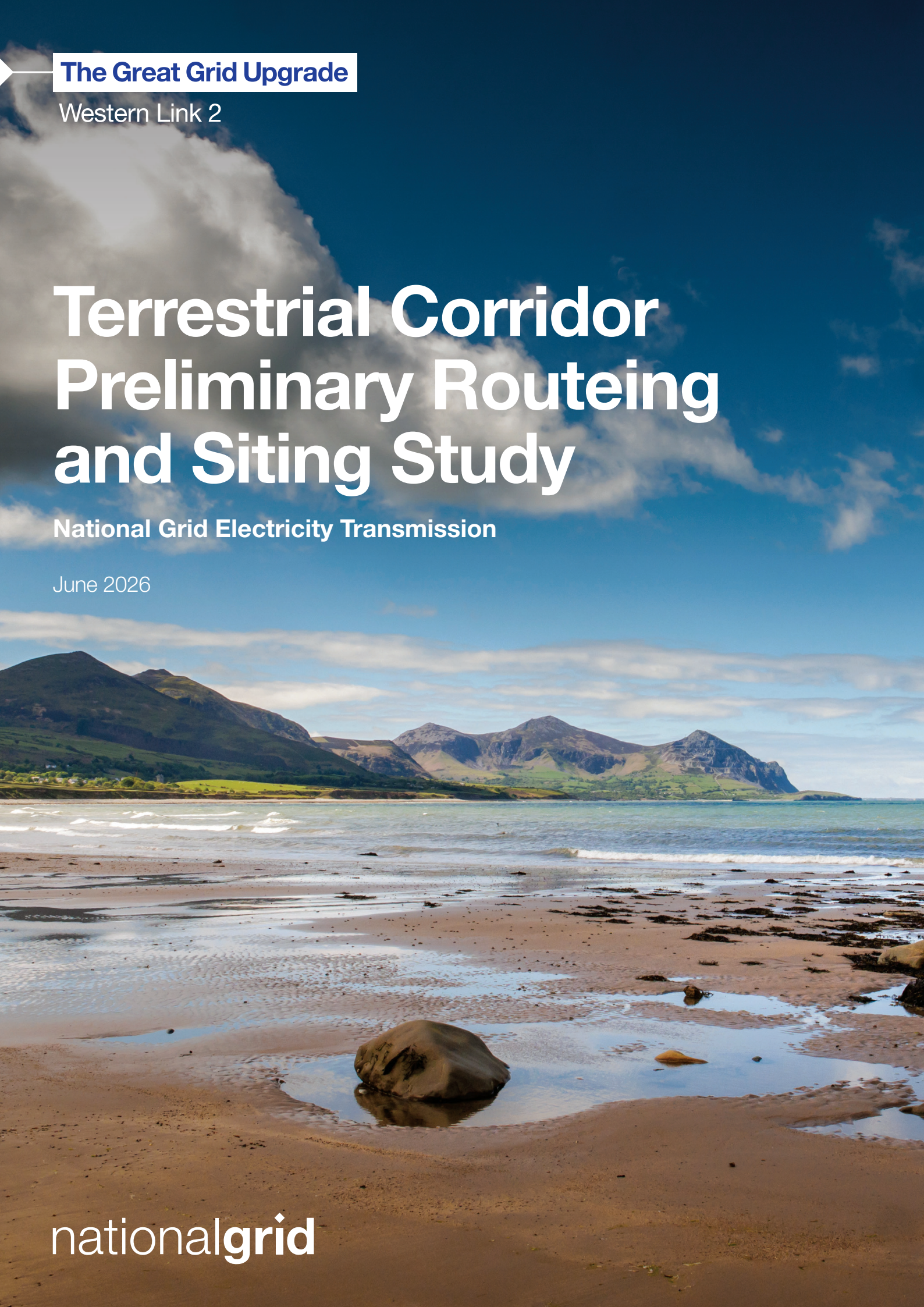
The Great Grid Upgrade

Western Link 2

Terrestrial Corridor Preliminary Routeing and Siting Study

National Grid Electricity Transmission

June 2026



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ACRONYMS AND DEFINITIONS

Acronym	Definition
AA	Appropriate Assessment
AC	Alternating Current
AGOL	ArcGIS Online
AIL	Abnormal Indivisible Load
AIS	Air-Insulated Switchgear
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
AIW	Ancient Woodland
BMV	Best and Most Versatile
BRAG	Black-Red-Amber-Green
CEMP	Construction Environmental Management Plan
CPRSS	Corridor Preliminary Routeing and Siting Study
CRoW	Countryside and Rights of Way Act 2000
cSACs	Candidate Special Area of Conservation
CTMP	Construction Traffic Management Plan
CWSH	Coastal West Scotland and Hebrides
CPT	Cone Penetration Testing
DC	Direct Current
DESNZ	Department for Energy Security and Net Zero
DAERA	Department of Agriculture, Environment and Rural Affairs
DEFA	Department of Environment, Food and Agriculture
EC	European Commission
ECoW	Ecological Clerk of Works
EGL	Eastern Green Link
EPS	European Protected Species
ESO	Electricity System Operator
EU	European Union
FCS	Favourable Conservation Status
GCR	Geological Conservation Review
GIS	Geographical Information Systems

