	Small	Negligible	Negligible	Negligible
Construction	Small	Negligible	Negligible	Negligible
Trackout	Small	Negligible	Negligible	Negligible

4.4.8 Table 4.14 shows the risk of effects with no mitigation is negligible in terms of human health, nuisance and ecological impacts.

4.4.9 Good practice dust management will be set out within the Outline CEMP, GEN01 of the Mitigation Register (Appendix 2.1).

ii. Operation

4.4.10 No impacts on air quality are anticipated from the operation of the Electrical Connection.

4.5 Noise

a) Baseline Conditions

4.5.1 Representative background and ambient sound levels are summarised below in Table 4.15 for each of the four Noise Sensitive Receptors (NSRs) located in Figure 4.10: Noise Sensitive Receptor Locations. The baseline sound levels presented within this report were measured by AECOM in February 2018 (Appendix 5: Noise Survey). NSR 2 and 3 are not listed below as access could not be obtained at these locations to measure background levels. However, the lack of monitoring data from NSRs 2 and 3 does not impact the comprehensiveness or validity of the assessments, and conclusions on the impacts and effects on NSRs 2 and 3 can be drawn from application of professional judgement to the results for the other four NSRs.

Table 4.15: Representative Background and Ambient Sound Levels

	Observations of baseline sound environment	Day time background sound level L_{AF90}	Day time ambient (residual) sound level L_{Aeq}	Night time *background sound level* L_{AF90}	Night time ambient (residual) sound level L_{Aeq}
NSR1	Distant rotary engine noise and M4 motorway traffic noise, low but audible. Bird	40	46	34	40

	Observations of baseline sound environment	Day time background sound level L_{AF90}	Day time ambient (residual) sound level L_{Aeq}	Night time *background sound level* L_{AF90}	Night time ambient (residual) sound level L_{Aeq}
	noise and cattle noises heard from the nearby area. On collection there was additional noise from farm activities as well as a low frequency plant hum which started up around 10:00. At night, low level plant hum heard, road traffic was audible to both the south and east. Very quiet site.				
NSR4	M4 motorway traffic noise and rotary engine noise low but audible. On collection dogs were barking at the nearby property. At night, low level plant hum and distant M4 traffic noise, low but audible. Very quiet site.	36	43	35	38
NSR5	On site hen noise and dogs barking. Wind rustle in the trees. Distant M4 traffic and rotary engine noises heard, low but audible. On collection a low level plant hum could be heard. At night, low level plant hum and distant M4 traffic noise, low but audible. Very quiet site.	43	54	38	40
NSR6	Wind rustle and birds heard in nearby trees, dogs barking in the distance. Distant M4 traffic and rotary engine noises heard, low but audible. Rotary engine noise, advised to be a drone, low but audible. At night, low level plant hum and distant road traffic noise heard. Very quiet site.	40	47	36	39

b) Potential Environmental Effects

i. Construction

4.5.2 Noise levels experienced by local receptors during construction will depend upon a number of variables, the most significant of which are:

- The noise generated by plant or equipment used on-site, generally expressed as Sound Power Levels (L_w) or the vibration generated by the plant;
- The periods of use of the plant on-site, known as its on-time;
- The distance between the noise/vibration source and the receptor;
- The noise attenuation due to ground absorption, air absorption and barrier effects;
- In some instances, the reflection of noise due to the presence of hard surfaces such as the sides of buildings; and
- The time of day or night the works are undertaken.

4.5.3 The predicted indicative construction noise levels for the Electrical Connection are given in Table 4.16 below.

Table 4.16: Predicted Construction Sound Levels ($L_{Aeq,T}$ dB)

Location		Distance from Electrical Connection	Electrical Connection (LAeq,T dB)
Cefn-betingau	NSR1	635 m north east	33
Felin Wen Farm	NSR2	760 m east	31
Llwynhelig	NSR3	600 m south east	33
Maes-eglwys	NSR4	250 m south	40
Lletty Morfil Farm	NSR5	180 m north west	46
Abergelli Farm	NSR6	600 m north	35

4.5.4 The Residential NSR4 and NSR5 are the closest of the identified NSRs to the Electrical Connection and have the highest predicted noise levels.

4.5.5 The predicted indicative construction noise levels range between 31 and 46 equivalent continuous level decibels ($L_{Aeq,\ T}$ dB). This is lower than the lowest observable adverse effect level (LOAEL) as derived from British Standard (BS) 5228:2009 of 65 $L_{Aeq,T}$ dB for day time, 55 $L_{Aeq,T}$ dB for evenings and weekends and 45 $L_{Aeq,T}$ dB for night time.

4.5.6 No additional mitigation is proposed however good practice noise management is considered within the N01- N09 Mitigation Register (Appendix 2.1), Outline CEMP, GEN01 (Appendix 2.2).

ii. Operation

4.5.7 No effects are anticipated during operation due to the nature of development.

4.6 Landscape

a) Baseline Conditions

4.6.1 The study area considered in this section is 5 km from the Project Site Boundary. This can be viewed on Figure 4.11: Landscape Designations.

i. Landform

4.6.2 The Electrical Connection Site is located within a valley with ground rising to the north, east and west which provides visual containment. Ground levels vary across the Electrical Connection Site from approximately 93.8 m AOD in the north-west corner to 77.12 m AOD along the southern perimeter. Ground levels generally fall in a southerly and south easterly direction.

ii. Movement and Connectivity

4.6.3 Junction 46 on the M4 lies approximately 1.5 km to the south of the Electrical Connection Site Boundary providing immediate access to the strategic road network between London and South Wales. To the immediate north of Junction 46 lies the Felindre Park and Share at Brynwhilhach adjacent to the un-developed Felindre Business Park. A network of minor roads dissect the 5 km study area, connecting settlements and farmsteads. These are typically surrounded by earthbanks with hedgerow and tree planting which contains views along them and successfully integrates them into the wider landscape. The study area is well served with PRoW although not all are easily accessible nor do they appear to be regularly used. A section of the Gower Way, a long distance footpath through the Afon Lliw valley passes within approximately 2 km at its closest point to the northern boundary of the Electrical Connection Site.

iii. Land Use and Built Form

4.6.4 The Electrical Connection Site is predominantly covered with pasture which is currently used for sheep and horse grazing. A soft surface horse training track, known as ‘The Gallops’, is immediately adjacent to the eastern Electrical Connection Site Boundary and runs diagonally north-west to south-east. Broadleaf woodland which is classified in part as Ancient Woodland lies around the Access Road to the Substation and Felindre Gas Compressor Station. Fields across the Electrical Connection Site are subdivided by ditches, post and wire fencing, remnant hedgerows and are interspersed with scrub vegetation.

4.6.5 Pastoral land and woodland are the predominant land uses within the wider valley, including Penllergaer Forest and other smaller broadleaved woodlands that are scattered throughout the valley. Combined with the network of hedgerows and hedgerow tree planting which define many of the small and irregular shaped fields as well as the network of minor roads, the landscape displays a well vegetated character. This character of woodland, rolling topography and visual containment helps integrate developments in the rural fabric.

4.6.6 The western part of the Electrical Connection Site encompasses the existing Access Road and the National Grid Car Park, adjacent to the Felindre Gas Compressor Station. Both the Substation and the Felindre Gas Compressor Station comprise large scale power infrastructure facilities characterised by tall industrial structures enclosed by security fencing and set within woodland planting. Pylons are prominent across the landscape and converge at the Substation. Pylons range in height with the closest pylon to the north of the Electrical Connection Site 44 m in height and the pylon to the south of the Electrical Connection Site, 51 m tall.

4.6.7 To the west of the Electrical Connection Site Boundary lies an Air-Insulated Switchgear (AIS) substation at Waun Ffyrdd. The associated overhead transmission lines and steel pylons are prominent elements within the valley landscape. To the north lies the Felindre Water Treatment Works at Waun y Garn-wen which is partially screened by planting although apparent in more elevated views from the north.

4.6.8 A number of solar farms lie around the Electrical Connection Site particularly to the north-east and east as well as to the north-west. The Felindre Business Park adjacent to the Park and Share at Brynwhilhach has been partially constructed with service infrastructure in place along with an outline landscape structure including stone walls and planting.

4.6.9 The main settlement in the 5 km study area is Swansea, with the northern edges of the city forming notable built form in the south and south eastern parts of the study area, approximately 2 km from the Electrical Connection Site Boundary. The Driver and Vehicle Licensing Agency (DVLA) office block forms a prominent tall building and local landmark in many views that look south. Morriston hospital complex at Pant-lasau lies to the south-east of the Electrical Connection Site with the settlement of Clydach extending to the east. Settlement locally is dispersed comprising small villages such as Felindre to the north-west or scattered properties and farmsteads.

iv. Landscape Designations

4.6.10 Landscapes can be given international, national, regional or local designations in recognition of their importance, outstanding scenic interest or attractiveness. The Landscape Designation within a 5 and 15 km study area from the Project Site Boundary can be viewed on Figure 4.11: Landscape Designations.

4.6.11 The Brecon Beacons National Park lies 13.5 km to the north of the Electrical Connection Site Boundary at its closest point. There is no theoretical visibility between the Electrical Connection Site and the National Park due to the distance and topography. As such the Brecon Beacons National Park as a landscape receptor is not considered further.

4.6.12 The Gower Area of Outstanding Natural Beauty (AONB) lies 10 km to the south-west of the Electrical Connection Site Boundary. The Gower AONB was designated in 1956 for its classic limestone coast and the variety of natural habitats. The Gower's scenery ranges from dune and salt marsh in the north to dramatic

limestone cliffs along the south coast, interspersed by sandy beaches. Inland the hills of Cefn Bryn and Rhossili Down dominate the landscape of traditional small fields, wooded valleys and open commons. There is limited visibility between the Electrical Connection and the AONB. Views of the Electrical Connection Site from within the Gower AONB are substantially screened by intervening woodland at Penllergaer Forest and Valley Wood, intervening hedgerows, hedgerow trees and copses and built form within settlements at Gorseinion, Penllergaer, Gowerton and Waunarlwydd, as well as extensive urban development within Swansea.

4.6.13 SLAs are identified in the CCS draft Local Development Plan (LDP) within Policy ER 5: Landscape Protection (Ref.4.10) and are identified on Figure 4.11. The Policy states that priority will be given to protecting, managing and enhancing the character and quality of the three SLAs:

- Mawr Uplands;
- Lower Loughor Valley and Estuary and Southern part of the Burry Inlet; and
- North East Gower and Cockett Valley.

4.6.14 Within the SLAs, development will only be permitted where proposals include measures to protect, manage and enhance the character and quality of the particular landscape features for which the SLA has been designated. The aim of the Policy is to ensure that the character and quality of the County's most valued landscapes are protected from inappropriate development and to encourage the management, enhancement and creation of key landscape features where possible.

4.6.15 There are four Country Parks within the wider landscape but all lie beyond the 15 km study area and do not experience any theoretical visibility.

b) Potential Environmental Effects

i. Construction

4.6.16 The Electrical Connection is routed immediately adjacent to the alignment of the new section of Access Road. The construction activity and plant associated with the Electrical Connection alone will only result in localised and limited effects to the landscape character resulting in a small loss of woodland and hedgerow planting. This will not affect the integrity or key characteristics of the landscape and is therefore not considered significant.

4.6.17 No additional mitigation is proposed, but good practice landscape and visual management measures will be will be included within the Outline CEMP (GEN01) (Appendix 2.2) and LEMS (GEN02) (Appendix 2.3) of the Mitigation Register (Appendix 2.1).

ii. Operation

4.6.18 Once operational there will be no significant visual effects or effects on the landscape character as a result of the Electrical Connection.

4.7 Historic Environment

a) Baseline Conditions

4.7.1 The following sections describe the archaeological and historical context of the 1 km and 5 km study areas from the Electrical Connection Site Boundary and the known sites within these. Full details are contained in the cultural heritage gazetteer (Appendix 6) and the assets are shown on Figures 4.12 and 4.13.

4.7.2 Table 4.17 summarises the number of historic assets within the Electrical Connection Site, and within the 1 km and 5 km study areas.

Table 4.17: Summary of Historic Assets

Historic Asset	Project Site	1 km Study Area	5 km Study Area
Scheduled Monument	0	0	11
Listed building (Grade I)	0	0	1
Listed building (Grade II*)	0	0	5
Listed Building (Grade II)	0	0	40
Listed building (all grades)	0	0	46
Non-designated asset	0	12	N/A
Conservation area	0	0	2
Registered Historic Parks and Gardens	0	0	3
Registered historic landscape	0	0	0

i. Palaeolithic and Mesolithic (1,000,000 – 4000 BC)

4.7.3 Evidence for human activity during the Palaeolithic period is extremely sparse across Wales as a whole, with the principal find sites being concentrated on the Carboniferous Limestone zone of the south-west coast and north-east Wales. The known settlement sites in South Wales have been discovered within caves, with no open sites yet recognised. The coast of Gower has yielded several very significant sites, but there is nothing known closer to the study area, nor have any stray finds been recovered locally. Although the Mesolithic period is somewhat better represented across Wales as a whole, known sites in South East Wales are once again concentrated in coastal areas, with few discoveries made in inland locations. No Mesolithic sites or finds are known within the study areas (Ref.4.11).

ii. Neolithic and Bronze Age (4000 – 700 BC)

4.7.4 The Neolithic period in Britain is differentiated from the preceding Mesolithic by the onset of a series of profound social, technological, and economic changes. The period coincides with the first domestication of animals and of cereal cultivation, and is accompanied by changes in material culture, including the development of ceramics and new lithic typologies. It was also a time when long-distance

connections developed across Britain, Ireland and mainland Europe, alongside mechanisms of long-distance exchange, principally of lithic artefacts (Ref.4.12 and Ref.4.13). From this period the evidence for human activity increases significantly across Wales, and it becomes possible to discuss the study areas specifically, as opposed to merely the broader regional pattern.

4.7.5 Neolithic communities were the first to leave their mark prominently on the landscape through the construction of monuments, which have traditionally dominated interpretations of the period. The emergence of monumental architecture provides evidence for new forms of social organisation and complexity, including ritualised mortuary activity involving formal burial deposition, ceremonial practices and the construction of social and cultural identities. The range of monument types present in South Wales is narrower than in areas such as Wessex, but its uplands are characterised by numerous, highly visible Neolithic and Bronze Age funerary and ritual monuments – principally but not exclusively in the form of cairns Ref.4.14 The majority of cairns were funerary monuments, although some may have served as memorials or have marked territorial boundaries. Very many appear to have been located for dramatic effect, often on ridge crests or on the saddle of hills close to well-travelled paths (Ref.4.15 and Ref.4.16). Others had utilitarian origins, having been formed by field clearance for agriculture: however, dating these latter features is difficult and some could plausibly relate to more recent times.

4.7.6 Within the study areas there are five cairns of presumed Neolithic to Bronze Age date that are designated as Scheduled Monuments. All are shown on Figure 4.13. These comprise a ring cairn on Craig Fawr (SM GM380), Pant-y-Ffa Round Cairn (SM GM201), Mynydd Pysgodlyn Round Barrow (SM GM202), Garn Goch Round Barrow (SM GM199), and a ring cairn on Tor Clawdd (SM GM353). The visual interrelationship of such monuments is a well-established theory as a key to understanding their positioning within the landscape. A study of a stone alignment at Bancbryn, located approximately 3 km north of Tor Clawdd (8 km from Electrical Connection Site Boundary; not illustrated), posits (but cannot prove) that the inter-visibility between those stones and Hartland Point, on the north Devon Coast, is significant. Incorporated into this alignment is Tor Clawdd, which is framed to the left side of the Hartland Point (Ref.4.17).

4.7.7 There is no evidence for contemporary settlement within the study areas.

iii. Iron Age (700 BC – AD 43)

4.7.8 The society that emerged in the Late Bronze Age and Iron Age was markedly different from its predecessor. The emergence of the hillfort points to a changing emphasis in the settlement pattern and to a radically altered social dynamic.

4.7.9 Although hillforts are the dominant monument of the period within the modern landscape, they are known to have existed in conjunction with wider undefended rural settlement, of which traces are mostly ephemeral and easily destroyed by cultivation. As Lynch et al. comment, ‘though overshadowed by the hillforts, the lightly enclosed or open farmstead must have shared a close relationship with their

more impressive counterparts' (Ref.4.15). Given this situation, it is reasonable to assume some level of settlement in the area, although its character and location remains unknown.

4.7.10 A probable Iron Age site is located within the 5 km study areas, located 1.35 km to the west of the Electrical Connection Site Boundary, as shown in Figure 4.12 and 4.13. This is Scheduled Monument (SM GM308), which comprises an oval enclosure measuring c. 90 m x 60 m, defined by a wide earthen bank that stands up to 1 m high in places. Its date is unproven but its morphology suggests it belongs to the Iron Age, with either a defensive and/or settlement function. The monument, now standing within woodland, is well preserved and retains considerable archaeological potential.

iv. Roman (AD 43 – AD 410)

4.7.11 The study areas are removed from the main framework of Roman forts and roads in the region, which developed during the conquest of South Wales between 47 and 77 AD (Ref.4.18and Ref.4.19). Forts were established at Coelbren, Neath, Loughor and Carmarthen, connected by a road network that can, in part, still be traced in the modern landscape (Ref.4.20). The remains of two Roman practice camps are known just outside of the 5 km study area, south of the Electrical Connection Site Boundary, on Mynydd Carn Goch (SM GM269).

4.7.12 A re-analysis of the rural evidence may challenge the widely held belief that the indigenous population was largely untouched by the Romans (Ref.4.21). However, identifiably Roman sites are entirely absent from the 1 km study area, although a continuity of native occupation must be assumed throughout this period and into the immediate post-Roman era.

v. Medieval (AD 410 – AD 1540)

4.7.13 The early medieval period in South Wales is broadly characterised by the emergence of distinct regional kingdoms, and of Christianity, with the possibility of some level of Viking depredation (Ref.4.18). Archaeologically, the period is very poorly evidenced, and no settlement sites of this era are known within the study areas – although it is possible that some Anglo-Norman and medieval Welsh sites may have earlier origins. One possible monument belonging to this period is the base of a stone cross within Llangyfelach churchyard, 1.6 km south of the Electrical Connection Site Boundary (SM GM299). Though not precisely dated, stylistically it would appear to belong to the early medieval period.

4.7.14 Evidence from the later medieval period in South Wales (i.e. after the Norman Conquest of the region) is far more abundant. No certain medieval sites are known within the Electrical Connection Site or 1 km study area, but Pen y Fedw (PRN 01525w) is suggested to have its origins in the 14th century (Ref.4.22), although the evidence supporting this assertion is unclear. Assuming some degree of continuity, some of the other post-medieval farms in the district could reasonably be assumed to have earlier origins.

4.7.15 Within the 5 km study area, the scheduled earthwork known as Cae Castell is probably medieval in date and, on the basis of its place-name, quite possibly defensive in character (SM GM439). Meanwhile, the tower of the St David's church, Llangyfelach, is the likely standing remains of a former 14th century church that stood within the curtilage of the present churchyard (LB 26236).

4.7.16 The present-day agricultural field pattern was largely established by the beginning of the 18th century, as evidenced by the 2":1 mile map of Glamorgan and Monmouthshire (1812-14; Ref.4.23). Of particular interest on this map are the hedgerows identified in this Report as AB03 and AB04, both of which are within the Project Site Boundary, but outside of the Electrical Connection Site. The date at which the field pattern as a whole began to develop is not known, but it is possible that some parts may have medieval origins.

vi. Post-medieval (AD 1540 – AD 1901)

4.7.17 Within the 1 km study area, the earliest forms of post-medieval remains appear to be predominately of domestic and agricultural purpose. One example (albeit immediately outside the 1 km study area) is Cynghordy Fawr (PRN 02750w), which is located in the north-east of the study area. This building is fairly typical of the architectural style of this period, comprising a 17th-century longhouse with a courtyard and further ranges including a stable block and granary.

4.7.18 George Yates' Map of Glamorgan, dated 1799 (Ref.4.24), shows 'Abergelly Fach' (AB02) as an isolated farm building, disconnected from a north/south aligned lane north of the Electrical Connection Site. A map of Glamorganshire (1812-14; Ref.4.23) depicts the same farm as comprising two north-east/south-west aligned rectangular buildings set within their own grounds, and connected to the existing north/south aligned lane via a short driveway. To the east of AB02 is the farmstead of 'Abergelly-fawr' (AB01), featuring at least two buildings and an associated connecting lane to the north. The remaining land is shown as an enclosed field system, which includes boundaries AB03 and AB04, located immediately north of Abergelly-fach.