Acronym	Definition
HGV	Heavy Goods Vehicle
HDD	Horizontal Directional Drilling
HLA	Historic Landscape Area
HRA	Habitats Regulations Assessment
HVDC	High-Voltage Direct Current
HND	Holistic Network Design
IAQM	Institute of Air Quality Management
IC	Infrastructure Consent
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
LNR	Local Nature Reserve
MCPRSS	Marine Corridor Preliminary Routeing and Siting Study
MLWS	Mean Low Water Springs
MU	Management Units
NCN	National Cycle Network
NESO	National Energy System Operator
NGET	National Grid Energy Transmission
NNR	National Nature Reserve
NPWS	National Parks and Wildlife Service
NPS	National Policy Statement
NRW	Natural Resources Wales
NIEA	Northern Ireland Environment Agency
OAST	Options Appraisal Summary Table
OHL	Overhead Line
OWF	Offshore Wind Farm
PLSS	Preliminary Landfall Siting Study
PRoW	Public Rights of Way
pSPA	Potential Special Protection Area
RIAA	Report to Inform the Appropriate Assessment
RIGS	Regionally Important Geodiversity Sites
RSPB	Royal Society for the Protection of Birds

Acronym	Definition
SCI	Sites of Community Importance
SSSI	Sites of Special Scientific Interest
SAC	Special Area of Conservation
SPA	Special Protection Area
SRN	Strategic Road Network
SIAA	Statement to Inform the Appropriate Assessment
SNCB	Statutory Nature Conservation Body
TCPA	Town and Country Planning Act 1990
TCPRSS	Terrestrial Corridor Preliminary Routeing and Siting Study
TJB	Transition Joint Bay
WL2	Western Link 2
WSI	Written Scheme of Investigation
ZOI	Zone of Influence

GLOSSARY OF TERMS

Term	Definition
Annex I habitat	A benthic habitat type listed in Annex 1 of the EU Council Directive 92/43/EEC on the conservation of natural habitats, including wild animals and plants.
Auxiliary	Providing supplementary or additional support.
Cable Corridor Combination	A continuous and systematically assembled sequence of Cable Corridor Sections between Landfall Siting Zones and Converter Station Siting Areas selected based on their technical and environmental viability.
Cable Corridor Sections	A designated spatial boundary that outlines the maximum permissible area within which the final onshore terrestrial cable infrastructure, including the cable route and its associated easement, may be constructed. This corridor encompasses all potential alignments and construction zones necessary for installation, maintenance, and operational access
Cluster	Mostly small settlements containing a tight, sufficient and easily defined cluster of houses. There are occasional settlements of comparatively larger size amongst them. However, none of the clusters contain a sufficient supply of facilities or services and are therefore dependent on higher order centres. Clusters are identified as a cohesive group of 10 or more houses, with a functional link with a higher order centre based on its location on a bus route with a bus stop or within 800 metres to a bus stop
Converter Station	A specialised type of substation that forms the terminal equipment for high-voltage direct current (HVDC) transmission line – converting direct current (DC) to alternating current (AC) or the reverse.
Converter Station Siting Area	A strategically defined area of land, of sufficient size that possesses the spatial, environmental, and technical capacity to accommodate a single converter station (with allowance for micrositing where relevant).
Corridor	A broad area, within which the new transmission infrastructure (underground cables) could be routed.
Decarbonisation	Reduction or elimination of carbon dioxide emissions from a process (e.g. manufacturing, energy production).
Department of Energy Security and Net Zero (DESNZ)	The Department for Business, Energy and Industrial Strategy existed until 2023 when it split into the Department for Business and Trade (DBT), the Department for Energy Security and Net Zero (DESNZ) and Department for Business and Trade.
Direct Current (DC) electricity transmission	Electric power transmission in which the voltage is continuous. This is most commonly used for long distance point to point transmission
Discounted	The permanent removal of an option during the appraisal process. A discounted option is conclusively excluded from all future project stages and will not be reconsidered. This decision typically arises from significant risks or constraints, such as technical infeasibility, environmental impacts, planning restrictions, or socio-economic challenges, which make the option unviable for consenting, construction, or operation.
Easement	The right to use the land of another party for a specified purpose. In the context of electricity transmission, easements are often used to grant rights to install and retain equipment such as overhead lines or buried cables across the land of a third party.

Term	Definition
Edge Effects	Edge effects refer to the changes in resource availability and physical and biological conditions that occur at the boundary of ecosystems or within adjacent ecosystems, often resulting from disturbances such as vegetation clearing. These effects can influence environmental conditions and species composition, at the interface of disturbed areas and adjacent habitats
Electricity Act 1989	An act which applies to Great Britian to privatise the electricity supply industry. This act established a licensing regime and regulator for the industry known as the Office of Gas and Electricity Markets (OFGEM).
Esker	A long narrow ridge or mound of sand, gravel, and boulders deposited by a stream flowing on, within, or beneath a stagnant glacier.
European protected species (EPS)	Plant and animals' species (excluding birds) that are protected by law throughout the European Union (EU) as listed in Annexes II and IV of the European Habitats Directive.
Evolv Energies	A new entity formed by Xodus to deliver a broader engineering service as developments ramp up globally, targeting energy transition contracts in the concept technology, pre-FEED, FEED and detailed design stages of offshore projects.
Graduated Swathe	Shaded areas within the emerging preferences within which the required permanent Project infrastructure is considered more or less likely to be located, shown by the varying levels of shading. Darker shaded areas represent where infrastructure is likely to be better located while lighter shading indicates less likely locations.
Habitat Regulations Assessment (HRA)	A process to determine the potential negative impacts that project plans may have on recognised protected European sites – including Judgement of Likely Significant Effect (JLSE) and Appropriate Assessment (AA).
High Voltage Alternating Current (HVAC)	Electric power transmission in which the voltage varies in a sinusoidal fashion. This is the most common form of electricity transmission and distribution.
High Voltage Direct Current (HVDC)	Electric power transmission using DC for the bulk transmission of electrical power (unlike the conventional systems with AC). Due to the absence of inductance in DC, HVDC lines offer better voltage regulation as compared to AC-based systems.
Holistic Design Network (HND)	Providing a recommended onshore and offshore design to allow 23 GW of offshore wind energy to be added to the existing energy network, facilitating the UK Governments goal to achieve 50 GW of offshore wind energy to Great Britain by 2030.
Horizontal Directional Drilling	A minimal impact trenchless method of installing underground utilities (e.g. pipes, cables, conduits) at a relatively shallow depth without disturbing the ground surface using a surface-launched drilling rig.
Interconnector	A structure that allows high voltage direct current (HVDC) electricity to flow between electrical grids, commonly used to connect two countries energy systems together.
Joint Nature Conservation Council	A public body that advises the UK Government and administrations to maintain and enrich biological diversity and conserve natural geological features.

Term	Definition
Landfall Compound Siting Area	A designated parcel of land identified as having the necessary spatial, technical, and environmental characteristics to accommodate the temporary and permanent infrastructure required for the onshore landing of an offshore HVDC cable system. These compound siting areas are critical for enabling the transition of the offshore HVDC cable to the onshore HVDC network.
Landfall Siting Zone	A geographically defined area of coastline that has been identified as having the physical, environmental, and technical characteristics necessary to accommodate the transition point where an offshore HVDC cable makes landfall and connects to the onshore HVDC system.
Marine Cable Preliminary Routeing and Siting Study (MCPRSS)	A document which will set out the preferred marine cable routeing option for AC5 and AC6 based on an assessment of the biological, physical, historical, and socio-economic marine environment.
National Electricity System Operators (NESO)	A publicly owned UK organisation responsible for managing the electricity market and balancing supply and demand since 2024, previously owned by National Grid plc (formally National Grid ESO).
National Grid Electricity Transmission (NGET)	A system operator responsible for the transmission of electricity in England and Wales.
Natural Resources Wales (NRW)	A Welsh Government sponsored body responsible for the protection and regulation of the environment and the maintenance of natural resources throughout Wales.
Network Options Assessment (NOA)	An evaluation to facilitate the development of an efficient, coordinated and economical system of electricity transmission consistent with the National Electricity Transmission System Security and Quality of supply Standard and the development of efficient interconnection capacity.
Office of Gas and Electricity Markets (OFGEM)	The government regulator for the electricity and downstream natural gas markets in Great Britian.
Options Appraisal	A robust and transparent process used to compare options and to assess the potential impacts they may have across a wide range of criteria including environmental, socio-economic, technical and cost factors.
Options Identification and Selection	Work undertaken to determine the emerging preferred converter station site, terrestrial cable corridor route and landfall location for the Welsh terrestrial component of the Project. It is intended to demonstrate how NGET's statutory duties, licence obligations, policy considerations, environmental, socio-economic, technical, cost, and programme issues have been considered and to provide information on the approach to the identification and appraisal of Corridors.
Overhead Line	An above ground electricity line that safely and securely transmits electricity through a series of conductors (wires). An overhead line comprises a series of components including supporting structures, such as pylons; line fittings, such as electrical insulators and conductor spacers; an earthwire (to protect the line from electrical faults and carry control data) and the conductors themselves.
Parked	To temporarily set aside a particular option during the appraisal process, not to discard it, but to defer its progression to later stages of project development. The

Term	Definition
	option remains available for future consideration, especially if those initially taken forward prove to be unfeasible due to changes in technical or environmental viability and scope.
Primary Cable Corridor Sections	The three main 'trunk' corridors, prioritised for their strategic alignment and minimal interaction with high-sensitivity areas, which formed the backbone of the preliminary cable corridor routing strategy. These corridors were designed to follow the most direct and least constrained paths.
Pylon	Overhead line structure used to carry overhead electrical conductors, insulators and fittings.
RSK	The RSK Group is a well-established global leader in the delivery of environmental and engineering solution consultation, founded in 1989 and comprising of over 200 companies.
Schedule 9	This is a requirement under the Electricity Act 1989 where National Grid Electricity Transmission and Scottish Power Energy Transmission has a statutory obligation regarding the preservation of amenity.
SP Transmission Plc (a subsidiary of SP Energy Networks, SPEN)	A system operator responsible for the transmission of electricity in central and southern Scotland.
Secondary Cable Corridor Sections	Additional routes developed to provide connectivity and optionality between the Primary Cable Corridor Sections. These routes allow for flexibility in routing, serving as contingency options to facilitate the creation of a robust and adaptable cable corridor network for appraisal.
Sites of Special Scientific Interest (SSSI)	A designated area of particular importance to science due to the presence of rare plant or animal species, geological or physiological features (e.g. Ancient Woodland, grasslands, bogs).
Special Area of Conservation (SAC)	A designated site of community importance that is protected, maintained and restored due to the presence of one or more rare habitats or species listed in the Habitats Directive at sea or on land.
Special Protection Area (SPA)	A designated site under the European Union Directive on the Conservation of Wild Birds, safeguarding the habitats of migratory and threatened bird's species – part of the Natura 2000 network.
Stage 1 Study Area	The broad area within which proposed onshore connection points of the Project could be located and within which detailed environmental and socio-economic data is gathered to inform the Stage 2: Options Identification and Selection phase.
Stage 2 Study Area	The broad area within which infrastructure (Landfall, Corridors, Siting Zones and/or Siting Areas) required for the Project could be located and within which detailed environmental and socio-economic data is gathered to inform Stage 2: Options Identification and Selection Process.
Study Area	A geographic boundary that defines the extent of the analysis or research.
Substation	A structure that transforms voltage from high to low or the reverse, as part of a larger electrical generation, transmission and distribution system.
Terrestrial	On or relating to dry land on earth.