4.7.19 By the time of the surveying of the Llangyfelach Tithe Map of 1838 (Ref.4.25), new field boundaries had been created and the fields made smaller and more irregular in shape. Boundaries AB03 and AB04 remained intact, forming the southern boundary of three irregular fields to the east of 'Abergelly fach' (AB01). The field systems depicted on the tithe map can also been seen on Ordnance Survey (OS) map of 1883-1884 (Ref.4.26). By this time 'Abergelli-fach' (AB02) had expanded, comprising a farmstead of at least six buildings. The most significant development is the establishment of a large plantation in north of the Electrical Connection Site. The subsequent OS edition of 1897 (Ref.4.27) names the plantation as 'Abergelli-fach Plantation'. A quarry (PRN 01349w) is depicted for the first time, and is labelled as a 'gravel pit' immediately west of AB02.

4.7.20 In the early post-medieval period the population of the larger Swansea area began to decline as the administrative centre for the region moved to Cardiff (Ref.4.28). This decline reversed in the early 18th century as the transport of materials for use

in industry such as coal and metals along the River Tawe became essential. The River Tawe was a vital trade route during the 18th and 19th centuries at the time when Swansea became renowned as a copper smelting centre with such works as the Hafod Copperworks (PRN 05956w) and the Landore Copperworks (PRN 01586w). Swansea's copper industry rose to prominence in the 18th century. Llangyfelach Copperworks (NPRN 34094), established in 1717, was the first of the major Swansea copperworks; its site is located beyond the 5 km study area, at the junction of Cwm Level Road and Neath Road to the north of Landore viaduct (Ref.4.29).

4.7.21 No copper-working sites are known within the 1 km study area, but several sites attest to the supporting coal-mining industries which grew up in Swansea's hinterland. Collieries established during this period within the study areas include Bryn Whilach Colliery (PRN 01340w) and an unnamed colliery at Mawr (PRN 01345w).

4.7.22 Industrial transport networks are also evidenced. In 1798, the Swansea Canal was opened, serving to increase the industrial capacity of the area, such that at one stage in the 19th century, three quarters of the world's copper ore was being transported to Swansea for processing (Ref.4.30). The century following the canal's construction saw the city's population grow from approximately 10,000 people to 95,000 people. Transport routes were established over land not only to supply the copperworks with raw materials but also to link the mines and collieries with the works and ports. Within the 5 km study area these include a tramroad (PRN 05950.0w) linking Bryn-whilach and Pen-rhiwfelen coal pits to Clydach Road, a mineral railway (PRN 03017.0w) situated within the community of Llangyfelach, and now a dismantled railway (PRN 02916.0w) serving Felindre Pit on the east side of the Lliw Valley.

vii. Modern (1901-present)

4.7.23 Due to the availability of cheaper copper and coal from overseas, the industrial prosperity of the South Wales region began to decline in the early 20th century (Ref.4.29). Throughout this period Swansea still remained a centre of industry within South Wales, with a population at the time of the outbreak of World War II of 167,000 people (Ref.4.31). The Velindre works (PRN 02905w; 1.4 km south of the Electrical Connection Site Boundary) was built as part of a post-war development programme begun after the Steel Company of Wales was formed in 1947. In 1952 the company started work on the construction of a cold reduction and electrolytic tinning plant at the site near Llangyfelach. The Velindre works began production in October 1956. The main building, the Mill Bay, was of very significant size: 1440 feet (ft) long, 100 ft wide and 66 ft high. It was closed down in September 1989 and its buildings were subsequently demolished.

4.7.24 One historic asset, 0.61 km to the north of the Electrical Connection Site Boundary originates in this period: Abergelli Colliery (NPRN 80607). When first shown on the OS map of 1931 (Ref.4.32), it comprised a water tank, engine houses, a slant (slanted shaft), and a tramway or railway following a course from the slant to a slag

heap at the north end of the colliery site. The colliery worked the Four Feet and Graigola (also known as the Brynwhilach) coal seams and was a registered colliery from 1926 to 1960 The owner, up to nationalisation, was the Graigola Merthyr Co. Ltd and it was worked in association with Clydach Merthyr Colliery located at Craig Cefn Parc, approximately 2.75 km north-east of the Electrical Connection Site Boundary (Ref.4.33).

4.7.25 Aerial photographs of the area taken in 1970 (Ref.4.34) show the addition of an electrical substation to the south-west of Abergelli Farm. The next significant changes to the Electrical Connection Site are shown on aerial photographs taken in 2008; these reflect the construction of the Felindre Gas Compressor Station. The photographs show that the works included the installation of the Oil Pipeline from the road to the north of Abergelli farm, traversing the fields to the east and south of the farm, to the Substation, which extends over much of the Abergelli fach Plantation. As a part of this development, a section of historic field boundary AB03 was removed for the pipeline easement.

4.7.26 Aerial photographs of 2010 show this complex being extended southwards. By 2015, much of the land to the east of the farm had been utilised for solar panels (Ref.4.34).

viii. Historic landscape characterisation

4.7.27 The Electrical Connection Site area lies in Landmap Historic Landscape Aspect Area H27 (Gower Supraboscus Agricultural). This is characterised by an irregular fieldscape with hedgerows and hedgebanks, reflecting a history of gradual and piecemeal enclosure in the valleys and foothills throughout the medieval and post-medieval periods. There is some evidence for enclosure in the pre-Norman period, and the process continued into the second half of the 19th century. Some unenclosed land and woodland remains. Limited industrial activity (mainly mining) also took place here in the 19th century and has left residual traces in the landscape. The settlement pattern is predominantly of dispersed character, but ribbon developments occur in areas of former industrial activity.

ix. Previous Investigations

4.7.28 A watching brief was undertaken by Cambrian Archaeological Projects (Ref.4.35) during groundworks associated with the construction of a high pressure gas pipeline between Felindre and Brecon. The watching brief was conducted through the fields to the east of Abergelli Farm, which is outside of the Electrical Connection Site, but within part of the Project Site Boundary. A single pit was noted and revealed evidence of *in situ* burning, which was potentially the remains of a hearth or furnace. It measured 1.5 m in diameter and was 0.2 m in depth. No date was ascertained for this feature. The site of this feature was located to the south of Abergelli farm at NGR SN 65136 01433, approximately 295 m outside of the Electrical Connection Site Boundary.

4.7.29 Archaeological watching briefs undertaken by Cotswold Archaeology during the construction of the Oil Pipeline revealed two undated charcoal spreads, north of

the Electrical Connection Site Boundary, but within the wider Project Site Boundary. Elsewhere, two pits with charcoal and burnt stone were exposed, and were associated with a spread of burnt material containing two worked, undated, flints. An evaluation at Waun y Garnwen outside of the 1 km study area to the north and forming part of the same scheme of works, recorded four probable former field boundaries (Ref.4.36).

4.7.30 A geophysical survey in the area immediately to the east of Abergelli Farm was undertaken in advance of the installation of a solar energy farm. The works identified probable soil-filled features in most of the study areas, and concluded that although some of the anomalies were weak or diffuse, most have potential to reflect the remains of archaeological features (Ref.4.37).

4.7.31 On the south-east fringe of the 1 km study area, a watching brief was undertaken by Oxford Archaeology within the grounds of Morriston Hospital prior to the development of new parking facilities. A linear field boundary and ornamental features relating to the garden of the former Maes y Gwernen Hall were recorded (Ref.4.38).

b) Potential Environmental Effects

4.7.32 Construction and operation of the Electrical Connection will not impact on any known historic asset. No known historic assets exist within its footprint.

4.7.33 A WSI will be prepared and a watching brief will be implemented during construction. In the event that any archaeology is discovered during construction it will be excavated, recorded and reported in line with the WSI as set out in CH02 of the Mitigation register (Appendix 2.1).

4.8 Traffic, Transport and Access

a) Baseline Conditions

4.8.1 In order to determine the baseline conditions for the local highway network, data was collected from numerous sources, as summarised in Table 4.18.

Table 4.18: Data Collection

Subject Area	Source
Local Highway Network	Site visit (21/11/2017) / OS mapping / online desktop review.
Highway Operational Conditions	Traffic surveys undertaken by Sky High (now Tracsis) in 2014.
Walking, Cycling and Public Transport	Site visit (21/11/2017)/ online desktop review (PRoW mapping obtained from the CCS, public transport timetables).
Road Safety	Personal Injury Collision (PIC) data obtained from the CCS.

4.8.2 The data was used to determine the:

- Weekday AM and PM peak hours for use in the assessment;
- Locations of concern in terms of highway operation;
- Collision history within the local highway network; and
- Opportunities for sustainable travel.

i. Local Highway Network

4.8.3 The Electrical Connection Site is served by the existing Access Road from the B4489, which is privately maintained and unlit. The width of the existing Access Road varies along its length between 3.5 m and 7.5 m, and is generally bordered by trees and intermittent hedgerows. The existing Access Road connects to the B4489 via a simple priority junction. This is characterised by large radii on the minor arm (the Access Road) to accommodate Heavy Goods Vehicle (HGV) movements.

4.8.4 The B4489 routes between the village of Felindre to the north (approximately 2.3 km from the existing Access Road) and the M4 Junction 46 to the south (approximately 1.8 km from the existing Access Road). The B4489 is subject to a 40 miles per hour (mph) speed limit at its junction with the existing Access Road. At this location, the road has a 5.5 m wide carriageway and is unlit. Approximately 330 m to the north of the existing Access Road, the B4489 becomes subject to the national speed limit. The B4489 continues a further 1.7 km north where it connects to Rhyd-y-Pandy Road at a priority junction. This section of the B4489 is unlit and ranges in width between 4.5 m and 5.5 m, with numerous passing places. The junction with Rhyd-y-Pandy Road and its approaches are subject to a 30 mph speed limit. Rhyd-y-Pandy Road routes east for 1.6 km where it passes the northern extent of the Project Site Boundary. This section of Rhyd-y-Pandy Road is unlit and ranges in width between 4.5 m and 5.5 m, with numerous passing places. It is subject to a 30 mph speed limit, increasing to the national speed limit around 900 m east of its junction with the B4489. It also serves the Felindre Water Treatment Works.

4.8.5 Approximately 475 m to the south of the existing Access Road, the B4489 is street lit. A further 75 m south from this point, the B4489 forms a three-arm roundabout with the access to the Felindre Park and Share.

4.8.6 The B4489 forms a dumbbell roundabout with the M4 Junction 46. The northern dumbbell roundabout junction comprises three arms; the B4489 and the eastbound on/off-slips of the M4. The southern dumbbell roundabout junction comprises six arms; the A48 (three arms), the B4489 Swansea Road, and the westbound on/off-slips of the M4. The south-eastern arm of the A48 forms a mini-roundabout junction with Pant Lasau Road approximately 90 m southeast of the southern dumbbell roundabout. These junctions are subject to a 40 mph speed limit and are lit.

4.8.7 For the purpose of this Report, the Local Highway Network has been segregated into the following key links:

- Link 1* – Rhyd-y-Pandy Road, between the AGI Access and the B4489;
- Link 2* – B4489, between Rhyd-y-Pandy Road and the existing Access Road;
- Link 3 – B4489, between the existing Access Road and the Felindre Park and Share;
- Link 4 – B4489, between the Felindre Park and Share and the M4 Junction 46;
- Link 5 – M4 eastbound on-slip;
- Link 6 – A48, between the northern and southern dumbbell roundabouts of the M4 Junction 46;
- Link 7 – M4 westbound off-slip;
- Link 8 – A48, between the M4 Junction 46 and the A48/Pant Lasau Road mini-roundabout;
- Link 9 – Pant Lasau Road;
- Link 10 – A48, southeast of the A48/Pant Lasau mini-roundabout;
- Link 11 – B4489, south of the M4 Junction 46; and
- Link 12 – A48, southwest of the M4 Junction 46.

**These links are associated with access to the AGI during operation and are therefore not relevant to the assessment of the Electrical Connection. However, they have been provided in this report to give representative baseline conditions of the local highway network.*

4.8.8 The local highway network is shown on Figure 4.14 and labelled with the links.

ii. Highway Operational Conditions

4.8.9 An Automatic Traffic Count (ATC) survey was undertaken on the B4489 between the existing Access Road and the roundabout junction with the Felindre Park and Share. The survey was undertaken between Thursday 16th October 2014 and Wednesday 22nd October 2014. The traffic flow information for an average weekday is summarised in Table 4.19. Growth factors have been applied to the 2014 data to represent conditions in 2017.

Table 4.19: Summary Traffic Flow Information – B4489

Time Period	Direction	Total Vehicles	Number of HGVs	HGV%
Weekday AM Peak Hour (07:45-08:45)	Northbound	44	1	2%
	Southbound	88	2	2%
	Two-Way	132	2	2%
Weekday PM Peak Hour (16:30-17:30)	Northbound	55	0	0%
	Southbound	30	0	0%
	Two-Way	85	0	0%
Weekday 24-Hour	Northbound	476	4	1%
	Southbound	510	8	2%
	Two-Way	987	12	1%

Note: Summation errors due to rounding.

4.8.10 Table 4.19 shows that, on an average weekday, the B4489 carries approximately 130 vehicles during the AM peak hour, 90 vehicles during the PM peak hour, and 1,000 vehicles over the 24-hour period. HGVs account for no more than 2% of total traffic.

4.8.11 Junction Turning Count surveys were also undertaken on Thursday 16th October 2014 at the following junctions in the local highway network:

- M4 Junction 46 Northern Dumbell Roundabout;
- M4 Junction 46 Southern Dumbell Roundabout; and
- A48/Pant Lasau Road Mini-Roundabout.

4.8.12 The traffic survey data is reproduced in Appendix 7.1. The 2014 traffic flows at the surveyed locations during the weekday AM and PM peak hours are shown on Figures 4.15 and 4.16 respectively. Growth factors have been applied to represent traffic flows in 2017, as shown on Figures 4.17 and 4.18 respectively.

4.8.13 The surveyed junctions have been modelled using the Transport Research Laboratory (TRL) software program 'Junctions 9'. They have been modelled as a linked network in view of their proximity to each other. This has required the use of the lane simulation tool, which only provides outputs for queuing and delay. The capacity assessment results for 2017 during the weekday AM and PM peak hours are summarised in Table 4.20. These are shown for the entry arms to the network (listed clockwise from the northern arm of the B4489) and exclude the internal links. The capacity assessment output reports are reproduced in Appendix 7.2.

Table 4.20: 2017 Capacity Assessment Results

Entry Arm	Weekday AM Peak Hour		Weekday PM Peak Hour	
	Queue (Vehicles)	Delay (Secs/ Vehicle)	Queue (Vehicles)	Delay (Secs/ Vehicle)
B4489 (North)	2	34	1	6
M4 WB Off-Slip	211	884	2	6
Pant Lasau Road	6	43	25	134
A48 (Southeast)	3	17	75	372
B4489 (South)	36	171	2	8
A48 (Southwest)	59	638	1	6
M4 EB Off-Slip	113	823	1	6

4.8.14 Table 4.20 shows that, during the AM peak hour, the highest levels of queuing and delay are experienced on the M4 eastbound and westbound off-slips, followed by the A48 (Southwest) and B4489 (South). During the PM peak hour, levels of queuing and delay are significantly lower across the junction, with Pant Lasau Road and the A48 (Southeast) experiencing the highest levels of queuing and delay.

4.8.15 On-site observations carried out by AECOM during the AM peak hour on Tuesday 21st November 2017 suggests that the M4 Junction 46 is operating well within capacity. At the time of the observational visit, it was apparent that the queues reported by the modelling were not present at that time. This is particularly the case for the M4 off-slips, which appeared to be free flowing or with minimal queuing. The modelling is therefore considered to represent a 'worst-case' of existing conditions at the junctions.

4.8.16 The analyses carried out as part of this section is based upon the previously observed traffic flows and queues and will therefore be a robust assessment of this part of the network.

iii. Road Safety

4.8.17 A review of PIC data has been undertaken to determine whether there are any locations on the local highway network with poor collision records.

4.8.18 The data was obtained from CCS for the three-year period from 1st October 2014 to 30th September 2017 (the most recent three-year period for which data was available). The reports for each of the PICs recorded on links 1 - 12 and corresponding junctions together with a plan showing the location of each PIC (these are not included in this Report for data protection reasons).

4.8.19 A total of 25 PICs were recorded over the three-year period, of which three were 'serious'. The remaining 22 PICs were all 'slight'. No 'fatal' PICs were recorded . For ease of analysis the PICs have been separated into those occurring at junctions and on links. The following account of the events which led to a PIC was taken from the records provided.

PICs at Junctions

4.8.20 One 'slight' PIC was recorded at the M4 Junction 46 Northern Dumbbell Roundabout. This involved a collision between a vehicle entering the roundabout and a vehicle already on the roundabout.

4.8.21 Four 'slight' PICs were recorded at the A48/Pant Lasau Road Mini-Roundabout. These all involved a collision between a vehicle entering the mini-roundabout and a vehicle already on the roundabout. These types of collisions are not uncommon on mini-roundabouts, due to the limited separation between entry arms. Further analysis has been undertaken of the listed causation factors for the PICs (these cannot be explicitly stated here for data protection reasons); this has not identified any highway defects contributing to these PICs.

4.8.22 One ‘serious’ PIC was recorded at the M4 Junction 46 Southern Dumbbell Roundabout. This involved a vehicle on the M4 westbound off-slip losing control and colliding with a tree on the central roundabout island.

PICs Recorded on Links

4.8.23 One ‘slight’ PIC was recorded on the B4489, south of its junction with Rhyd-y-pandy Road. This involved a collision between two vehicles on a bend; one vehicle was travelling northbound, and the other vehicle was travelling southbound.

4.8.24 Three ‘slight’ PICs were recorded on the M4 eastbound, between the off and on slips of the M4 Junction 46. Two of these PICs involved vehicles losing control, and the remaining PIC involved a rear-end shunt collision.

4.8.25 Two ‘slight’ PICs were recorded on the M4 eastbound, east of the M4 Junction 46, both of which involved rear-end shunt collisions.

4.8.26 Two ‘slight’ PICs were recorded on the M4 westbound, east of the M4 Junction 46. These involved a rear-end shunt collision, and a collision between two vehicles as one vehicle was changing lanes.

4.8.27 One ‘slight’ PIC was recorded on the M4 westbound off-slip. This involved a vehicle losing control and leaving the carriageway.

4.8.28 Three ‘PICs’ were recorded on the M4 westbound, between the off and on slips of the M4 Junction 46. The ‘serious’ PIC involved a vehicle losing control after entering the drainage system. The ‘slight’ PICs involved a rear-end shunt collision, and a vehicle losing control and colliding with the central barrier.

4.8.29 One ‘slight’ PIC was recorded on the M4 eastbound, west of the M4 Junction 46. This involved a rear-end shunt collision.

4.8.30 Two ‘slight’ PICs were recorded on the M4 eastbound off-slip. One of the PICs involved a vehicle losing control, colliding with the barrier and overturning. No description was provided for the remaining PIC.

4.8.31 One ‘slight’ PIC was recorded on the A48 between the M4 Junction 46 Southern Dumbbell Roundabout and the A48/Pant Lasau Road Mini-Roundabout. This involved a vehicle travelling southeast-bound entering the opposite side of the carriageway and colliding with an oncoming vehicle.

4.8.32 One ‘serious’ PIC was recorded on Pant Lasau Road, northeast of the A48/Pant Lasau Road Mini-Roundabout. This involved a collision between a vehicle and a pedestrian that had entered the carriageway.

4.8.33 One ‘slight’ PIC was recorded on the A48, southeast of the A48/Pant Lasau Road Mini-Roundabout. This involved a collision between a vehicle performing a u-turn and another vehicle.

4.8.34 One ‘slight’ PIC was recorded on the A48, southwest of the M4 Junction 46. This involved a collision between a vehicle pulling off from the side of the carriageway and a vehicle travelling southwest-bound.

Summary

4.8.35 Overall, the analysis of the PIC data and listed causation factors has not identified any existing highway safety issues in the local highway network. Where PICs have been recorded, these have been identified as being as a result of causation factors relating to driver/road user error and weather conditions. No causation factors relating to highway defects have been reported in the PIC data.

iv. Walking and Cycling

4.8.36 The walking and cycling facilities and PRoW are shown on Figure 4.19.

4.8.37 There are no footways that serve the Electrical Connection Site. The nearest footways are on the B4489, approximately 475 m south of the existing Access Road (on the approach to the junction with the Felindre Park and Share. This footway continues to the M4 Junction 46. The 500 m section of the footway to the north of the M4 Junction 46 is separated from the carriageway edge by a barrier. At the M4 Junction 46 the footways continues south along the east side of the carriageway, serving the southern arms of the southern dumbbell roundabout, with dropped kerbs and tactile paving to facilitate crossing movements across entry arms.