Term	Definition
Terrestrial Cable Preliminary Routeing and Siting Study (TCPRSS)	A document which will set out the preferred terrestrial cable routeing option and siting for the Welsh Onshore component of AC6 and associated supporting infrastructure based on an assessment of the biological, physical, historical, and socio-economic terrestrial environment.
Town and Country Planning Act 1990 (TCPA)	An act to regulate the development of land and land-use planning in England and Wales.
Transition Joint Bay (TJB)	Buried concrete pad with joint connecting offshore and onshore cables.
Unexploded ordinance (UXO)	An explosive weapon that is yet to detonate and still poses a risk (e.g. bombs, projectiles, explosives).
UK National Site Network	The UK National Site Network refers to a network of protected areas (e.g. Special Areas of Conservation (SACs), and Special Protection Areas (SPAs)) that have been established under the Habitats and Birds Directives.
UK Biodiversity Action Plan Habitats	The UK Biodiversity Action Plan (BAP) habitats cover a wide range of semi-natural habitat types which have been identified as being at threat and requiring conservation.
Wildlife and Countryside Act 1981	An act to comply with the European Council Directive 79/409/EEC for the conservation of wild birds. This act gives protection to native species and controls the release of non-native species and enhances the protection of Sites of Special Scientific Interest (SSSIs).

EXECUTIVE SUMMARY

National Grid Electricity Transmission Plc (NGET) own, build and maintain the high voltage electricity transmission system in England and Wales. Scottish and Southern Electricity Networks Transmission (SSEN-T) and SP Transmission Plc (a subsidiary of SP Energy Networks, SPEN) own, build and maintain the high voltage electricity transmission system in Scotland. In each of their geographical areas, NGET, SSEN-T and SP Transmission Plc are responsible for making sure electricity is transported safely and efficiently from where it is produced to where it is needed.

This Terrestrial Corridor Preliminary Routeing and Siting Study (TCPRSS) details the work undertaken at the Options Identification and Selection Stage (Stage 2). It includes development and refinement of preliminary Landfall Siting Zones, Landfall Compound Siting Areas, Cable Corridor Sections (and Combinations), and Converter Station Siting Zones, and the comparative assessment of these to identify NGET's emerging preferred options. Together, these define the broad location of the new infrastructure required to meet the Project need.

The TCPRSS will be used to inform early-stage consenting, Environmental Impact Assessment Scoping, pre-application consultation and engagement with key stakeholders, including landowners, local authorities, and statutory consultees.

A Bridging Note titled "*A Bridging Note for the Terrestrial Corridor Preliminary Routeing and Siting Study and Stage 1 Consultation Materials*" is provided at the front of this document (immediately following the front cover) and should be read prior to the remainder of this TCPRSS. The Bridging Note explains how the information presented in this TCPRSS relates to more recent project documents, including the Western Link 2 Stage 1 Consultation Materials. It provides context on how the project has evolved since this report was prepared in September 2025, including changes to terminology, project definition and design development, and should be used to aid the reader's understanding of this document within the current project context.

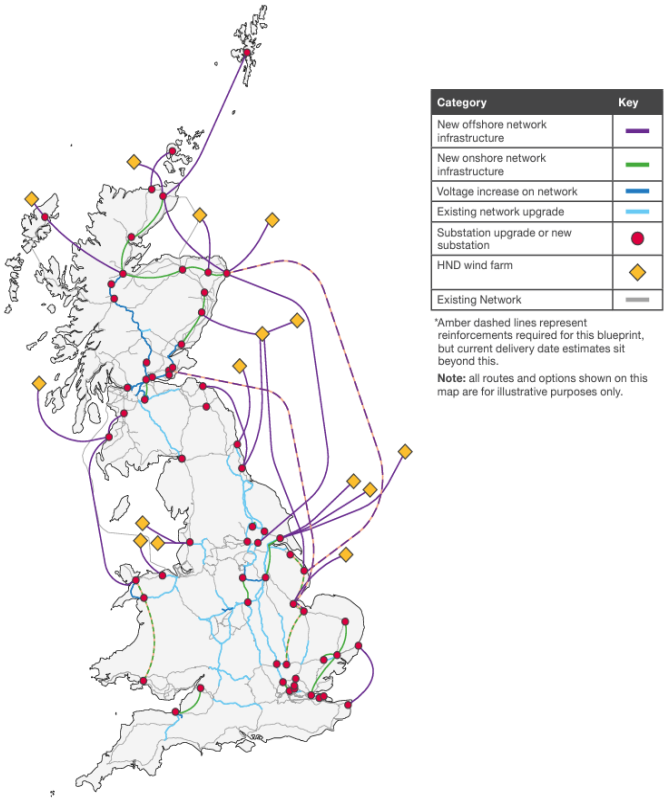
As detailed in the Bridging Note, at the time the TCPRSS was prepared, the project was identified as AC6 and is therefore referred to as such throughout the document (or as "the Project") to reflect its designation at that stage of development. Since then, the project has progressed and has been formally renamed Western Link 2 (WL2), which is the terminology that will be adopted following this TCPRSS.

This TCPRSS appraises the infrastructure components required for the Welsh Onshore component of the Project.

The Project constitutes two proposed offshore high-voltage direct current energy links (previously referred to as AC5 and AC6), with associated onshore infrastructure between Ayrshire in Scotland and Gwynedd in Wales.

The Project will be routed from the west coast of Scotland and connect into potential landfall locations in north Wales (as illustrated in **Figure i**). Following National Grid Electricity System Operator's (ESO) (now known as the National Electricity System Operator) Pathway to 2030 Holistic Network Design and Beyond 2030 reports, AC6 was identified as an essential reinforcement option to support the large-scale delivery of electricity generated from renewable energy. By enabling greater transfer of renewable generation from Scotland to areas of high demand further south, AC6 will help meet the UK Government's Net Zero targets and provide long-term security of energy supply to homes and businesses.

Figure i: NGET Proposed and Existing Network Infrastructure.



Under NGET's Strategic Optioneering Process, eleven potential Welsh connection points were initially assessed, including substations in north and south Wales. Through appraisal and subsequent reporting, Pentir (AC6-1) in north Wales and Bridgend (AC6-9) in south Wales were identified as the two options to progress into the Options Identification and Selection stage.

AC6 will comprise of Scottish Onshore, Marine and Welsh Onshore components. NGET is responsible for consenting the marine works and all onshore works in Wales. This report has been developed in tandem with the Marine Corridor Preliminary Routeing and Siting Study (MCPRSS) and strategic options appraisals undertaken for AC6 to ensure consistency and has given specific regard to the Welsh Onshore component of the Project, located within north Wales.

Strategic Optioneering

The indicative location for this new transmission reinforcement was identified through a Strategic Options Appraisal undertaken at the Strategic Proposal Stage (Stage 1)[1]. This considered a range of options for providing the necessary north-south power flows identified as being needed to accommodate energy generation being proposed off the western coast of the UK.

Summary of the Project

The Project will establish a new HVDC link beneath the sea from Scotland to north Wales, making landfall on the Gwynedd coast in north Wales. From landfall, the transmission reinforcement link will transmit electricity via underground HVDC cables to a new converter station, proposed to be located near the existing Pentir substation. At the converter station, electricity will be converted from direct current to alternating current and then transmitted to the existing Pentir substation via new High Voltage

[1] NGET's Approach to Consenting outlines the project development process, divided into six stages, for major infrastructure projects; Strategic Proposal, Options Identification & Selection, Defined Proposal & Statutory Consultation, Assessment & Land Rights, Application, Examination & Decision and Construction, with Strategic Proposal being Stage 1 and Construction being Stage 6. NGET's Approach to Consenting is detailed in Chapter 3 of this report.

Alternating Current (HVAC) connections, which will be constructed underground. To facilitate the new connection, a minor extension to the existing Pentir substation will be required, however this work will be delivered separately and does not form part of the Project.

The following sections summarise the key Welsh Onshore components of the Project as they stand at this stage of process. These include the Landfall Siting Zones, Cable Corridor Sections, and Converter Station Siting Zones that have been assessed to inform the emerging preferences.

The Welsh Onshore Project is made of the following components:

Landfall Siting Zones and Landfall Compound Siting Areas

Four preliminary Landfall Siting Zones were identified and taken forward in the options appraisal; these were:

- LF1, located towards the western extent of the Gwynedd coastline;
- LF2, situated centrally along the Caernarfon Bay coast;
- LF3, positioned slightly further east within Caernarfon Bay; and
- LF4, identified as an eastern option along the Gwynedd shoreline.

When considering all environmental, engineering, and socio-economic factors, LF2 and LF3 were identified as the preferred Landfall Siting Zones to progress further. Both areas offer the best opportunity for landfall installation, particularly from a biological and engineering perspectives, with fewer terrestrial constraints and more favourable transition opportunities into the terrestrial HVDC cable. However, recognising the preliminary nature of this stage of the Project, all four Landfall Siting Zones and their associated Landfall Compound Siting Areas are being retained to be progressed into pre-application consultation and subject to further geophysical surveys by marine engineers.

At this stage of the Project, LF2, LF3 and LF4, together with their associated Landfall Compound Siting Areas, are being progressed into pre-application consultation and subject to further assessment and geophysical surveys by marine engineers. LF4 is being retained to maintain optionality at this preliminary stage, recognising the iterative nature of the optioneering and design development process. LF1 was discounted from further consideration at this stage due to marine engineering feasibility constraints identified during early assessment.

Cable Corridor Sections and Combinations

The emerging preference for the terrestrial HVDC cable connection from the preferred Landfall Siting Zones (LF2 and LF3) towards Pentir is defined as AC6-PEN-CC-GS-01. This corridor combination primarily builds upon the central Cable Corridor Combination option AC6-PEN-CC-LF2_W but also integrates unconstrained areas from other Cable Corridor Sections to retain flexibility.

The route passes inland from the Gwynedd coastline, navigating around sensitive ecological and cultural heritage sites, while avoiding the most constrained sections of high-quality agricultural land and floodplain areas. This emerging preference represents the best balance between minimising environmental and socio-economic effects, reducing technical complexity, and ensuring a cost-effective and direct alignment towards Pentir.

By adopting AC6-PEN-CC-GS-01 as the emerging preference, the Project secures a corridor that is technically feasible, avoids the most sensitive receptors, and preserves optionality for further design work. Retaining flexibility within the corridor at this stage also allows the Project to respond to future survey findings and stakeholder input before a final route alignment is selected.

Converter Station Siting Zones

Four potential siting zones for a new converter station near Pentir were identified and assessed:

- AC6-PEN-CVT-RA01, located closest to the existing 400 kV Pentir substation;
- AC6-PEN-CVT-RA02, situated slightly further from the substation but within the same wider area;
- AC6-PEN-CVT-RA03, positioned east of Pentir in more constrained terrain; and
- AC6-PEN-CVT-RA04, located to the south, in an area with potential ground condition and access constraints.

Following detailed appraisal, AC6-PEN-CVT-RA01 and AC6-PEN-CVT-RA02 have been identified as the emerging preferences. Both sites minimise potential landscape and visual effects, reduce the technical complexity of connecting to the existing substation, and avoid the most sensitive environmental and socio-economic receptors.