4.8.38 There are no formal cycling routes in the vicinity of the Electrical Connection Site. Part of the B4489 is identified as an ‘advisory cycling route’ on the CCS’s cycle map. This covers the section of the B4489 that routes north from the existing Access Road to Felindre and to a point approximately 475 m south of the Access Road.

4.8.39 There are numerous PRoW crossing/in the vicinity of the Electrical Connection Site. Footpaths LC34 and LC117 cross the existing Access Road (and the new section of Access Road) at points approximately 350 m and 1.3 km from the B4489. Footpath LC35B passes close to the Electrical Connection Site Boundary to the north.

v. Public Transport

4.8.40 The nearest bus stop to the Electrical Connection Site is the ‘Pant Lasau Cross’ stop located on Mynydd Gelli Wastad Road. It is situated approximately 1.1 km to the southeast of the Electrical Connection Site and can be accessed via Footpath LC117. It provides access to Service 141 which routes between Gorseinon and Morriston.

4.8.41 Service 142, passes to the north of the Electrical Connection Site Boundary, routeing between Morriston and Garnswllt. The nearest stop that provides access to this service is the ‘Lliw Reservoirs’ stop located on Rhyd-y-pandy Road. This is situated to the east of Felindre and approximately 1.4 km to the northwest of the Electrical Connection Site Boundary. There is no footway between the Electrical Connection Site and this bus stop. This service is operated by Community Transport for the Dulais, Afan, Neath, Swansea and Anman Valley areas. There are three to four services per day in each direction, although these can generally only be pre-booked.

4.8.42 There are no railway stations in the vicinity of the Electrical Connection Site. Llansamlet railway station is situated approximately 5.5 km southeast of the Electrical Connection Site Boundary, accessible by car via the A48 (from M4 Junction 44 and 46). Swansea railway station is a further 7 km from the Electrical Connection Site Boundary; this is a key local transport hub and is more easily accessible by public transport. Swansea railway station is managed by Arriva Trains Wales. There are four services daily from Swansea to Shrewsbury; an hourly service from Swansea to Manchester Piccadilly, which calls at Cardiff Central; and a total of two to three services hourly from Swansea to Cardiff Central. Great Western Railway also provides services from Swansea to London Paddington, calling at Bristol Parkway.

4.8.43 Overall, the opportunities to access the Electrical Connection Site by public transport are limited, and it is therefore considered that, for the purposes of this Report, no trips by construction, maintenance and permanent staff will be undertaken by these modes.

vi. Parking

4.8.44 Felindre Park and Share is accessed from the B4489, approximately 550 m south of the existing Access Road. It is located on the site of the proposed Felindre Business Park. It has capacity for 480 spaces and its use is encouraged for employees of the DVLA Headquarters in Clase. A shuttle bus service runs between the Felindre Park and Share and the DVLA. There are no other parking facilities in the local highway network. The Felindre Park and Share is understood to be managed by the DVLA and will not be available for use by the Project.

b) Potential Environmental Effects

i. Construction

Traffic Generation

4.8.45 The peaks in construction staff traffic and HGV traffic for the Electrical Connection are shown for the weekday AM and PM peak hours and 24-hour period in Table 4.21.

Table 4.21: Electrical Connection Peak Traffic Generation

Time Period	Vehicle Type	Arrivals	Departures	Total
Weekday AM Peak Hour (07:45-08:45)	Light Vehicles (Staff)	2	0	2
	HGVs	2	0	2
	Total	**4**	**0**	**4**
Weekday PM Peak Hour (16:30-17:30)	Light Vehicles (Staff)	0	2	2
	HGVs	0	2	2
	Total	**0**	**4**	**4**
Weekday 24-Hour	Light Vehicles	2	2	4

Time Period	Vehicle Type	Arrivals	Departures	Total
	(Staff)			
	HGVs	3	3	6
	Total	**5**	**5**	**10**

Severance, Pedestrian Delay, Pedestrian Amenity, Fear and Intimidation – Traffic Flows

4.8.46 Table 4.22 and Table 4.23 show the two-way total link flows during the weekday AM and PM peak hours respectively for the '2022 Baseline' and '2022 Baseline + Electrical Connection Construction Traffic' scenarios, the difference between the two and the percentage change.

Table 4.22: 2022 Two-Way Total Traffic Flows (All Vehicle) (Electrical Connection) – Weekday AM Peak Hour (07:45-08:45)

Link No.	2022 Baseline	2022 Baseline + Electrical Connection Construction Traffic	Difference	% Change
1	-	-	+0	+0%
2	140	140	+0	+0%
3	140	144	+4	+2%
4	382	385	+4	+1%
5	415	415	+0	+0%
6	1,223	1,225	+2	+0%
7	876	877	+1	+0%
8	2,334	2,334	+0	+0%
9	1,365	1,365	+0	+0%
10	1,239	1,239	+0	+0%
11	1,112	1,113	+0	+0%
12	938	938	+0	+0%

Table 4.23: 2022 Two-Way Total Traffic Flows (All Vehicle) (Electrical Connection) – Weekday PM Peak Hour (16:30-17:30)

Link No.	2022 Baseline	2022 Baseline + Electrical Connection Construction Traffic	Difference	% Change
1	-	-	+0	+0%
2	90	90	+0	+0%

Link No.	2022 Baseline	2022 Baseline + Electrical Connection Construction Traffic	Difference	% Change
3	90	93	+4	+4%
4	242	245	+4	+1%
5	842	843	+2	+0%
6	1,239	1,241	+2	+0%
7	606	606	+0	+0%
8	2,023	2,024	+1	+0%
9	950	950	+0	+0%
10	1,221	1,222	+0	+0%
11	1,124	1,124	+0	+0%
12	948	948	+0	+0%

Note: Summation errors due to rounding.

4.8.47 The maximum percentage change in the volume of traffic as a result of the Electrical Connection, as reported in Table 4.22 and Table 4.23 is +4%. This is for link 3, B4489, between the existing Access Road and the Felindre Park and Share; during weekday PM peak hour. This level of increased traffic flows on pedestrian experience is not significant.

4.8.48 Table 4.24 shows the two-way HGV link flows during the weekday 24-hour period in 2022 both without and with the Electrical Connection construction traffic, the difference between the two and the percentage change.

Table 4.24: 2022 Two-Way HGV Traffic Flows (Electrical Connection) – Weekday 24-Hour

Link No.	2022 Baseline	2022 Baseline + Electrical Connection Construction Traffic	Difference	% Change
2	13	13	+0	+0%
3	13	19	+6	+46%
4	154	160	+6	+4%

4.8.49 The level of increase in HGV traffic associated with the Electrical Connection on the pedestrian experience on these links is not significant. Minimal pedestrian movement has been observed at these locations, which is typical given the nature of the strategic access junction. It is also likely that any pedestrians at these locations will already be accustomed to the levels of general traffic and HGVs.

4.8.50 No additional mitigation is proposed however traffic management will be covered within a CTMP and CSTP, T03 – T05 of the Mitigation Register (Appendix 2.1).

Driver Delay

4.8.51 Table 4.25 and Table 4.26 show the driver delay at the junction network during the weekday AM and PM peak hours respectively in 2022 both without and with the Electrical Connection construction traffic.

Table 4.25: Capacity Assessment Results (Electrical Connection) – Weekday AM Peak Hour (07:45-08:45)

Entry Arm	Delay (Seconds/Vehicle)			% Change
	2022 Baseline	2022 Baseline + Electrical Connection Construction Traffic	Difference	
A	38	38	+0	+0%
B	1,040	1,028	-12	-1%
C	54	58	+4	+7%
D	20	21	+1	+5%
E	287	297	+10	+3%
F	859	870	+11	+1%
G	1,030	1,023	-7	-1%

Note: A = B4489 (North). B = M4 WB Off-Slip. C = Pant Lasau Road. D = A48 (Southeast). E = B4489 (South). F = A48 (Southwest). G = M4 EB Off-Slip.

Table 4.26: Capacity Assessment Results (Electrical Connection) – Weekday PM Peak Hour (16:30-17:30)

Entry Arm	Delay (Seconds/Vehicle)			% Change
	2022 Baseline	2022 Baseline + Electrical Connection Construction Traffic	Difference	
A	6	6	+0	+0%
B	7	7	+0	+0%
C	220	231	+11	+5%
D	552	571	+19	+3%
E	9	9	+0	+0%
F	6	6	+0	+0%
G	7	7	+0	+0%

Note: A = B4489 (North). B = M4 WB Off-Slip. C = Pant Lasau Road. D = A48 (Southeast). E = B4489 (South). F = A48 (Southwest). G = M4 EB Off-Slip.

4.8.52 Table 4.25 shows that, during the AM peak hour, the entry arms of Pant Lasau Road, the B4489 (South) and A48 (Southwest) will experience a change in junction delay of up to 7%, which is not considered significant. The M4 eastbound and westbound off-slips will experience decreases in delay; this is as a result of changes in the balance of traffic flows at the junction, which will result in more gaps for traffic exiting from this arm as priorities are changed. The B4489 (North) and A48 (Southeast) will experience very little change, which is not significant.

4.8.53 Table 4.26 shows that, during the PM peak hour, all entry arms will experience a little to no change in delay, with the exception of Pant Lasau Road and the A48 (Southeast), which will experience an increase of up to 5 and 3% respectively, which is not considered significant.

4.8.54 No additional mitigation is proposed, but management measures to minimise driver delay will be included within a CTMP and CSTP, T03 – T05 of the Mitigation Register (Appendix 2.1).

ii. Operation

4.8.55 The traffic generation of the Electrical Connection during the operational phase is expected to be negligible.

4.9 Geology and Ground Conditions

a) Baseline Conditions

4.9.1 The baseline geology, ground conditions and hydrogeology data of the Electrical Connection Site has been gathered from the following sources:

- Landmark Information Group Envirocheck Report (October 2017) (Appendix 8.1);
- Preliminary Geo-Environmental Risk Assessment from the Abergelli Power Project (Appendix 8.2);
- BGS Digital Geological map of Great Britain at 1:50,000 scale (Ref.4.39); and
- A site walkover undertaken in July 2014.

i. Made Ground

4.9.2 There is no Made Ground indicated within the Electrical Connection Site, based on published BGS records. Made Ground is only considered to be likely to be present an areas associated with previous development such as the landfill and colliery. It may also be present if the landowner undertook land levelling. If any Made Ground is present within the Electrical Connection Site, its composition and provenance would be unknown.

ii. Superficial Geology

4.9.3 There are two types of superficial deposits identified across the Electrical Connection Site comprising: glacial diamicton till and glaciofluvial deposits of sand and gravel. The glaciofluvial deposits are located at the western end of the Electrical Connection while the rest of the length is till.

4.9.4 The BGS indicates that there are no boreholes located in Electrical Connection Site, however there are three immediately to the north, within the wider Project Site Boundary, one of which is available to view online and presented in Appendix 8.3. The borehole log is located east of Abergelli Farm in an area mapped as being underlain by Devensian glaciofluvial deposits of sand and gravel.

4.9.5 The borehole log indicates superficial deposits comprising yellow brown sandy gravelly clay down to 6.4 metres below ground level (mbgl), overlying grey brown clayey gravelly sand, clayey sand and sandy clay down to 15.8 mbgl considered to be representative of glaciofluvial deposits. These are underlain by firm yellow clay becoming stiff grey gravelly clay described in the log as possible boulder clay which is likely to be glacial till; proven to a maximum depth of 16.8 mbgl. Traces of coal were identified at 10.7 mbgl within the clayey sand.

iii. Bedrock Geology

4.9.6 The bedrock geology underlying the Electrical Connection Site consists of the Grovesend Formation of the South Wales Upper Coal Measures Formation, comprising argillaceous mudstones and siltstones, with well-developed coals, and minor lithic sandstones. The BGS Lexicon of Named Rock Units (Ref.4.40) indicates that the Grovesend Formation is the youngest unit found in the South Wales coalfield.

4.9.7 The north eastern corner of the 1 km search buffer surrounding the Electrical Connection Site is underlain by the Swansea Member, comprising green-grey Pennant Sandstone, with thin mudstone/siltstone and seatearth interbeds and (mainly thin) coals. This geological formation is overlain conformably by the Grovesend Formation.

4.9.8 The Preliminary Geo-Environmental Risk Assessment (Appendix 8.2) indicates that there was a ‘Slant’ (inclined shaft or level) identified at Abergelli Colliery, which provided access to both the Graigola and Swansea Four Feet coal seams.

iv. Soils and Agriculture

4.9.9 The soil and agriculture land classifications are discussed in the Preliminary Geo-Environmental Risk Assessment (Appendix 8.2) and confirmed by NATMAP Soilscapes indicate the following (Ref.4.41):

- There are two different soil classification areas across the Electrical Connection Site. The predominant soil classification is described as “freely draining, slightly acid loamy soils”. The soils are of “low fertility”, with “arable and grassland” land cover and precipitation “drains to local groundwater and rivers”. There is

potential for groundwater contamination with these soils, comprising nitrate, siltation and nutrient enrichment of streams from soil erosion.

- The northern most areas of the Electrical connection are within areas where the soil classification is described as “slowly permeable, wet, very acidic upland soils with a peaty surface”. The soils are described as “low fertility” and land cover is described as “moorland rough grazing and forestry”. The precipitation “drains to the stream network”. Overgrazing of this soil could lead to accelerated run-off and soil erosion.
  - From the LLe Geo-Portal Predictive ALC Map (Ref.4.42) the ALC for the land within the Electrical Connection Site is Grade 4 (“poor quality agricultural land”).”.
- The Electrical Connection Site is known to be utilised as improved grazing for sheep and horses, with small areas of marshy grassland and woodland copses interspersing improved grassland.

v. Ground Workings and Mineral Resources

4.9.10 The Envirocheck Report (Appendix 8.1) does not indicate the presence of any historical ground workings on the Electrical Connection Site (being within the Project Site Boundary area investigated). Within the 1 km search buffer there are three records of historical ground working features. These have all ceased production and are listed in Table 4.27. These comprise two opencast mines producing sands and gravel and one underground mine producing coal. Immediately outside of the 1 km search area there are a further five opencast mines with ceased production of sandstone.

Table 4.27: Recorded Opencast and Underground Mines

Site Name	Distance and direction	Type of site	Status	Geology and Commodity
Aber-Gelli-Fach Gravel Pit	611 m N	Opencast	Ceased	Glaciofluvial Deposits - sand and gravel
Bryn-Whilach Plantation Gravel Pit	500 m SW	Opencast	Ceased	Till - sand and gravel
Bryn-Whilach	760 m SW	Underground	Ceased	Grovesend Formation - deep coal

4.9.11 The Coal Authority Mining Report (Appendix 8.4) identified Abergelli Colliery located approximately 610 m from the closest point of the Electrical Connection Site Boundary, to the north of Abergelli Farm.

4.9.12 The Coal Authority Mining Report (dated 30 July 2014) indicated that the Electrical Connection Site is in the “likely zone of influence from workings in three seams of coal, at shallow to a depth of 380 m”. Figure 4.20 presents the mine workings from

the mine abandonment plan within the Project Site Boundary. This plan shows that the entire Project Site Boundary is influenced by mine workings.

4.9.13 As illustrated within the Coal Authority Mining Report, there is one mine and one shaft entry located - close to the Electrical Connection Site. The mine entry is located in the vicinity of Abergelli Colliery (north of Abergelli Farm). The mine shaft is located south of the Substation at (NGR 264970, 200800) adjacent to the Electrical Connection Site Boundary. There is no record of any treatment to the mine/shaft entries. These mine/shaft entries are shown on Figure 4.21: Potential Sources of Contamination and Locations of Interest. A site visit undertaken on the 12th March 2018 has confirmed that the shaft has been back filled and no open void was visible.

vi. Ground Stability/Subsidence

4.9.14 The Coal Authority Mining Report (Appendix 8.4) indicates that no notice of the risk of the land being affected by subsidence has been given under Section 46 of the Coal Mining Subsidence Act 1991.

4.9.15 Abergelli Farm has been subject to remedial works, by or on behalf of the Coal Authority under its emergency surface hazard call out procedures. No further information was provided, however two damage notices or claims for alleged subsidence damage were made in June 1995 and November 1996 both of which were rejected.

4.9.16 Geological hazards within the full Project Site Boundary have been identified in the Landmark Envirocheck Report (Appendix 8.1); these are detailed in Table 4.28.

Table 4.28: Geological Hazards

Geological Hazard		Hazard Potential:
Stability Hazards	Collapsible Ground	No hazard to very low
	Compressible Ground	No hazard to high
	Ground Dissolution	No hazard
	Landslide Ground	Very low to low
	Running Sand Ground	No hazard to low
	Shrinking or Swelling Clay Ground	No hazard to very low
Radon Affected Areas	Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level).	
Radon Protection Measures	No radon protective measures are necessary in the construction of new dwellings or extensions	

4.9.17 The high compressible ground hazard is assumed to be associated with an arear of peat located in the north east of the Generating Equipment Site and to the north west of Abergelli Farm outside of the Electrical Connection Site Boundary. This hazard therefore does not apply to the Electrical Connection.

vii. Hydrogeology

4.9.18 The superficial glaciofluvial deposits and the bedrock geology are both classified as Secondary A Aquifers. Secondary A Aquifers are defined as '*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*.'

4.9.19 The superficial glacial till deposits are classed as Unproductive Strata, defined as 'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'.

4.9.20 The Landmark Envirocheck Report (Appendix 8.1) has identified no groundwater abstraction licences associated with the Electrical Connection Site or wider Project Site Boundary. There is only one licence located within 100 m of the Project Site Boundary, recorded 56 m to the north-east for a well at Abergelli Farm, licence number 22/59/4/0027 dated February 1993, for general farming and domestic use. There are a further seven licensed groundwater abstractions within 1 km of the Project Site Boundary all for general farming and domestic use and a further 21 within 2 km of the Project Site Boundary. CCS has also identified a number of private water supplies located within the same search areas.

4.9.21 The Electrical Connection Site does not lie within a groundwater Source Protection Zone (SPZ).

4.9.22 The Landmark Envirocheck identifies the groundwater vulnerability classification of the soils beneath the Electrical Connection Site and surrounding area. These vary between Low (L) to High (H) Leaching Potentials (classifications of L, H1, H3, I1 and U). These classifications are described as follows:

- L: Soils in which pollutants are unlikely to penetrate the soil layer because water movement is largely horizontal or they have large ability to attenuate diffuse pollutants. Lateral flow from these soils contributes to groundwater recharge elsewhere in the catchment.
- H1: Soils which readily transmit liquid discharges because they are either shallow or susceptible to rapid by-pass flow directly to rock, gravel or groundwater.
- H3: Coarse textured or moderately shallow soils which readily transmit non-absorbed pollutants and liquid discharges but which have some ability to attenuate absorbed pollutants because of their large clay or organic matter contents.
- I1: Soils which can possibly transmit a wide range of pollutants.
- U: Soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst case vulnerability classification (H) assumed, until proved otherwise.

4.9.23 The Envirocheck Report indicates the presence of two discharge consents to groundwater near the Electrical Connection Site, however these have both been surrendered. Both were held by the Felindre Gas Compressor Station, one for discharging sewage to an unnamed land drain, effective between 2007 and 2010;

and one for trade discharges (site drainage) to the Afon Llan, effective from 2006 until it was surrendered in 2011.

4.9.24 There have been no Pollution Incidents to Controlled Waters recorded on the Electrical Connection Site by the Envirocheck Report. There have been three between 250 m and 500 m of the Project Site Boundary, which were classed as Category 3 minor incidents and a further eight incidents between 500 m and 1 km of the Project Site Boundary. These were classed between Category 1 major incident and Category 3 minor incidents.

viii. Soil Chemistry

4.9.25 The Envirocheck Report has identified the estimated background soil chemistry (for selected key elements) across the Electrical Connection Site. They are summarised as:

- Arsenic: 25 – 35 mg/kg,
- Cadmium: <1.8 – 3.0 mg/kg,
- Chromium: 60 – 90 mg/kg
- Nickel: 15 – 45 mg/kg; and
- Lead: <100 mg/kg.

ix. Landfill

4.9.26 The Envirocheck Report indicates that there are no landfill sites located within the Electrical Connection Site.

4.9.27 The closest landfill site to the Electrical Connection is one registered landfill and an adjacent historic “Landfill Extension” located at Abergelli Farm between 605 m and 870 m north of the Electrical Connection Site. The current status of the registered landfill is ‘closed’ and it was only able to accept non-biodegradable wastes. The total void space was calculated at 75,000 m^3 with a total tonnage of 142,500 t.