By contrast, AC6-PEN-CVT-RA03 and AC6-PEN-CVT-RA04 were parked due to significant constraints, including severance from existing infrastructure, proximity to sensitive receptors, and potential engineering risks such as ground stability and historic landfill sites.

The progression of AC6-PEN-CVT-RA01 and AC6-PEN-CVT-RA02 into pre-application consultation provides the opportunity to refine the final converter station siting choice in response to public feedback, environmental survey results, and ongoing design development.

Graduated Swathe

A 'graduated swathe' has been identified within the emerging preferences. The graduated swathe is a way of showing the areas within the emerging preferences where the required permanent Project infrastructure is considered more or less likely to be located. The graduated swathe is shown with a colour shading, with the depth of shading indicating NGET's emerging view of where infrastructure would be best located based on the work undertaken to date. Darker shading indicates more likely locations, while lighter shading indicates less likely locations.

The use of the graduated swathe is intended to emphasise the preliminary nature of judgements made to date in respect of infrastructure locations within the emerging preferred corridor, siting zones and siting areas. The emerging preferences illustrated by the graduated swathe will be refined in a systematic manner, taking full account of feedback obtained through pre-application consultation, in conjunction with the collation and analysis of baseline ecological data and other relevant technical considerations. Accordingly, the graduated swathe reflects not only the current assessment of potential infrastructure locations, but also the ongoing, iterative process through which these assessments will be continually reviewed and updated as additional information and consultation feedback are received.

Next Steps

During pre-application consultation, NGET will be inviting feedback from landowners, local communities and stakeholders about, the proposed corridor and graduated swathe, and matters that they would like NGET to consider as AC6 is developed in more detail. The feedback from pre-application consultation, along with information from proposed surveys to supplement our baseline data, and ongoing design studies will inform further development of the Project.

The Welsh Onshore Project will require planning permission, which is expected to be subject to an Environmental Impact Assessment, statutory public consultation, and design development prior to submission of the application to Cyngor Gwynedd under the Town and Country Planning Act 1990.

An Environmental Impact Assessment Scoping Report will be prepared in 2026, prior to the pre-application consultation, to seek a formal opinion on the scope of the Environmental Impact Assessment.

1. INTRODUCTION

1.1 Overview

National Grid Electricity Transmission (NGET) and SP Transmission Plc (a subsidiary of SP Energy Networks, SPEN) are undertaking investigative constraints mapping and route corridor options appraisal works for an offshore high-voltage direct current (HVDC) electricity transmission reinforcement link project between the west coast of Scotland to either northern or southern Wales.

The project was identified and referred to within the National Electricity System Operator's Holistic Network Design (HND) as 'AC5/AC6'. RSK acknowledges that the project is now being referred to as Western Link 2 (WL2), reflecting its progression and the establishment of a joint venture between NGET and SP Transmission Plc to unify all components of the project (as illustrated in **Figure 1.3.1**).

However, at the time of preparing the TCPRSS, and throughout the Stage 2 development process, the project was identified as AC6. Accordingly, for the purposes of the TCPRSS, the project continues to be referred to as AC6 (or "the Project") to reflect its designation at that time. This approach is explicitly set out in both the Bridging Note at the outset of the TCPRSS and within the Executive Summary. Subsequent documentation and future stages of the project will adopt the name Western Link 2 (WL2).

1.2 Use of this Document and Bridging Note

This TCPRSS was prepared during an earlier stage of project development (Stage 2: Options Identification and Selection) and reflects the information and terminology applicable at that time. A Bridging Note titled "*Bridging Note for the Terrestrial Corridor Preliminary Routeing and Siting Study and Stage 1 Consultation Materials*" is included at the front of this TCPRSS (immediately following the front cover) to support its interpretation alongside more recent project documentation.

The Bridging Note explains how the project has evolved since the TCPRSS was prepared, including updates to terminology, design development and project definition. It also provides clarity on how this report should be read in conjunction with the Stage 1 Consultation Materials and the Onshore EIA Scoping Report. It is recommended that the Bridging Note is read prior to reviewing the main body of this document.

This TCPRSS focusses on the Welsh Onshore component of the Project.

1.3 Wider Strategic Context and Need for the Project

AC5 and AC6 are integral elements of a wider framework of transmission reinforcement initiatives identified through the HND to support the UK's net zero targets. These projects will deliver High Voltage Direct Current (HVDC) reinforcement along the west coast of Great Britain, strengthening the cross-border transmission network between Scotland and Wales.

AC5 is a subsea HVDC transmission link between two locations on the northern and southern Ayrshire coast. It is intended that this link will connect from the 'T-point'[2] connection on the southern Ayrshire coast to the grid on the northern Ayrshire coast.

AC6 complements this by extending HVDC reinforcement further south, improving power flow between Scotland and Wales. Together, AC5 and AC6 form part of the UK's first-of-its-kind multi-terminal HVDC system, operating at 525kV and capable of transmitting 2GW of power. Further information about both AC5 and AC6 is provided in **PROJECT DESCRIPTION.**

The innovative three-terminal configuration enhances the resilience and flexibility of the national grid, enabling more efficient integration of renewable energy sources. The design provides a strategic connection point from a proposed offshore generation project, facilitating the delivery of clean energy to areas of demand and supporting the decarbonisation of the electricity system.

The National Energy System Operator (NESO) (formerly the National Grid Electricity System Operator [ESO],' before 2024) Network Options Assessment 2021/22 Refresh (National Grid ESO, 2022) identified the need for major reinforcement of the national electricity transmission system across the Anglo-Scottish border. There are high volumes of wind power generation in Scotland but a lower local

[2] 'T-point' will act as a junction between the transition join bays for the AC5 and AC6 cables.

electricity demand; inversely, south of the Scottish border in England and Wales, there is typically a lower energy generation but higher electricity demand. This difference has historically led to an overall north to south power flow through the region.

The combined AC5 and AC6 project has been identified as one of several HND within the '*Pathway to 2030'* National Grid ESO Report (2022) and '*Beyond 2030'* NESO Report (2024), through which this reinforcement will be delivered. The objective of these reports is to provide recommendations to support the large-scale delivery of electricity generated from renewables, primarily offshore wind, via a reinforced electricity transmission network between Scotland, England and Wales. The HND recommends that additional links between Scotland and Wales are needed to meet the decarbonisation of the UK's electricity grid while also meeting the energy demands of citizens and business.

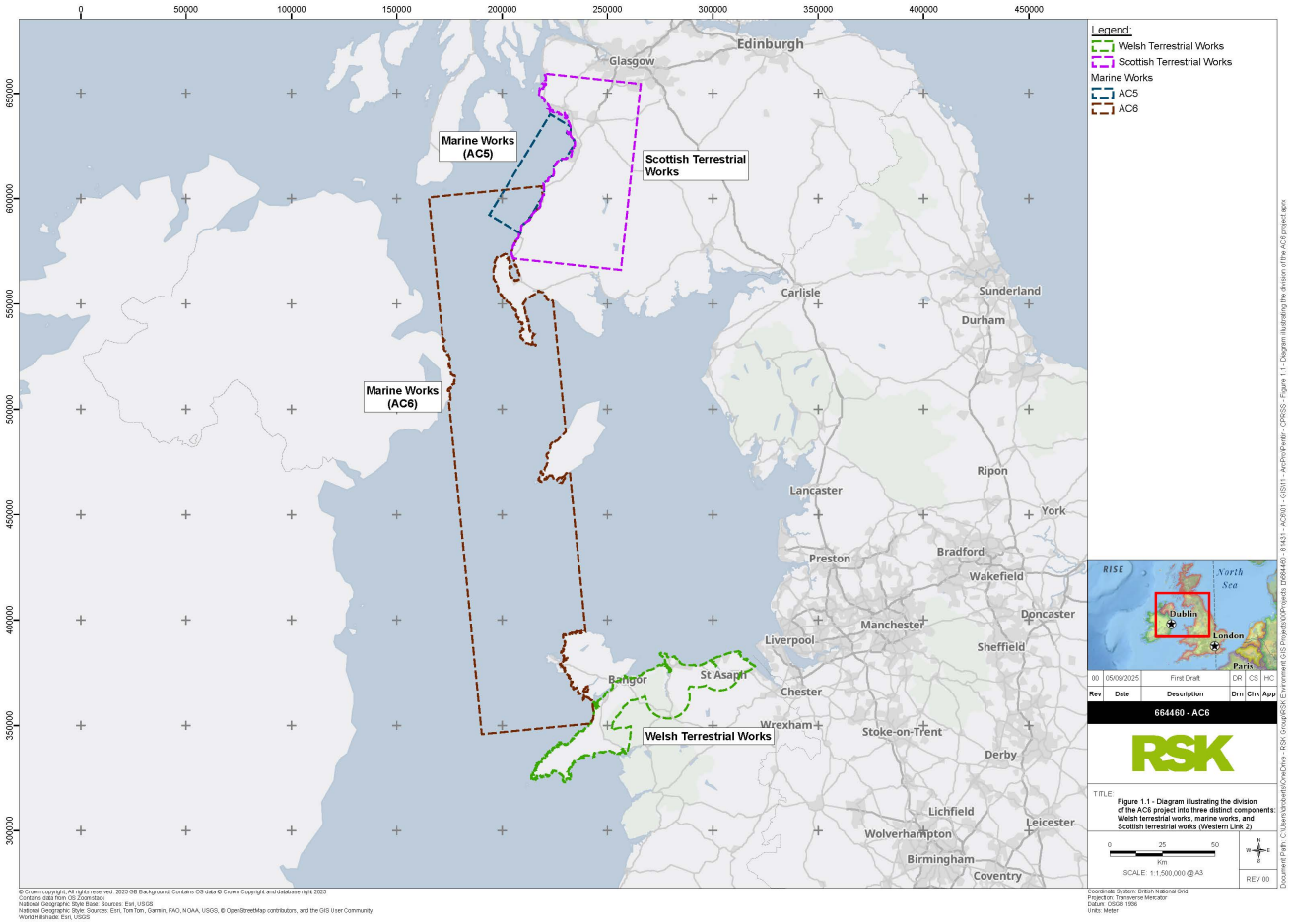
The Options Appraisal process is an integral part of project development, as specified in National Grid's (2022) 'Our Approach to Consenting'. To date, AC5 and AC6 has undergone Strategic Proposal works (Stage 1) and is now undergoing Options Identification and Selection (Stage 2). For further information on this process, refer to **OPTIONS APPRAISAL** APPROACH**3.4**.

The purpose of this TCPRSS is to detail the work undertaken to identify emerging preferences for Welsh Onshore infrastructure components associated with the Project. It examines the differentiating biological, physical, historical, access, socio-economic, planning and technical constraints present within the Stage 2 Study Area and explains how these receptors have materially influenced decisions regarding terrestrial and landfall routeing and siting.

The TCPRSS forms part of a broader suite of documents that collectively inform the preferred end-to-end solution for AC5 and AC6. This report specifically focuses on the terrestrial elements of the Project within Wales. For detail on the marine aspects of AC5 and AC6, please see the counterpart to this report, the '*Marine Corridor Preliminary Routeing and Siting Study (MCPRSS)*' (RSK 2025a).