4.9.28 The Landfill Extension is reported to have accepted inert waste. The planning application for this extension was granted in 1997. NRW provided the Working Plan and associated drawings for the landfill which were dated March 1994. The total void space was calculated at 99,898 m^3, with a total tonnage of 179,816 t. The Working Plan described the land as low lying, and poorly drained. Approximately three quarters of the landfill area was covered by a mine soil dump from Abergelli Colliery. This mine waste was removed leaving a layer of well compacted mine waste over the majority of the landfill area. The area of ground that was covered by the mine spoil was used for drying out of water treatment sludge (aluminium sulphate) though ceased when the landfill became operational. No further information on this operation is known.

4.9.29 Swansea City Waste Disposal Company Ltd gained planning permission for ‘excavation and removal of inert material from landfill site and restoration’ at Abergelli Farm in February 2003 (CCS Ref: 2002/0312). This consent was subsequently amended, extending the permission to allow the excavation and

removal of inert material until 31st December 2010 (2007/0907). The site has now been fully restored.

4.9.30 There are also an additional three historical landfills within 400 m of the Electrical Connection Site. The first is located 285 m south of the closest point on the Electrical Connection Site Boundary at Gorswen Farm and accepted unspecified waste between 1971 and 1972. The second landfill was licenced to British Steel and located 210 m south. It was active between 1980 and 1994 and received deposited waste included industrial and household waste. The third landfill is located 325 m south-east and was active been 1955 and 1970 receiving deposited waste included inert, industrial and special waste.

x. Recorded Animal Burial Grounds

4.9.31 Information obtained from CCS indicates there was no local cull of animals in Swansea, Neath Port Talbot or Carmarthenshire during the Foot and Mouth outbreak in 2001. No mass burial of animals have been recorded at the Electrical Connection Site.

xi. Historical Land Use

4.9.32 Historical maps have been provided in the Landmark Envirocheck Report, presented in Appendix 8.1. The historical development of the Electrical Connection Site is summarised in Table 4.29.

Table 4.29: Historical Development

Dates / Sources	On Electrical Connection Site	Surrounding Area
1877 1:2,500 1884 1:10,560	The Electrical Connection Site is predominantly agricultural fields and tracks, with areas of woodland and marshland.	The land is predominantly agricultural. A limekiln is identified approx. 175 m south of the Electrical Connection Site; west of the Maes-eglwys development. There are a number of buildings associated with Abergelli Fach and Bryn-Mawr to the north of the Electrical Connection Site and Abergelli Fawr to the east.
1890 1:10,560 1898 – 1899 1:2,500	The woodland to the north of the Electrical Connection Site has now been identified as Abergelli Fach Plantation.	A gravel pit is identified to the west of Abergelli Fach approx. 475 m north west of the closest point on the Electrical Connection Site Boundary.
1921 1:10,560 1917-1918 1:2,500	Rises and streams are now indicated on the map.	A tank is identified next to a spring 240 m north of the Electrical Connection Site, on the edge of the Abergelli Fach Plantation. The gravel pit located to the west of the Abergelli Fach is now identified as 'old'. The limekiln previously identified west of Maes-eglwys is now labelled as 'Old Limekiln'.
1935-1936 1:10,560 1935 1:2,500	No significant changes.	Abergelli Colliery, associated buildings, engine houses, railway sidings, slant (loading bay) and tank are identified on the map, north of Abergelli Fach approximately 610 m from the closest point of the Electrical Connection Site. The gravel pit to the west of Abergelli Fach is no longer labelled.
1951 1:10,560	No significant changes.	The buildings associated with Abergelli Colliery have changed slightly but still appear to be operational.
1964 1:10,560 1961 1:2,500	No significant changes.	The colliery is now identified as disused. A spoil heap/tip adjacent to the colliery is identified to the north west of the mine with a routeway into the centre of the tip. Railway sidings tracks run through the colliery and ends at the edge of the spoil heap/tip. The tank at the edge of the Abergelli Plantation is no longer identified.

Dates / Sources	On Electrical Connection Site	Surrounding Area
1976 1:10,000 1973-1975 1:2,500	Electricity pylons are identified across the Electrical Connection Site in an east to west direction.	The majority of the buildings associated with Abergelli Colliery no longer remain. The Substation is presented adjacent to the east of the Electrical Connection Site. Associated pylons run south, north and east.
1986 1:2,500	No significant changes.	A gas valve compound is shown 1.4 km to the north of the Electrical Connection Site. Beyond the gas valve compound are covered reservoirs and associated water treatment works.
1990 1:2,00	No significant changes.	The spoil heap/tip/landfill adjacent to the former Abergelli colliery is no longer present on the map.
1991 1:10,000 1992 1:2,500 1999 Google Earth Pro imagery	No significant changes.	A large warehouse building is now present in the area adjacent to the former Abergelli Colliery (which is no longer labelled). From the earliest imagery available on Google Earth Pro the landfill adjacent the former Abergelli colliery appears to be backfilled and the slope graded. The majority of the Landfill Extension adjacent to the Abergelli landfill is vegetated. Abergelli Fach is now labelled as Abergelli Farm and looks to have been redeveloped. Abergelli Fawr to the east is now labelled as ruins.
1999 1:10,000	No significant changes.	Velindre Works (more information in paragraph 4.7.23) to the south of the Electrical Connection Site is no longer present.
2000 Aerial photography	No significant changes.	No significant changes.
2002 1:10,000 2002 Google Earth Pro imagery	No significant changes.	Two buildings associated with the former colliery remain along with a large warehouse.

Dates / Sources	On Electrical Connection Site	Surrounding Area
2006 1:10,000	No significant changes.	An area to the west of Abergelli Farm is cleared of vegetation. Part of the former tip to the north of the former Abergelli Colliery has been redeveloped into an area of hardstanding.
2008 Google Earth Pro imagery	No significant changes.	The Felindre Gas Compression Station located north of the Electrical Connection Site is being developed. A large tract of land leading north from the station is cleared of vegetation to allow for the pipelines to be buried. The area of ground west of Abergelli Farm which was cleared in 2006 now has a number of small buildings present.
2010 Google Earth Pro imagery	No significant changes.	There is a new access road serving the Felindre Gas Compression Station development. Two new residential dwellings have been built on the open ground to the west of Abergelli Farm.
2013 Google Earth Pro imagery	No significant changes.	The access road serving the Felindre Gas Compressor Station development is no longer present.
2015 Google Earth Pro imagery	No significant changes.	A new area of hardstanding has been developed on the landfill site adjacent to the former Abergelli Colliery. Two solar parks have been developed; Rhyd-y-pandy solar park to the east of the Electrical Connection Site and Abergelli Farm to the north.

xii. Potentially Contaminative Land Uses

4.9.33 Table 4.30 lists land uses identified which have the potential to cause contamination on the Electrical Connection Site and within 250 m of the Electrical Connection Site Boundary. Land uses further than 250 m from the Electrical Connection Site Boundary are not considered as they are unlikely to affect the Electrical Connection Site. The table also details contaminant groups potentially present as a result of these land uses.

Table 4.30: Land Uses and Potentially Present Contaminant Groups

Process / Land use	Location	Contaminant Groups Potentially Present
Felindre Gas Compressor Station, the Substation and electricity pylons	Off-Site: North and west of the Electrical Connection Site. Electricity pylons located across the Electrical Connection Site.	Polychlorinated biphenyls (PCB's), other transformer oils and solvents
Agricultural land	On-Site: Across the majority of the Electrical Connection Site including plantations along the norther boundary.	Fertilisers, pesticides, herbicides, fuel and oil hydrocarbons associated with machinery, organic and biological contaminants.

xiii. Sources of Contamination

4.9.34 It is considered that the most likely sources of contamination for the Electrical Site are:

- Contamination associated with the off-site historic landfill and landfill extension including aluminium sulphate sludge; and
- Contamination from agricultural land use.

xiv. Preliminary Conceptual Site Model (CMS)

4.9.35 On the basis of the information summarised above, a preliminary CSM has been developed for the Project Site Boundary, which includes the Electrical Connection Site. The CSM identifies potential contaminants, receptors (both on and off-site) and exposure pathways that may be present. The identification of such potential "pollutant linkages" is a key aspect of the evaluation of potentially contaminated land. Potential "pollutant linkages" associated with the Project Site Boundary are detailed within Table 4.31.

4.9.36 It should be noted that the identification of potential "pollutant linkages" does not indicate that they are significant in any way or that the Electrical Connection Site is unsuitable for its current/proposed use. It does, however, act as a way of focusing

future data collection at the Electrical Connection Site and identifying any key potential risks associated with the Electrical Connection Site.

4.9.37 The model is based on a desk study and a walkover undertaken in 2014 and will be confirmed through intrusive investigation prior to detailed design.

Table 4.31: Preliminary Conceptual Site Model

Source	Pathway	Receptor	Risk	Risk Description
Off-Site: Waste within the historic landfill and landfill extension (including the process of drying out water treatment sludge)	Direct contact with shallow groundwater impacted with landfill leachates.	Construction Workers	Low	The majority of the development area will comprise hardstanding; therefore the risk of exposure is negligible. Regular contact with this potential contaminative source is unlikely. The presence of vegetation across the majority of the Project Site limits exposure via the direct contact pathway.
Landfill gas generation	Inhalation of soil vapours outdoors	Construction Workers	Low	There is potential for landfill gases to be present within the landfill and landfill extension. The gas generation is anticipated to be low as the landfill was licenced to only receive inert and non biodegradable waste. This needs to be considered as buried structures will be constructed to the east of the landfills.
	Migration of ground gases / vapours into buildings including accumulation in confined spaces	Human Health: Future workers on the Generating Equipment	Low	
		Built environment / structures / services		
Mine gas generation	Inhalation of soil vapours outdoors	Construction workers	Moderate / Low	During the construction works there is a possibility that ground gas from coal bed methane or mine workings may be disturbed. The Coal Authority report indicates that there are shallow workings present in 3 seams of coal to depths of 380 m. Ground investigation is required to assess the likelihood and level of risk. With current land use the risk is considered to be moderate to low as there has been minimal ground disturbance.
	Migration of ground gases / vapours into buildings including accumulation in confined spaces	Human Health: Future workers on the Generating Equipment		
		Built environment / structures / services		
Natural gas from potential peat stratum	Inhalation of soil vapours outdoors	Human Health: Future workers on the Generating Equipment	Moderate / Low	There is potential for natural ground gases to be present within the peat stratum mapped in localised areas within the Project Site. The gas generation is anticipated to be moderate to low in these areas and this currently vents naturally.

Source	Pathway	Receptor	Risk	Risk Description
	Migration of ground gases / vapours into buildings including accumulation in confined spaces	Construction workers	Moderate / Low	Construction workers may potentially disturb the peat habitat during the construction works; this is particularly relevant with sub-surface construction activities where ground gas may accumulate.
		Built environment / structures / services		
Agricultural land (potential sheep dips, use of fertilisers)	Surface run-off	Controlled waters (groundwater in Secondary A superficial and bedrock aquifers and drainage ditches within the Project Site Boundary)	Low	Fertilisers could be washed into receiving surface waters. Drainage ditches run across the Project Site and may transport contaminants. The farming practices and potential use of chemicals is unknown but as the land is predominantly used for grazing the risk is considered low.
	Dermal contact and ingestion of soils and dust Inhalation of dust	Human Health: Future workers on the Generating Equipment	Low	The majority of the development area will comprise hardstanding; therefore the risk of exposure is negligible. Regular contact with this potential contaminative source is unlikely. The presence of vegetation across the majority of the Project Site limits exposure via the direct contact pathway.
		Construction workers	Low	As above. In addition, the exposure durations are limited and the receptor class is less sensitive. Regular contact with site soils is unlikely.
Natural radon gas	Inhalation of soil vapours outdoors	Human Health: Future workers on the Generating Equipment	Low	The Envirocheck report indicates that the radon potential is low in this area.
	Inhalation of soil vapours indoors	Construction workers		

Source	Pathway	Receptor	Risk	Risk Description
Aggressive soil conditions	Direct contact with shallow groundwater and soil	Buried concrete structures of the Project	Low	Whilst aggressive soil conditions (sulphate / pH) may be present, the area which will require buried structures is on greenfield land and therefore the probability of the risk occurring is unlikely; therefore the risk is considered low.
Chemicals used during construction works including oils/fuels, liquid concrete and other materials	Accidental releases to ground including spillage/ leakage from containers and engines, followed by vertical/lateral migration	Controlled Waters: Secondary A superficial and bedrock aquifers	Low	If spillage of chemicals occurred during construction operations it is likely that this would be quickly recognised and contained, due to operational requirements. Construction industry pollution prevention guidelines will be followed, as detailed in the CEMP, such as use of bunded storage of any chemicals or fuel kept on site, the introduction of petrol interceptors to filter run off from areas of hardstanding created for construction plant.

b) Potential Environmental Effects

i. Construction

Geology and Soils: Sand and Gravel Reserves

4.9.38 The Electrical Connection will be routed adjacent to the Felindre Gas Compressor Station and the Substation, and adjacent to the new section of Access Road. Therefore the land is already sterilised in this area. No significant impact is anticipated from the construction of the Electrical Connection on sand and gravel reserves. No additional mitigation is proposed.

Geology and Soils: Coal reserves

4.9.39 The UDP Proposals Map indicates that coal reserves are present underlying the Electrical Connection (Ref.3.1 and included in Figure 4.22). The Electrical Connection will be routed adjacent to the Felindre Gas Compressor Station and the Substation, and adjacent to the Access Road, therefore the majority of the Electrical Connection route is already sterilised and should ground investigation works demonstrate that the coal reserves are at the working depth of the Electrical Connection, only a relatively small area of the coal reserves will be affected compared to the full extent. Therefore no significant impact is anticipated and no additional mitigation is proposed.

Agricultural Land

4.9.40 The construction works associated with the Electrical Connection will result in the direct, local and permanent sterilisation of approximately 0.33 hectares (ha) of Grade 4 agricultural land of 'poor quality'. No additional mitigation is proposed.

4.9.41 With the embedded mitigation as set out in G01 - G05 Mitigation Register (Appendix 2.1) no significant effects during construction are anticipated.

ii. Operation

4.9.42 No significant effects are anticipated during the operation phase.

5. Summary of Effects

5.1.1 The potential environmental effects of the Electrical Connection are set out in Section 4 of this Report and the Screening Matrix in Appendix 1. No likely significant effects have been identified.

Table 5.1: Summary of Effects of the Electrical Connection

Technical Topic	Potential Effect(s)	Additional Mitigation and Proposed Management Plans	Significance
Ecology	Effects on habitats and species through loss and temporary loss of habitat during construction.	E01 – E26 Mitigation Register (Appendix 2) Outline CEMP (GEN01) (Appendix 2.2) Outline LEMS (GEN02)	Not significant

Technical Topic	Potential Effect(s)	Additional Mitigation and Proposed Management Plans	Significance
		(Appendix 2.3)	
Flood Risk and Water Quality	Effects on water quality from construction activities. No flooding impacts identified. No operational impacts identified.	Outline Surface Water Management Plan and Drainage Strategy (WQ01, WQ02, WQ03) (Appendix 2.4)	Not significant
Air Quality	Effects on human health, nuisance and ecological impacts during construction.	AQ01 – AQ04 Mitigation Register (Appendix 2.1) Outline CEMP (GEN01)	Not significant
Noise and Vibration	Noise levels during construction.	N01- N09 Mitigation Register (Appendix 2.1) Outline CEMP (GEN01).	Not significant
Landscape and Visual	Landscape character effects during construction/ decommissioning.	LV01 Mitigation Register (Appendix 2.1) Outline CEMP (GEN01) (Appendix 2.2) Outline LEMS (GEN02) (Appendix 2.3)	Not significant
Historic Environment	None	CH01 and CH02 Mitigation Register (Appendix 2.1)	N/A
Traffic, Transport and Access	Potential effects on construction traffic generation, driver delay and PROW users due to severance.	CTMP and CSTP (T01 – T05) (Appendix 2.5 and 2.6)	Not significant.
Geology, Ground Conditions and Hydrogeology	Sterilisation effects on mineral and coal reserves resulting from construction. Potential effects on agricultural land during construction. During operation, potential structural effects from chemical attack.	G01 - G05 Mitigation Register (Appendix 2.1)	Not significant

6. Conclusions

6.1.1 Based on the nature and size of the Electrical Connection, its setting within the Electrical Connection Site and from the assessment of potential effects as outlined above, it is considered that the Electrical Connection will not have significant effects on the environment.

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Figures

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

LEGEND

- Electrical Connection Site
- Project Site Boundary

AECOM Internal Project No:

60542910

Drawing Title:

SITE LOCATION PLAN

Scale at A3: 1:25,000

Drawing No:	Rev:
FIGURE 1	005

Drawn:	Chk'd:	App'd:	Date:
GM	CC	CA	31/07/18

400 0 400 800 1,200 1,600 2,000 m

Filename: C:\Users\oharag\Desktop\lecy\F1_Site_Location rev 1.mxd

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www.aecom.com

Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

LEGEND

- Electrical Connection Site
- Project Site Boundary
- Electrical Connection (400kV Cable)

AECOM Internal Project No:

60542910

Drawing Title:

SITE LAYOUT PLAN

Scale at A3: 1:7,500

Drawing No:	Rev:
FIGURE 2	005

Drawn:	Chk'd:	App'd:	Date:
GM	CC	CA	03/08/18

60 0 60 120 180 240 300 m

N

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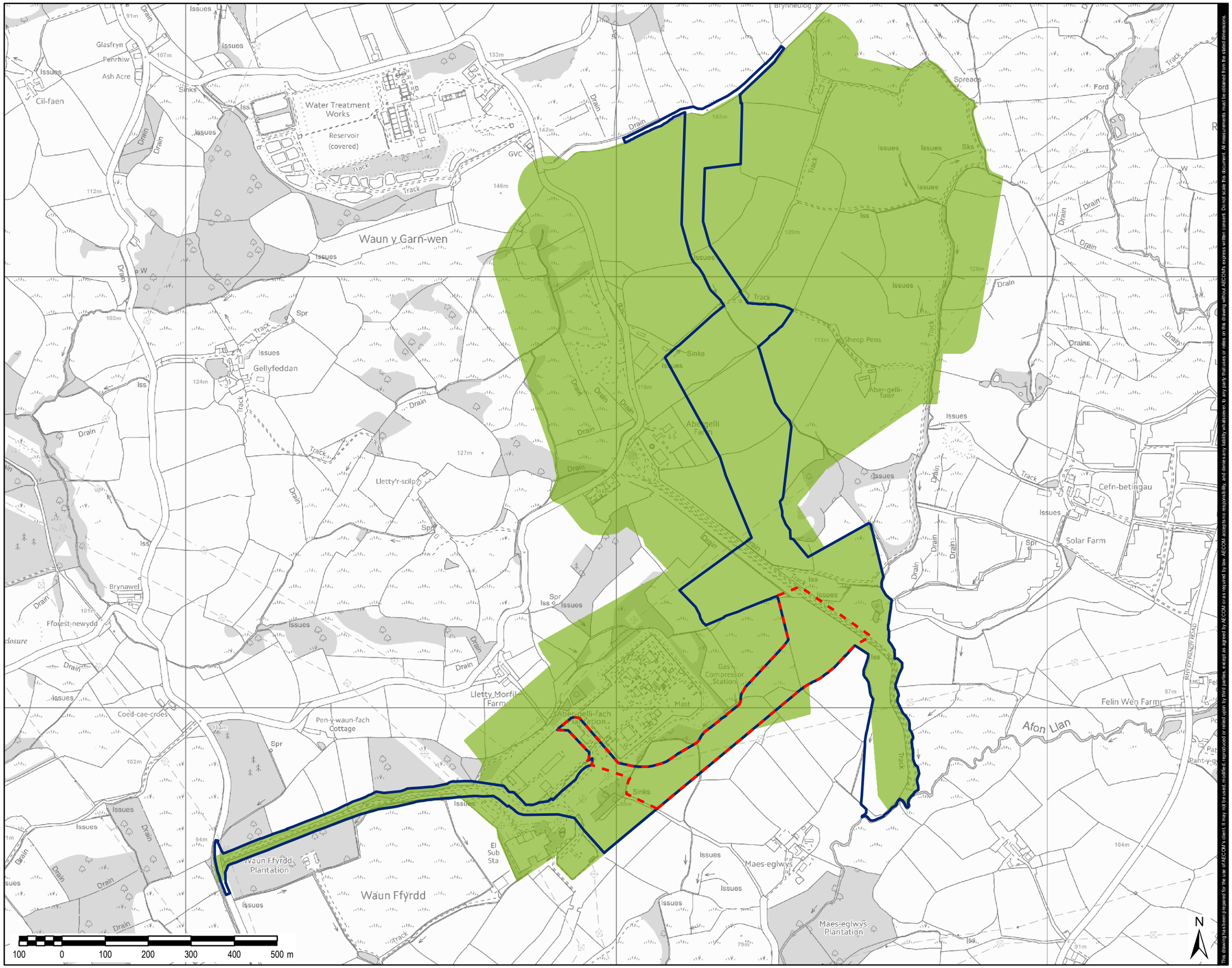

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

- Electrical Connection Site
- Project Site Boundary
- BSG Ecology 2014 Site Boundary

AECOM Internal Project No:

60542910

Drawing Title:

ECOLOGICAL STUDY AREA

Scale at A3: 1:8,000

Drawing No:			Rev:
FIGURE 4.1			002
Drawn:	**Chk'd:**	**App'd:**	**Date:**
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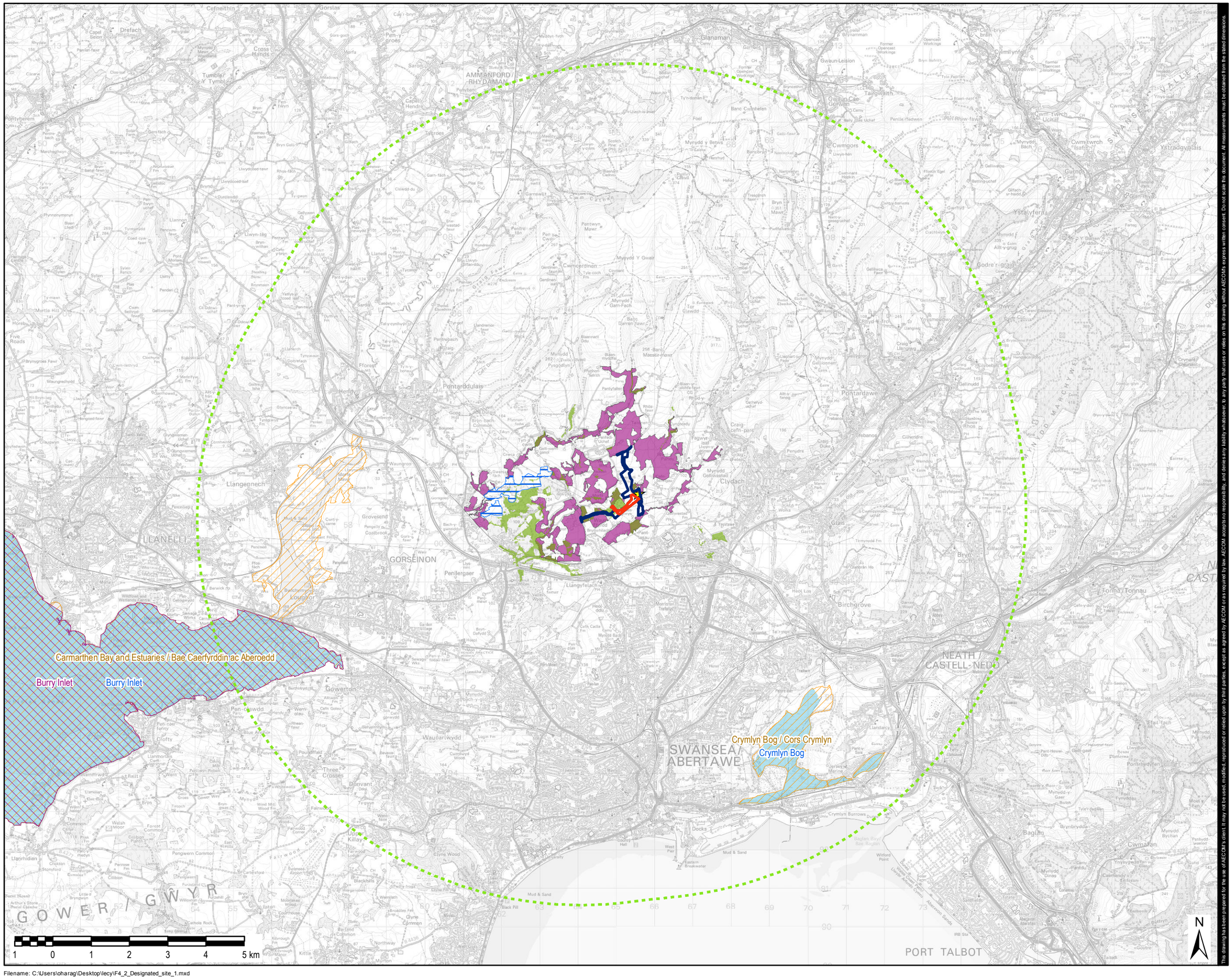

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

LEGEND

- Electrical Connection Site
- Project Site Boundary
- 10km Study Area
- Special Protection Area
- Special Area of Conservation
- Site of Special Scientific Interest
- Ancient Woodlands
- Ramsar Site
- SINCs
- Proposed Stack Location

AECOM Internal Project No:

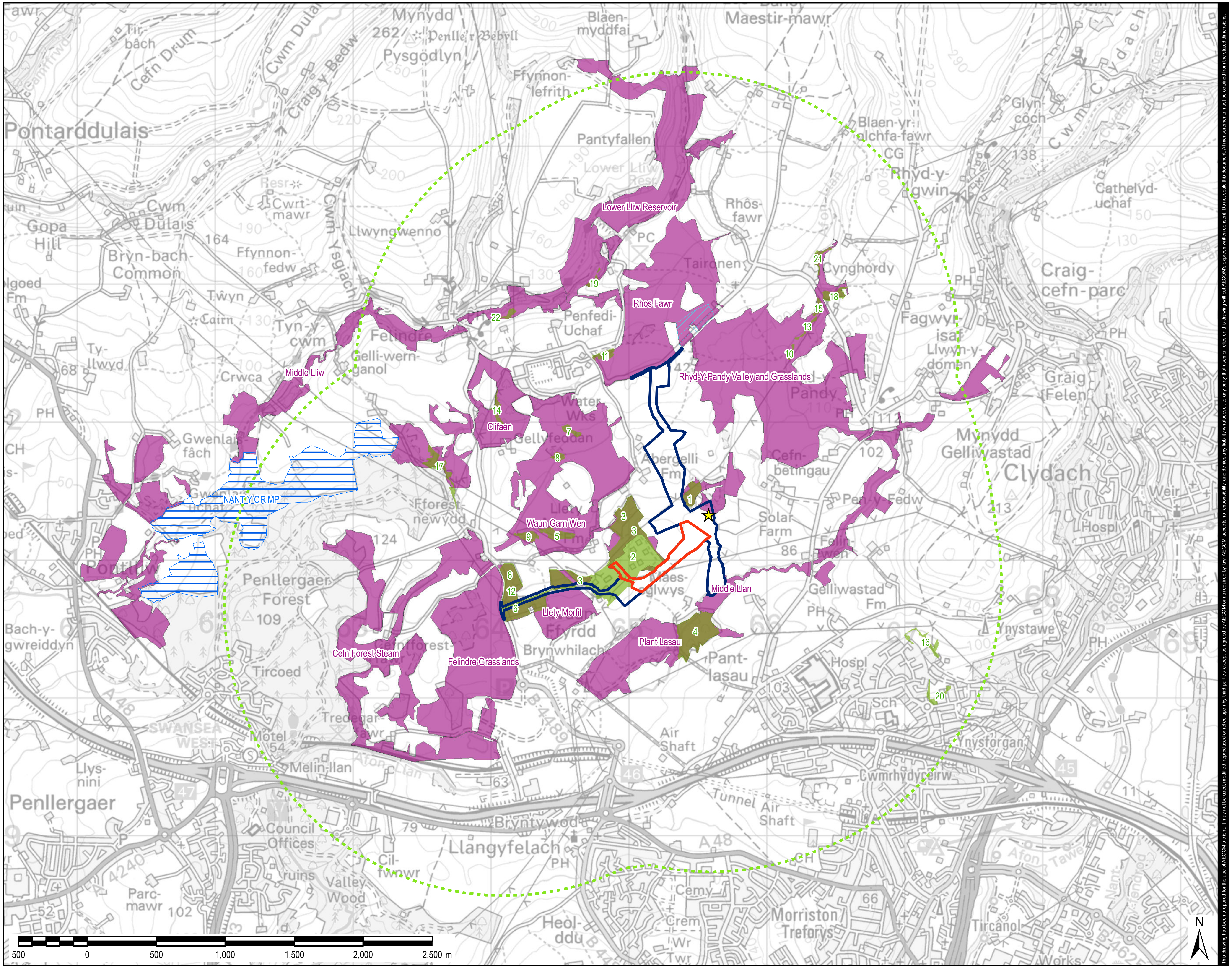
60542910

Drawing Title:

DESIGNATED SITES 1

Scale at A3: 1:90,000

Drawing No:			Rev:
FIGURE 4.2			005
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GM	CC	CA	31/07/18



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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

- Electrical Connection Site
- Project Site Boundary
- 2km Study Area
- Site of Special Scientific Interest
- Coed Barcud Wildlife Trust Reserve
- Ancient Woodland
- SINCs
- Proposed Stack Location

Copyright:

AECOM Internal Project No:

60542910

Drawing Title:

DESIGNATED SITES 2

Scale at A3: 1:25,000

Drawing No:			Rev:
FIGURE 4.3			005
Drawn:	Chk'd:	App'd:	Date:
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Above Ground Installation

Felindre Water Treatment Works

Felindre Gas Compressor Station

Swansea North Substation

N

0 50 100 200 500 M

Notes:

1) The outline LEMP is for illustrative purposes only and identifies the principles of the landscape and ecological mitigation. The final LEMP will be subject to the detailed design layout and will be completed as part of a planning condition.
2) This figure should be read in conjunction with Landscape and Ecology Mitigation Strategy, Outline Lighting Strategy, and Flood Consequence Assessment - Outline Drainage Strategy.
3) All detailed planting design to reflect utility easements.
4) All existing trees and hedgerows within the Project Site Boundary will be retained where reasonably practical.
5) All construction laydown areas to be fully reinstated (save for maintenance compound).
6) All boundary features (fencelines, hedgerows etc) and fields to be reinstated along Pipeline corridor and to the edge of the new access road corridor, subject to utility easements.
7) The location of existing landscape features, including hedgerows, woodland areas and solar farms shown on this figure has been informed by a combination of aerial photography and site observation.
8) Final form of attenuation ponds to be developed in parallel with detailed design.
9) Refer to Appendix 3.10. Figure 1.1 for Otter and Water Vole Survey Area and Survey Results.

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

Key:

- Electrical Connection Site
- Project Site Boundary
- Perimeter fence
- Water main
- Footpath
- Oil Pipeline
- Overhead power lines

Existing Features

- Key woodland areas

Proposed Features

- Hedgerows with trees
- Woodland structure planting
- Attenuation pond
- Access Road
- Electrical Connection
- Temporary laydown areas

AECOM Internal Project No:

60542910

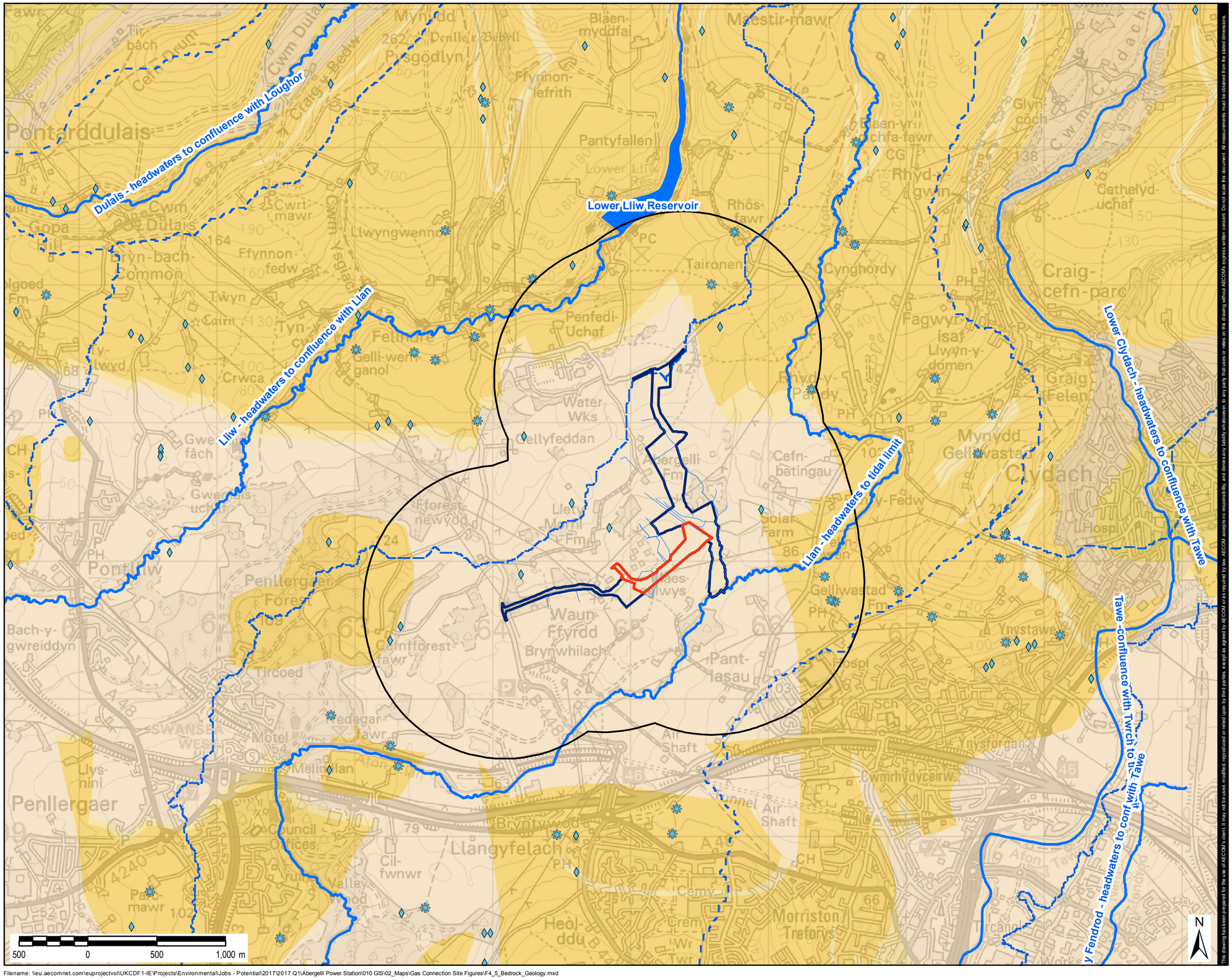
Drawing Title:

LANDSCAPE AND ECOLOGY MITIGATION PLAN- ELECTRICAL CONNECTION SITE

Not to scale

Drawing No:			Rev:
FIGURE 4.4			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
CS	RM	CA	31/07/18

Filename: \\UKEDI4FP002\UKEDI4FP002-V11E\PROPOSALS\Landscape\LIVE\Abergelli DCO\InDesign



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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

- Electrical Connection Site
- Other Watercourses
- Project Site Boundary
- 1 km Buffer
- Wells
- Springs
- WFD Rivers
- WFD Lakes

Bedrock Geology

- Grovesend Formation
- Swansea Member Sandstone
- Swansea Member Mudstone Siltstone Sandstone

Copyright:

AECOM Internal Project No:

60542910

Drawing Title:

BEDROCK GEOLOGY

Scale at A3: 1:25,000

Drawing No:			Rev:
FIGURE 4.5			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
JN	GM	CA	26/07/18

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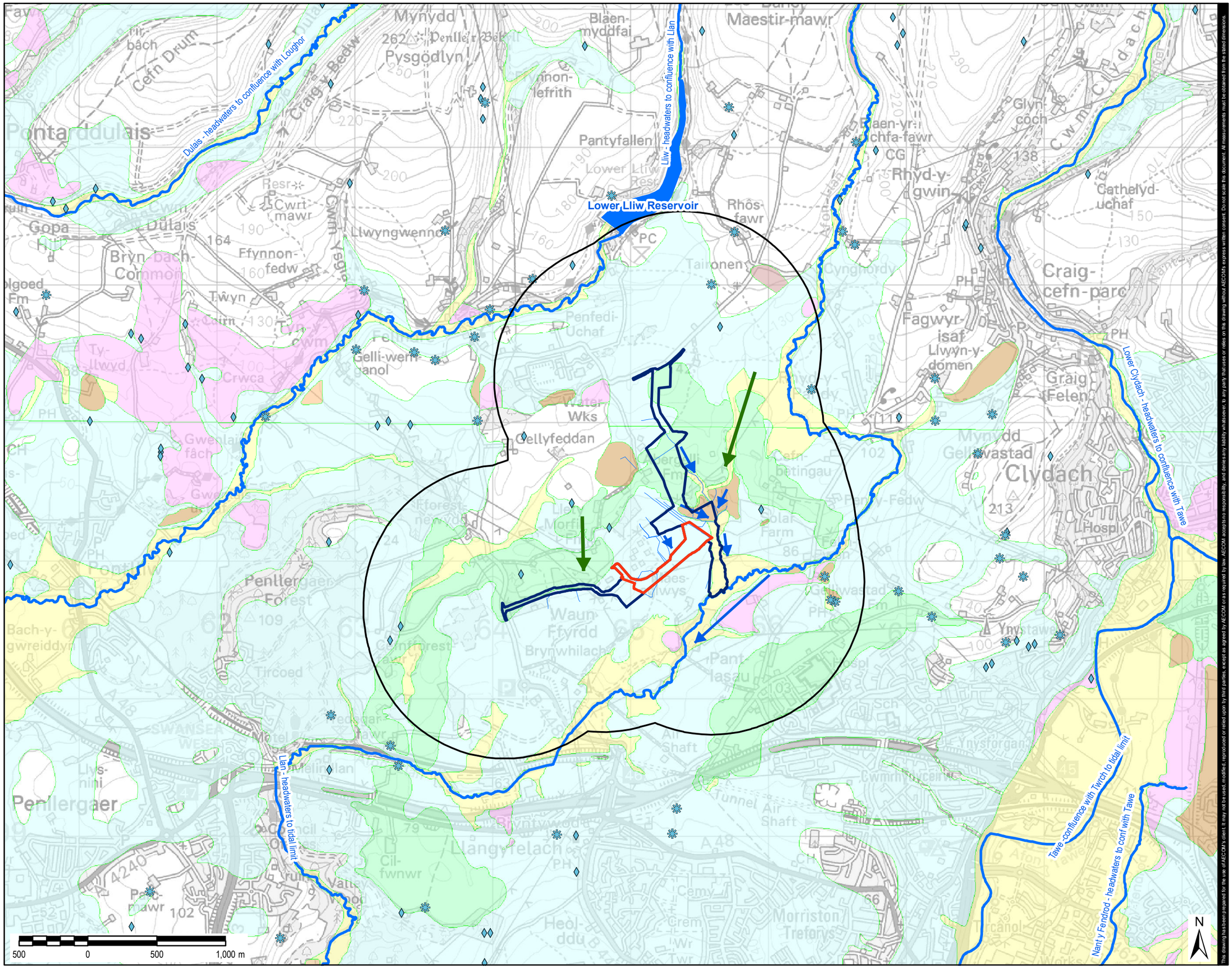

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

- Electrical Connection Site
- Project Site Boundary
- 1 km Buffer
- Wells
- Springs

Inferred Water Flow Direction

- Groundwater
- Surface Water
- WFD Rivers
- WFD Lakes

Superficial Geology

- Till
- Glacial Deposits
- Glaciolfluvial Deposits
- Alluvium
- Peat

AECOM Internal Project No:

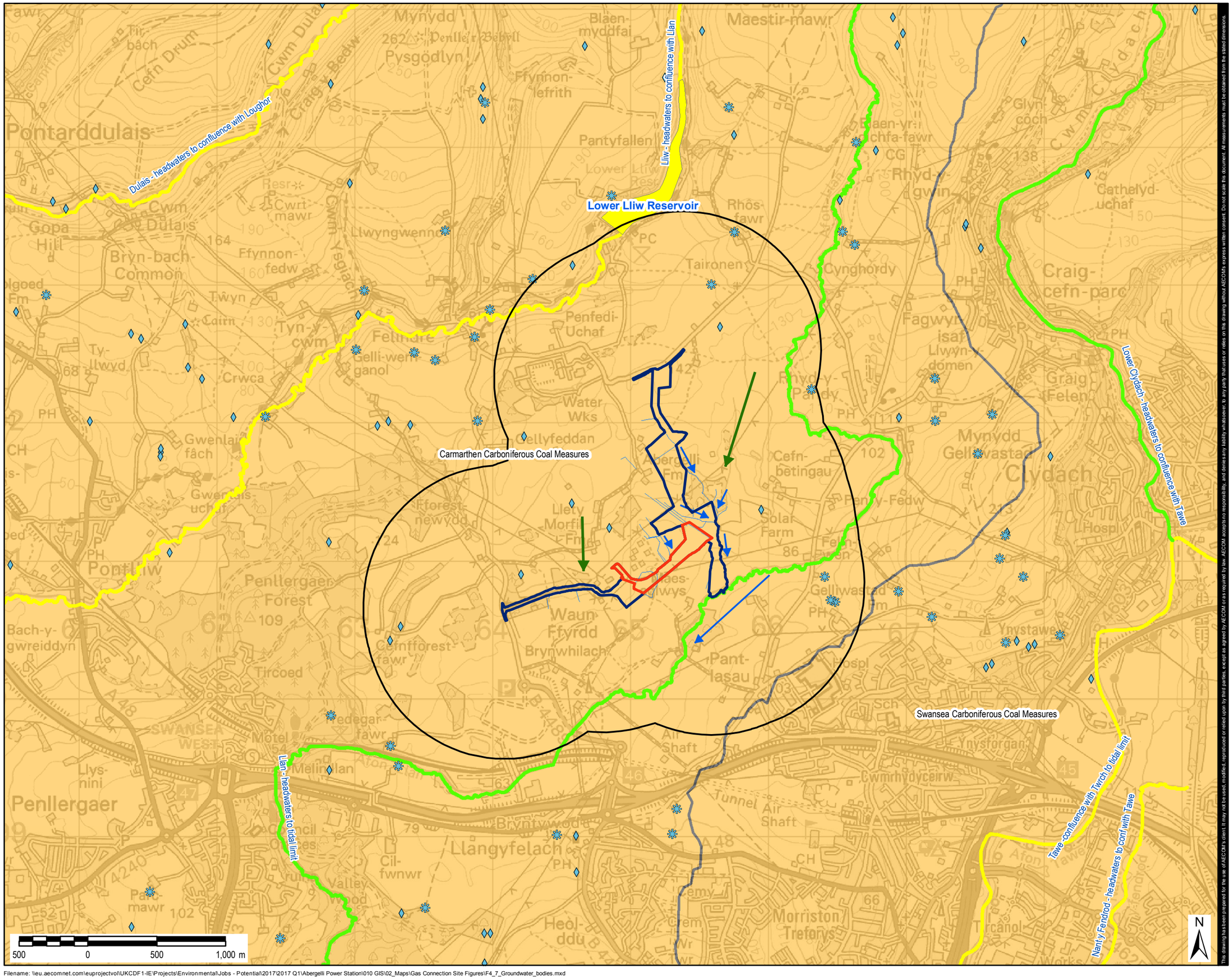
60542910

Drawing Title:

SUPERFICIAL GEOLOGY

Scale at A3: 1:25,000

Drawing No:			Rev:
FIGURE 4.6			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
JN	GM	CA	31/07/18



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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

- Electrical Connection Site
- Project Site Boundary
- 1 km Buffer
- Wells
- Springs

Inferred Water Flow Direction

- Groundwater
- Surface Water

WFD Lakes

- Moderate

WFD Rivers

- Good
- Moderate

WFD Groundwater Bodies

- Poor

Copyright:

AECOM Internal Project No:

60542910

Drawing Title:

GROUNDWATER BODIES

Scale at A3: 1:25,000

Drawing No:			Rev:
FIGURE 4.7			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

- Electrical Connection Site
- Project Site Boundary
- 1 km Buffer
- Wells
- Springs
- Disused adit
- Wales Incident Recording System (WIRS)
- National Incident Recording System (NIRS)
- Historic Industrial Sites
- Industrial Sites
- NRW Historic Landfill Sites
- WFD Lakes
- WFD Rivers
- WFD SW Catchments

Inferred Water Flow Direction

- Surface Water

Main River Flood Risk

- High
- Medium
- Low
- Very Low

AECOM Internal Project No:

60542910

Drawing Title:

POTENTIAL POLLUTION SOURCES

Scale at A3: 1:25,000

Drawing No:			Rev:
FIGURE 4.8			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
JN	GM	CA	26/07/18

500 0 500 1,000 m

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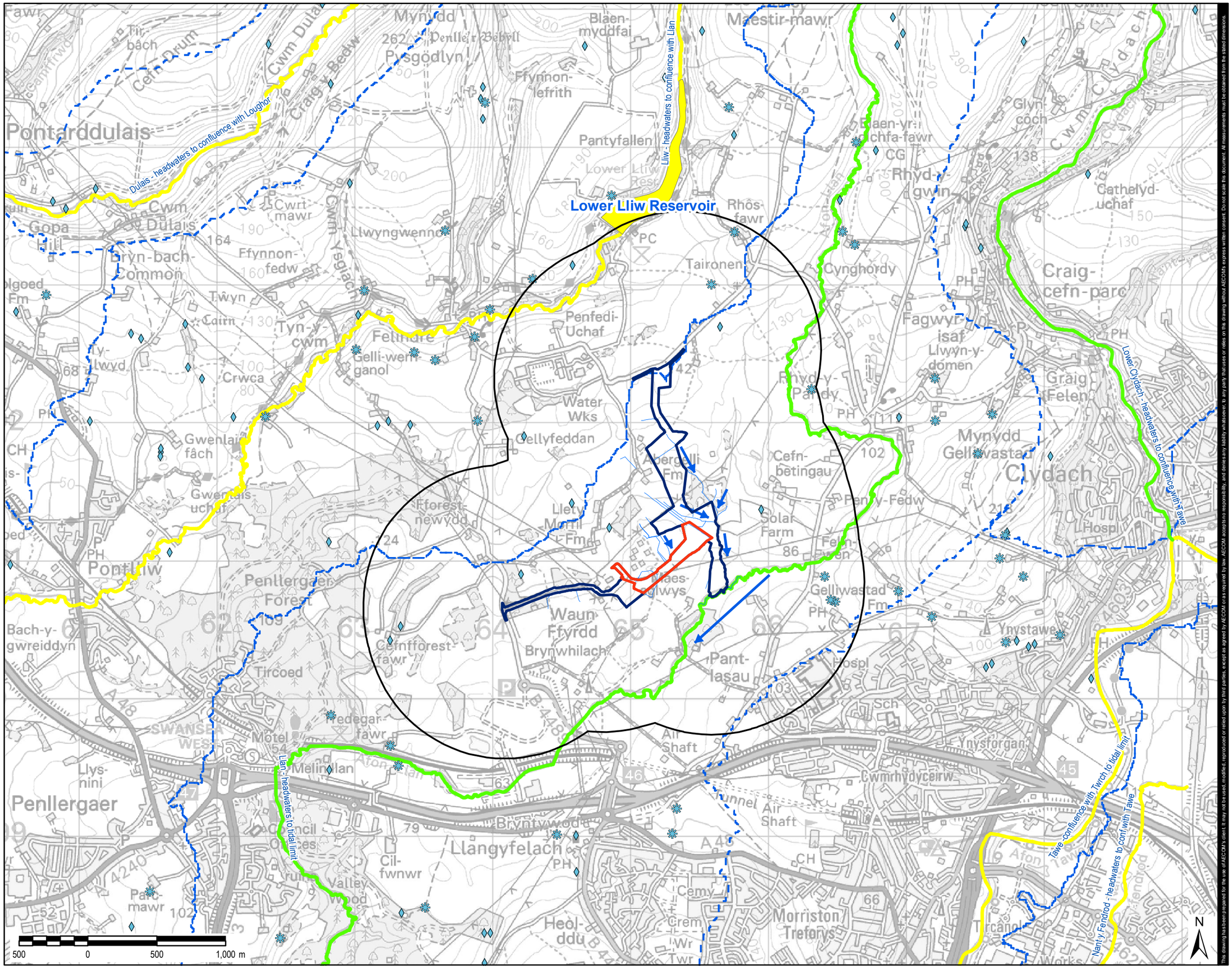

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

LEGEND

- Electrical Connection Site
- Project Site Boundary
- 1 km Buffer
- Wells
- Springs
- Surface Water

WFD Lakes

- Moderate

WFD Rivers

- Good
- Moderate
- WFD SW Catchments

Copyright:

AECOM Internal Project No:

60542910

Drawing Title:

SURFACE WATER BODIES

Scale at A3: 1:25,000

Drawing No:			Rev:
FIGURE 4.9			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
JN	GM	CA	31/07/18

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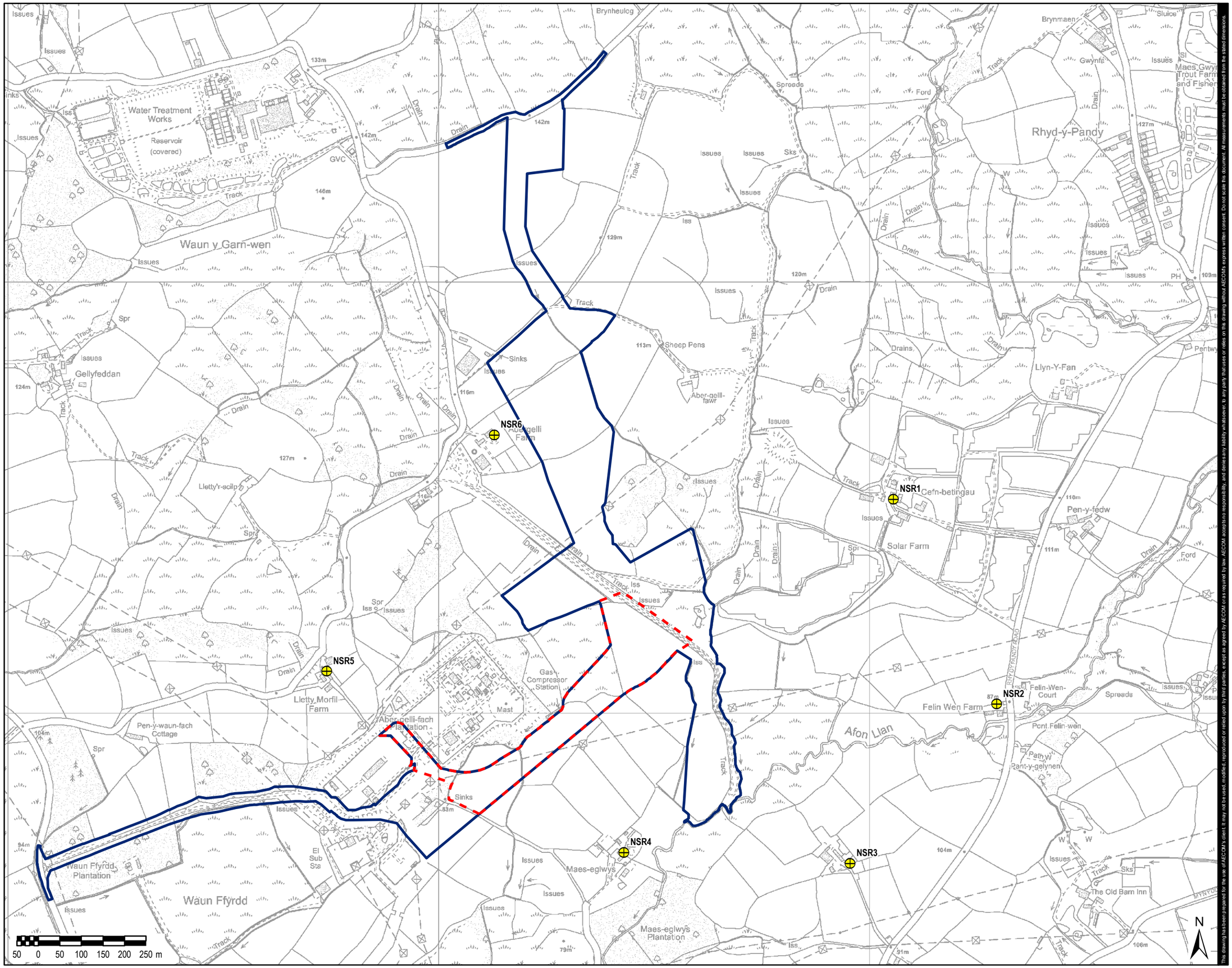

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

LEGEND

- Electrical Connection Site
- Project Site Boundary
- Noise Sensitive Receptors

Noise Sensitive Receptor	Address
NSR1	Cefn-betingau
NSR2	Feline Wen Farm
NSR3	Llwynhelig
NSR4	Maes-eglwys
NSR5	Llety Morfil Farm
NSR6	Abergelli Farm

AECOM Internal Project No:
60542910

Drawing Title:

NOISE SENSITIVE RECEPTOR LOCATIONS

Scale at A3: 1:7,000

Drawing No:			Rev:
FIGURE 4.10			01
Drawn:	**Chk'd:**	**App'd:**	**Date:**
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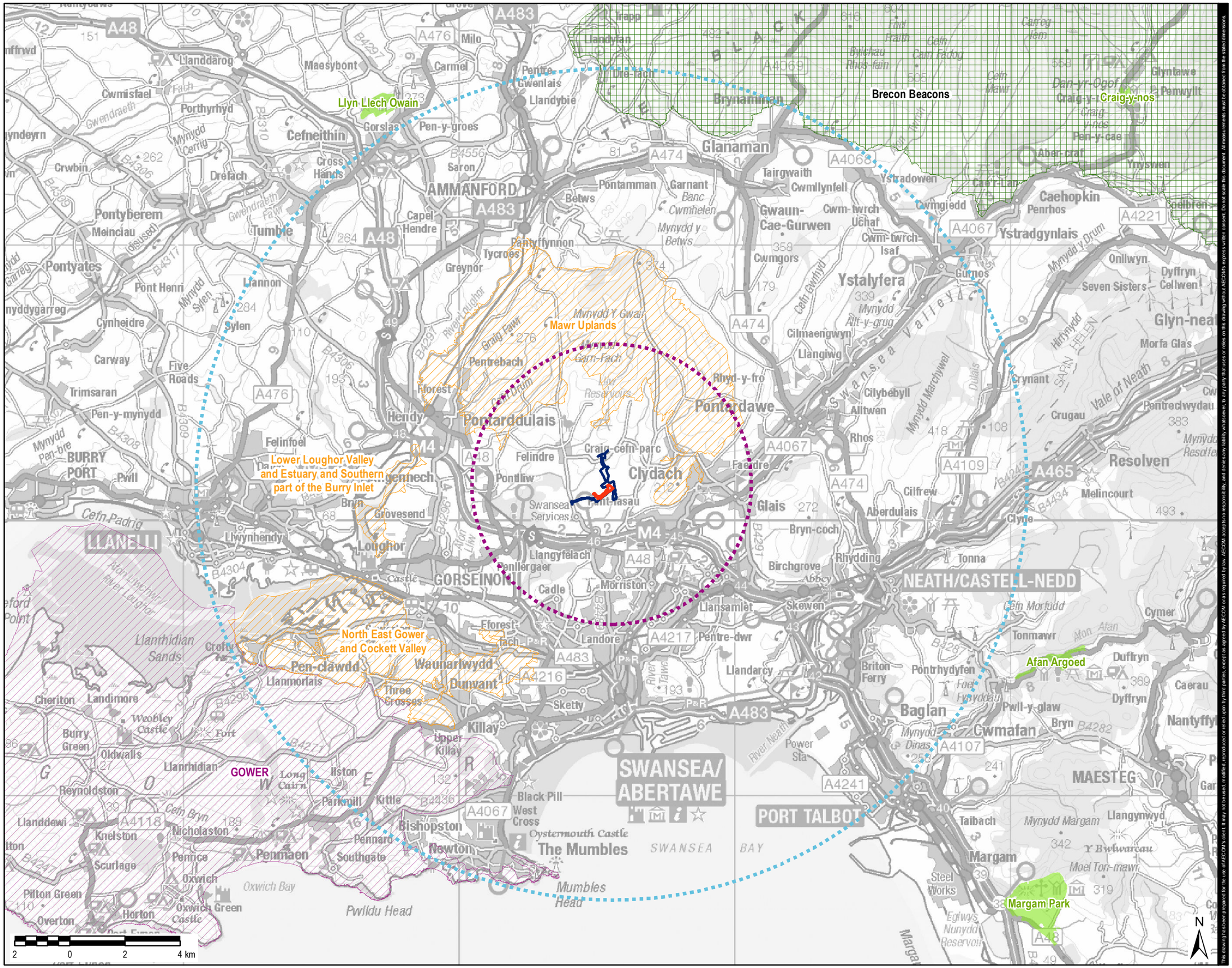

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

- Electrical Connection Site
- Project Site Boundary
- 15km Study Area
- 5km Study Area
- Special Landscape Areas
- Country Park
- Area of Outstanding Natural Beauty
- National Park

Copyright:

AECOM Internal Project No:

60542910

Drawing Title:

LANDSCAPE DESIGNATION

Scale at A3: 1:125,000

Drawing No:			Rev:
FIGURE 4.11			001
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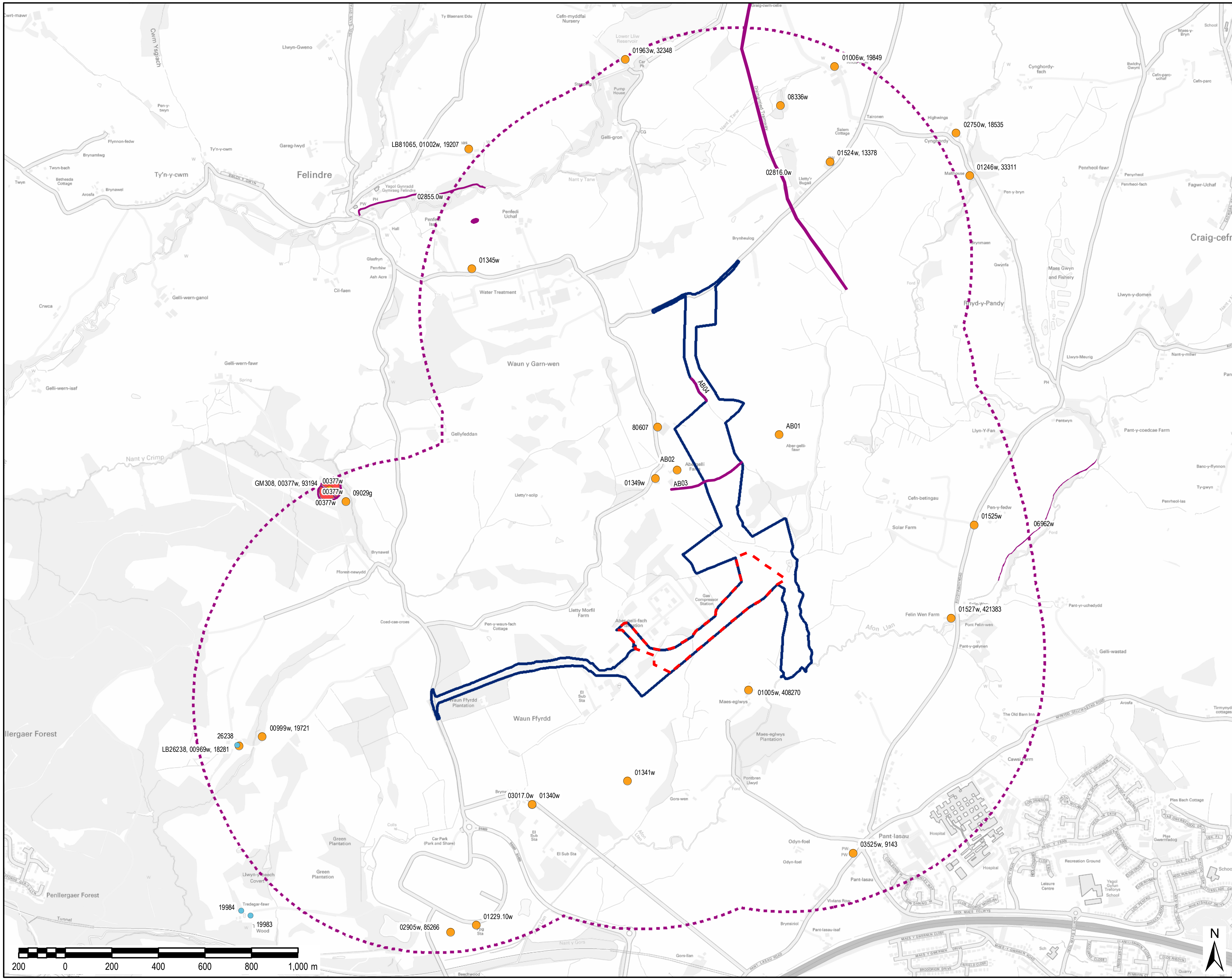

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

LEGEND

- Electrical Connection Site
- Project Site Boundary
- Grade II - Listed Building
- Historic Asset - Point
- Historic Asset - Linear
- Scheduled Monument
- 1km Study Area

AECOM Internal Project No:

60542910

Drawing Title:

HISTORIC ASSETS
1KM STUDY AREA

Scale at A3: 1:15,000

Drawing No:	Rev:
FIGURE 4.12	005

Drawn:	Chk'd:	App'd:	Date:
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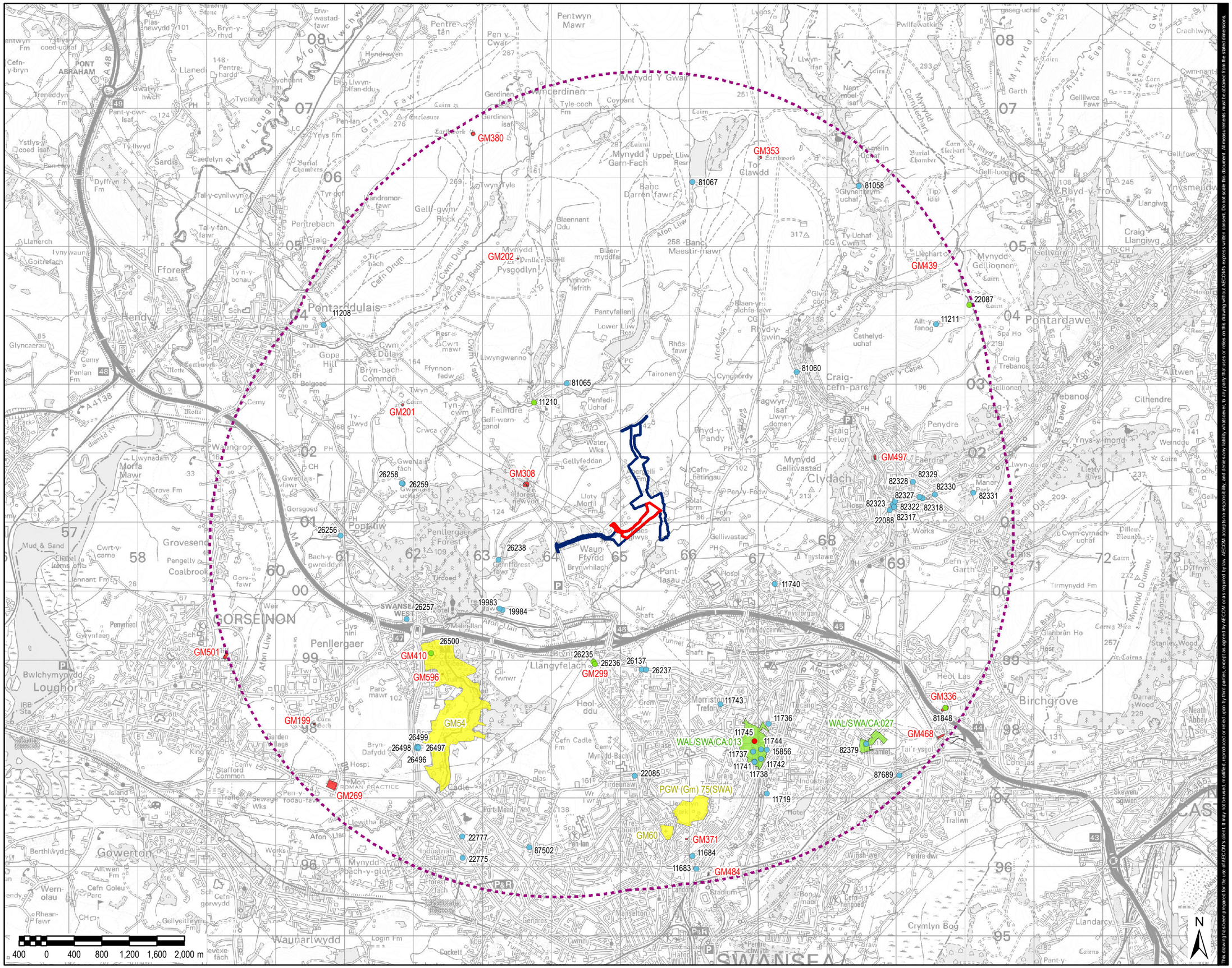

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

LEGEND

- Electrical Connection Site
- Project Site Boundary
- Grade I - Listed Building
- Grade II* - Listed Building
- Grade II - Listed Building
- Conservation
- Parks and Gardens
- Scheduled Monument
- 5km Study Area

AECOM Internal Project No:

60542910

Drawing Title:

DESIGNATED HISTORIC ASSETS IN THE 5KM STUDY AREA

Scale at A3: 1:50,000

Drawing No:	Rev:
FIGURE 4.13	005

Drawn:	Chk'd:	App'd:	Date:
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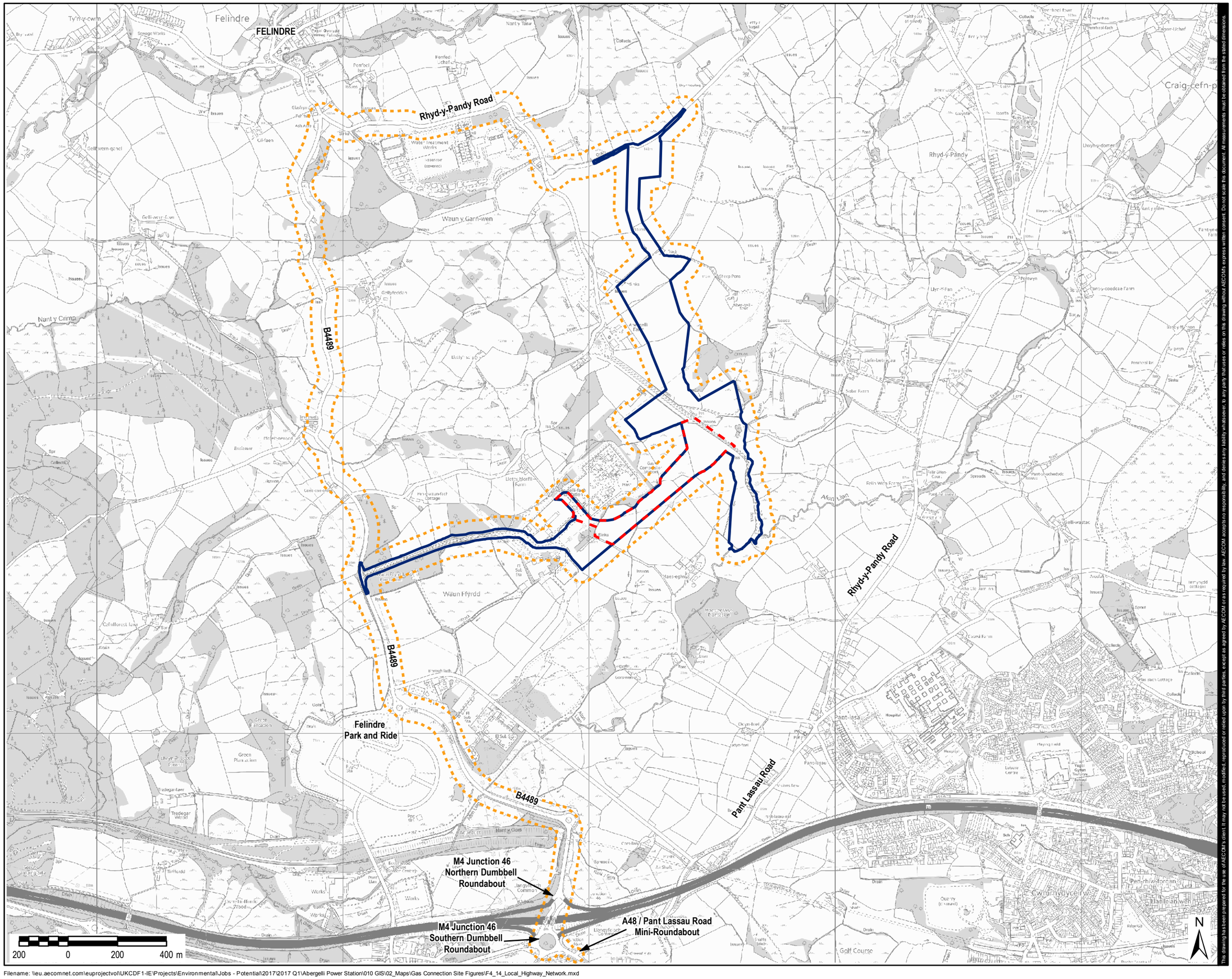

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

- Electrical Connection Site
- Project Site Boundary
- Study Area

AECOM Internal Project No:

60542910

Drawing Title:

LOCAL HIGHWAY NETWORK

Scale at A3: 1:14,000

Drawing No:			Rev:
FIGURE 4.14			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GM	NW	CA	26/07/18

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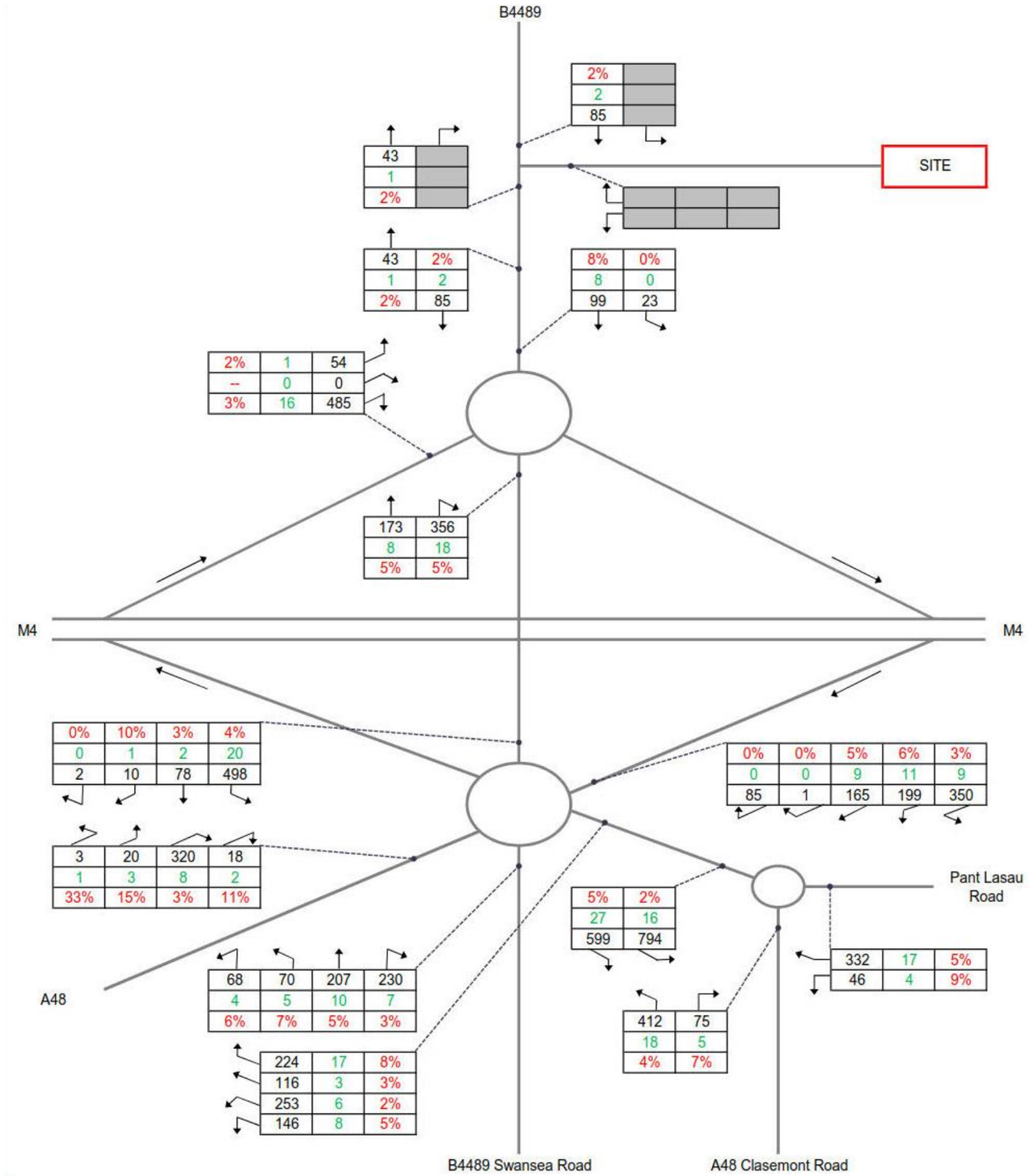

Key:

XX Total Vehicles XX HGVs XX HGV %

Notes:

1. Traffic flows at M4 J46 and A48/Pant Lasau Road junction based on Junction Turning Count (JTC) surveys undertaken on 16/10/2014.
2. Traffic flows on the B4489 based on Automatic Traffic Count (ATC) survey undertaken between 16/10/2014 and 22/10/2014.
3. Peak hour derived from analysis of junction inflows.
4. Cells highlighted in grey indicate that this movement has not been surveyed.

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Project Title:

ABERGELLI POWER PROJECT

Client:

LEGEND

Copyright:

AECOM Internal Project No:

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Drawing Title:

TRAFFIC FLOWS – 2014 OBSERVED: WEEKDAY AM PEAK HOUR

Scale at A3: Not To Scale

Drawing No:	Rev:
FIGURE 4.15	001

Drawn:	Chk'd:	App'd:	Date:
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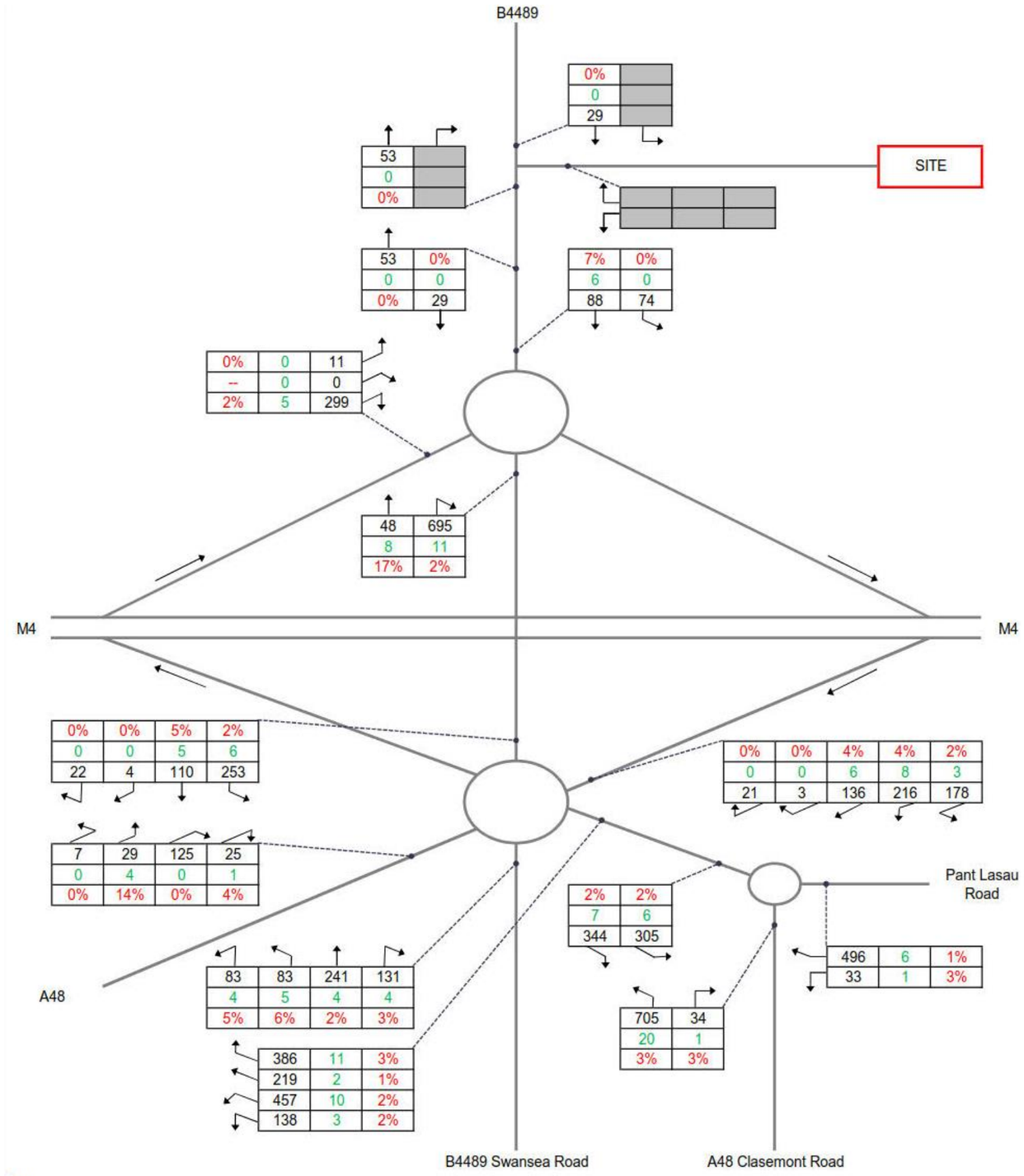

Key:

XX Total Vehicles XX HGVs XX HGV %

Notes:

1. Traffic flows at M4 J46 and A48/Pant Lasau Road junction based on Junction Turning Count (JTC) surveys undertaken on 16/10/2014.
2. Traffic flows on the B4489 based on Automatic Traffic Count (ATC) survey undertaken between 16/10/2014 and 22/10/2014.
3. Peak hour derived from analysis of junction inflows.
4. Cells highlighted in grey indicate that this movement has not been surveyed.

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Project Title:

ABERGELLI POWER PROJECT

Client:

LEGEND

AECOM Internal Project No:

60542910

Drawing Title:

TRAFFIC FLOWS – 2014 OBSERVED: WEEKDAY PM PEAK HOUR

Scale at A3: Not To Scale

Drawing No:			Rev:
FIGURE 4.16			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
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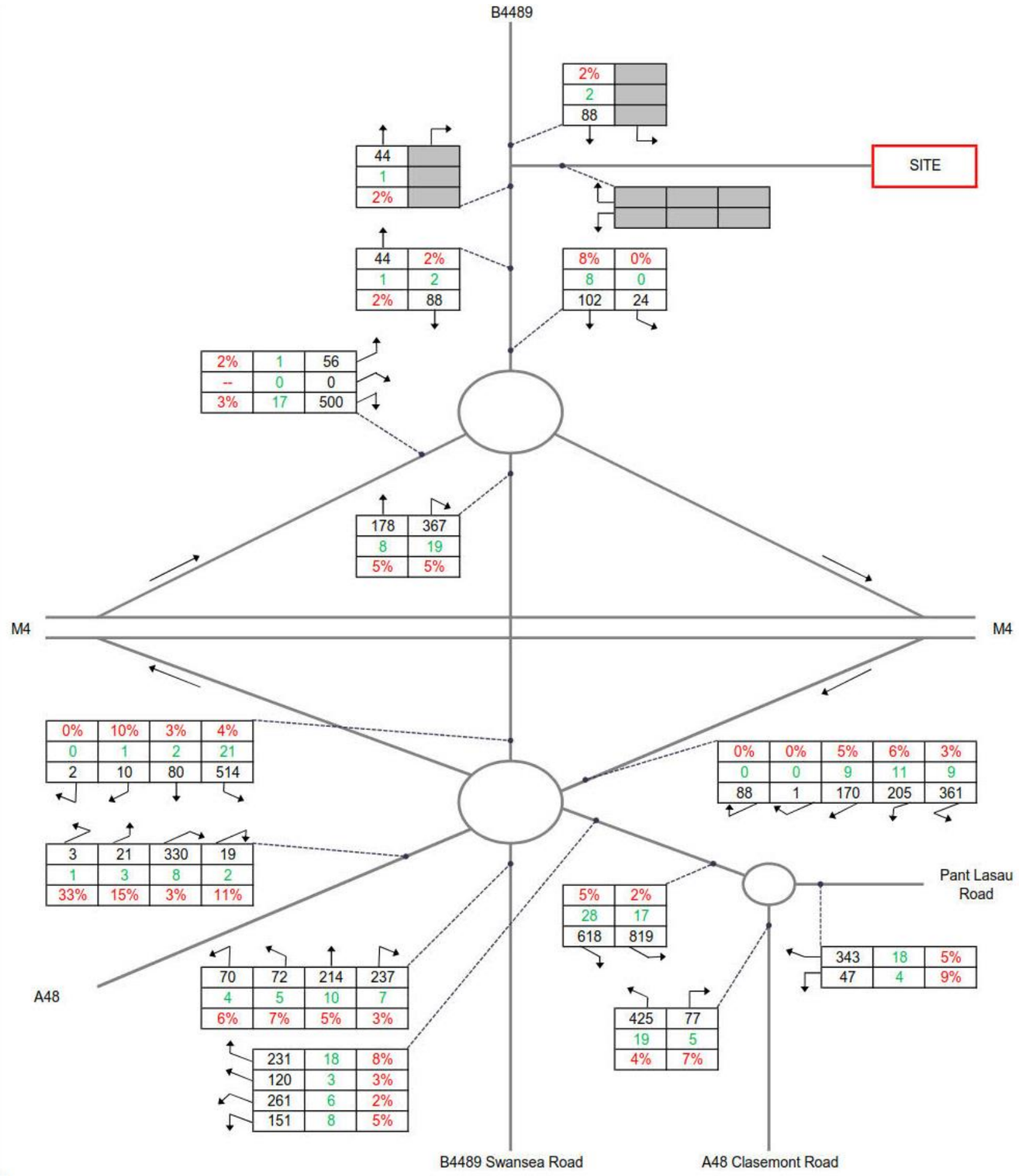

Key:

XX Total Vehicles | XX HGVs | XX HGV %

Notes:

1. TEMPro Weekday AM Peak Growth Factor = 1.0317 (applied to all movements).
2. Cells highlighted in grey indicate that this movement has not been surveyed.

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

AECOM Internal Project No:

60542910

Drawing Title:

TRAFFIC FLOWS – 2017 BASE YEAR: WEEKDAY AM PEAK HOUR

Scale at A3: Not To Scale

Drawing No:				Rev:
FIGURE 4.17				001
Drawn:	**Chk'd:**	**App'd:**	**Date:**	
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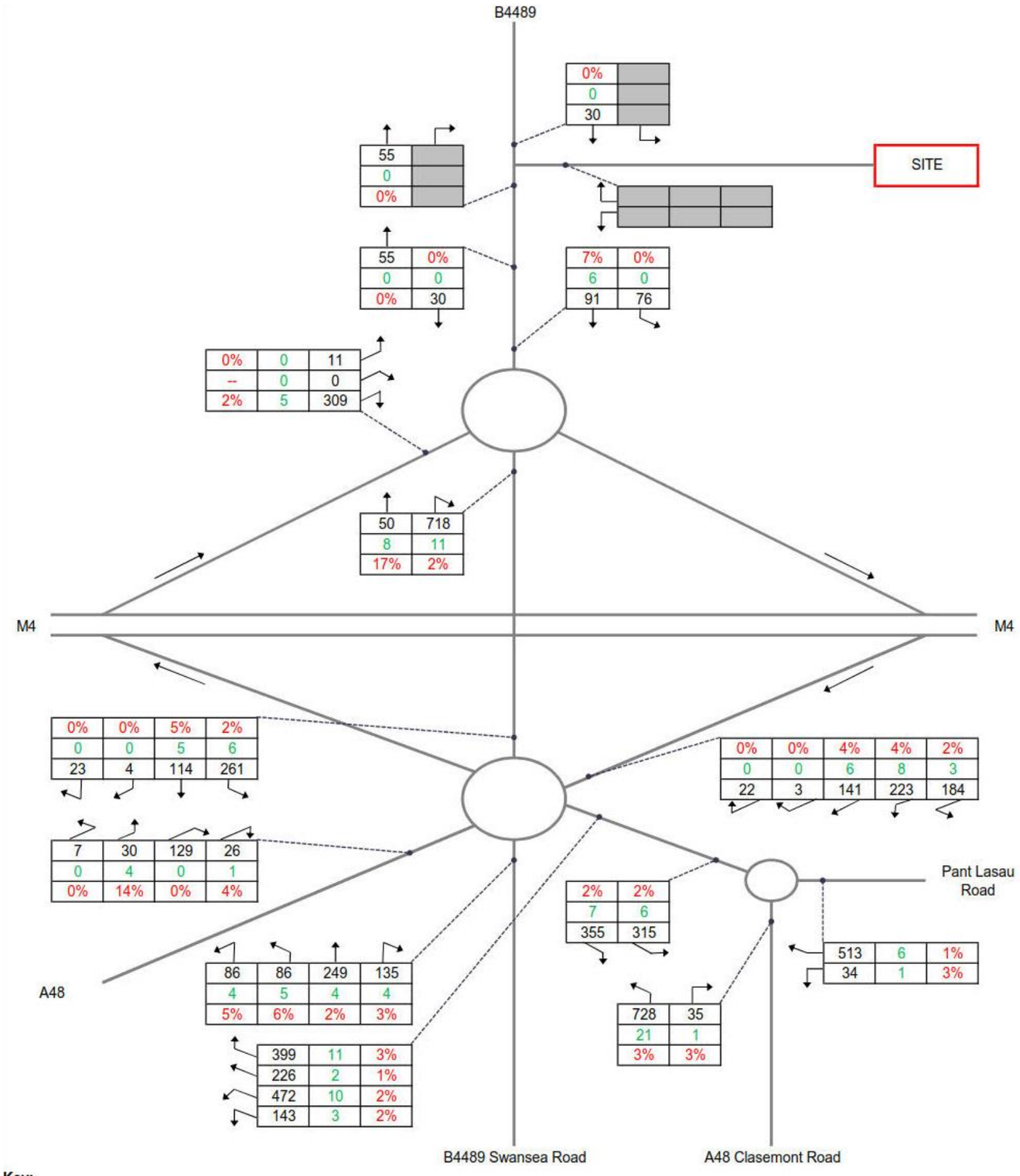

Key:

XX Total Vehicles | XX HGVs | XX HGV %

Notes:

1. TEMPro Weekday AM Peak Growth Factor = 1.0333 (applied to all movements).
2. Cells highlighted in grey indicate that this movement has not been surveyed.

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

AECOM Internal Project No:

60542910

Drawing Title:

TRAFFIC FLOWS – 2017 BASE YEAR: WEEKDAY PM PEAK HOUR

Scale at A3: Not To Scale

Drawing No:			Rev:
FIGURE 4.18			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GM	NW	CA	19/07/18

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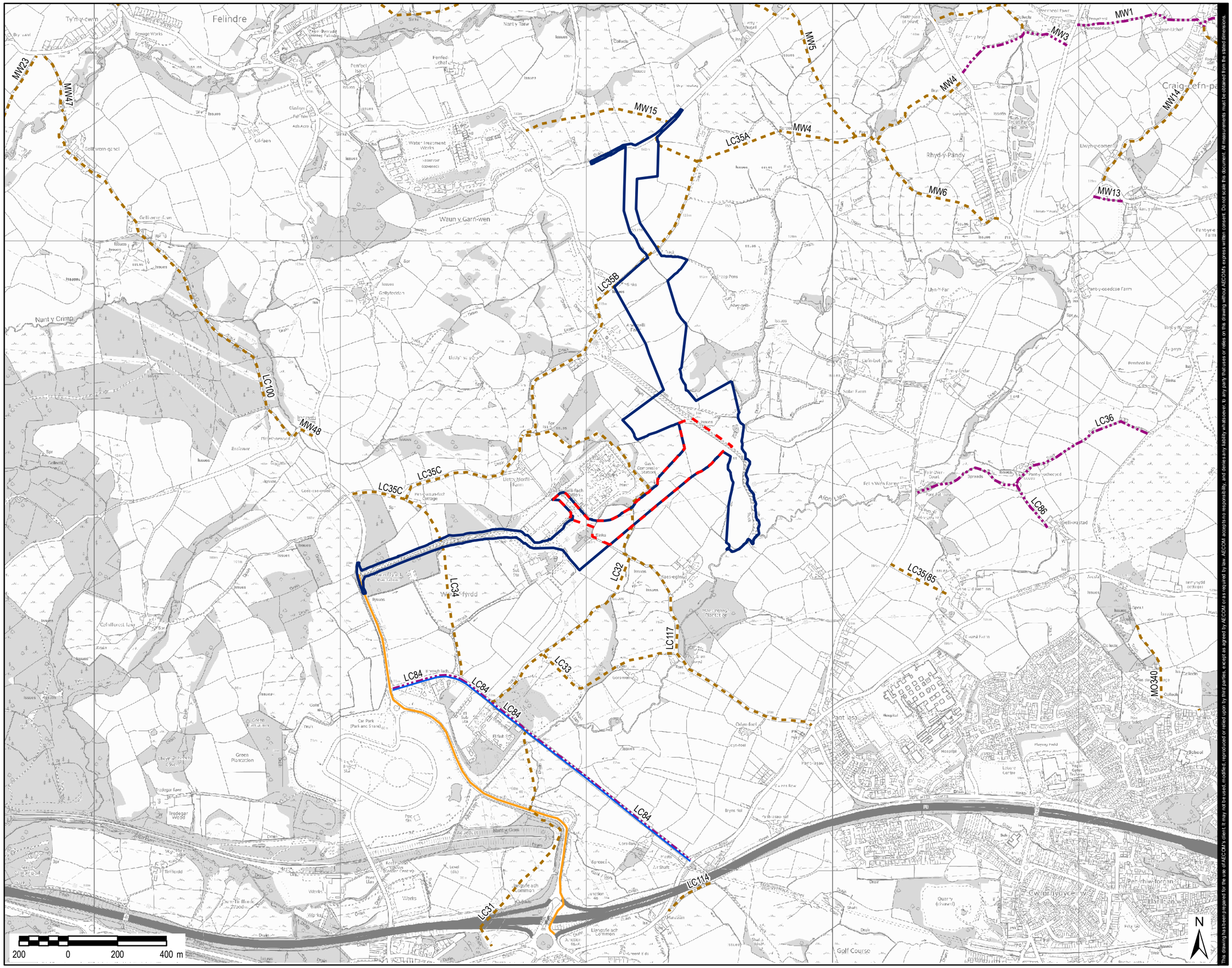

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power

LEGEND

- Electrical Connection Site
- Project Site Boundary
- Bridleway
- Footpath
- Traffic Free Cycle Route
- Footway

AECOM Internal Project No:

60542910

Drawing Title:

PEDESTRIAN AND CYCLE ROUTES AND PUBLIC RIGHTS OF WAY

Scale at A3: 1:14,000

Drawing No:			Rev:
FIGURE 4.19			001
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GM	NW	CA	26/07/18

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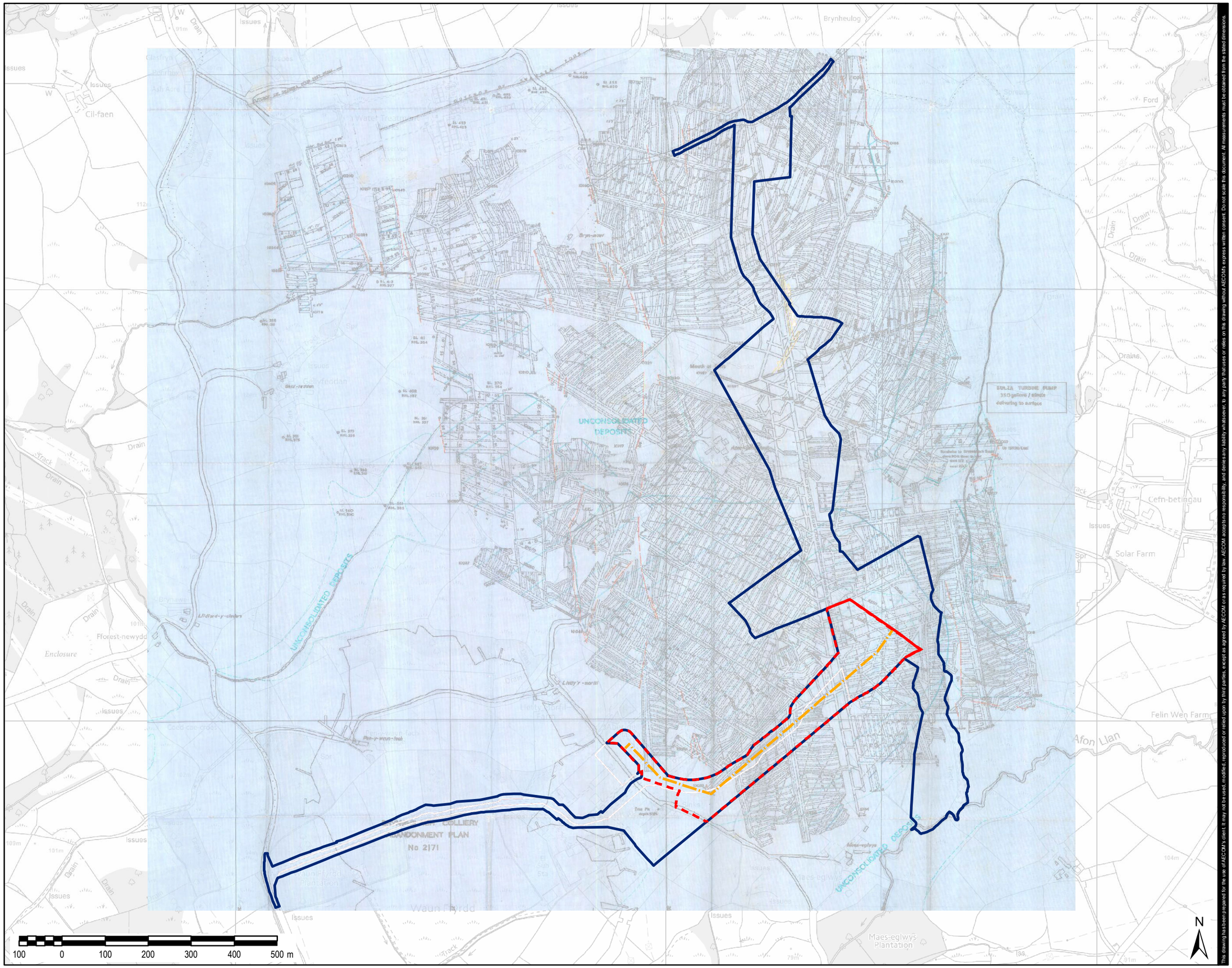

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

LEGEND

- Electrical Connection Site
- Project Site Boundary
- Electrical Connection (400kV Cable)

AECOM Internal Project No:

60542910

Drawing Title:

MINE ABANDONMENT PLAN

Scale at A3: 1:8,000

Drawing No:			Rev:
FIGURE 4.20			005
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GM	CC	CA	03/08/18

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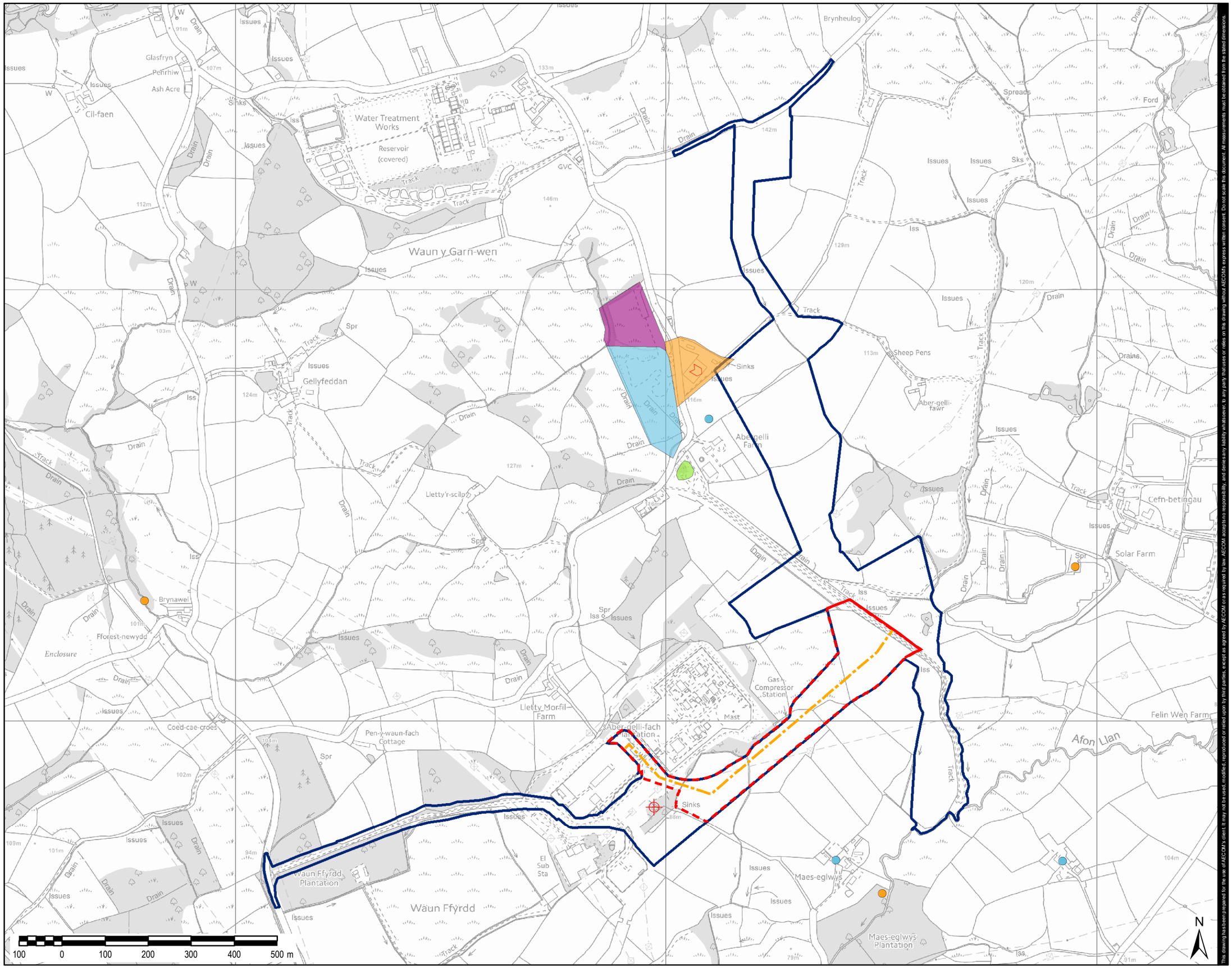

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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

LEGEND

- Electrical Connection Site
- Project Site Boundary
- Electrical Connection (400kV Cable)
- Groundwater Abstraction
- Groundwater Abstraction Licence known not to be used
- Disused adit
- Disused mine shaft
- Abergelli Farm landfill
- Abergelli Farm landfill and historical mine spoil heap
- Disused Abergelli Collery
- Old gravel pit

AECOM Internal Project No:

60542910

Drawing Title:

POTENTIAL SOURCES OF CONTAMINATION AND LOCATIONS OF INTEREST

Scale at A3: 1:8,000

Drawing No:			Rev:
FIGURE 4.21			005
Drawn:	**Chk'd:**	**App'd:**	**Date:**
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Project Title:

ABERGELLI POWER PROJECT

Client:

Abergelli power
A Drax Group company

LEGEND

- Project Site Boundary
- Electrical Connection Site
- Sand and Aggregates
- Coal
- Electrical Connection (400kV Cable)

AECOM Internal Project No:

60542910

Drawing Title:

UDP MINERAL RESOURCES PLAN

Scale at A3: 1:8,000

Drawing No:			Rev:
FIGURE 4.22			005
Drawn:	**Chk'd:**	**App'd:**	**Date:**
GM	CC	CA	03/08/18

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