It should be noted that the emerging preference and alternative options identified in this report and the MCPRSS may be subject to modification, design evolution and refinement following stakeholder engagement, public consultation, further design development, and environmental survey work. This TCPRSS is informed by appraisal work that forms part of an ongoing and iterative process. The findings and recommendations will continue to be tested and refined as work progresses.

[3]Figure 1.3.1: Diagram illustrating the division of the AC6 project into three distinct components



[3] * The Isle of Anglesey is excluded from the search area due to its designation as the Anglesey Area of Outstanding Natural Beauty (AONB), which extends along the entire coastline, and as a GeoMôn UNESCO Global Geopark. Crossing from Anglesey into North Wales is further constrained by the Menai Strait and Conwy Bay, which contain Annex I sandbank habitats, rendering a northern route unfeasible.

1.4 AC6 Project Team

Table 1.4.1 summarises the core project team responsible for delivery of the Stage 2: Options Identification and Selection and their respective roles:

Table 1.4.1: Key organisations involved in Stage 2 of AC6

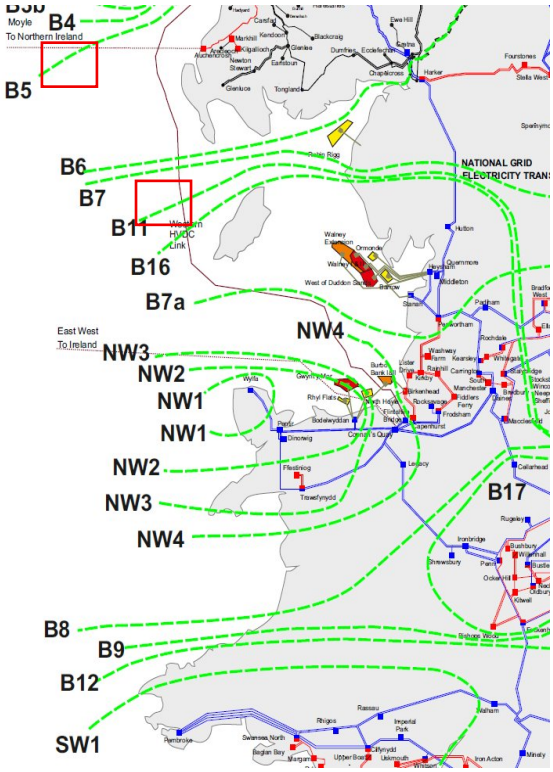
Organisation	Role
National Grid Electricity Transmission	Project owner for Welsh terrestrial and marine elements of the AC6 portion of WL2, as well as leading on the marine portions of the Manx, and Northern Irish marine works for the marine elements of the AC6 portion of WL2.
SP Transmission Plc (a subsidiary of SP Energy Networks, SPEN)	Project owner for Scottish terrestrial and marine elements of the AC6 and AC5 portion of WL2, as well as supporting on the marine portions of the Manx, and Northern Irish marine works for the marine elements of the AC6 portion of WL2.
AtkinsRéalis	Terrestrial Engineering Consultant
RSK Environment Ltd	Terrestrial Environmental Consultant
Evolv Energies	Marine Engineering and Survey Consultant
RSK Environment Ltd	Marine Environmental Consultant

This multidisciplinary team has collaborated to deliver the technical and environmental work required to inform the siting and appraisal processes outlined in the TCPRSS and MCPRSS.

1.5 Background and Need Case

Within the UK, the electricity network system is split into boundaries as shown in **Figure 1.5.1**: UK Power Boundaries**.** There is a limit to the amount of electricity that can flow through each boundary and as more electricity is required within the UK, the NESO can identify areas of priority to increase capacity.

Figure 1.5.1: UK Power Boundaries



The AC5 and AC6 project will reinforce power transfer across the Scottish and Welsh national boundaries by increasing capacity and reinforcing existing systems. The Project is essential to ensure effective transfer across B6 and B7a boundaries to enable excess energy generated in Scotland to be exported to the south. The Project will ensure suitable infrastructure is available to support acceleration of Welsh transmission projects and future export of excess energy from Wales.

1.6 Structure of this Report

The TCRPSS is structured as follows:

- **Chapter 2: PROJECT DESCRIPTION**– provides a summary of the differentiating components of the Welsh Onshore components of the Project;
- **Chapter 3: LEGISLATION, POLICY, AND STATUTORY** DUTIES – an overview of relevant policy, NGET's statutory duties, and NGET's guidance;
- **Chapter 4: OPTIONS APPRAISAL APPROACH** – details the 9-step methodology used to identify, define, and appraise the Study Area for the Welsh Onshore components of the AC6 and to define Landfall Siting Zones, Landfall Compound Siting Areas, Cable Corridor Sections, Cable Corridor Combinations and Converter Station Siting Zones for appraisal;
- **Chapter 5: OPTIONS APPRAISAL – LANDFALL COMPOUND SITING AREAS** – presents a summary appraisal of the common and differentiating biological, physical, historical, access, and socio-economic designations and receptors considered in the development and assessment of the Landfall Compound Siting Areas. It identifies both Common Environmental Receptors and Differentiating Environmental Receptors across all siting options, and provides a comparative appraisal and summary that supports the identification of the emerging preferred Landfall Compound Siting Area(s);
- **Chapter 6: OPTIONS APPRAISAL – CABLE CORRIDOR SECTIONS AND COMBINATIONS** – provides a summary of the common and differentiating biological, physical, historical, access, and socio-economic designations and receptors considered in the development and appraisal of the

Cable Corridor Sections. It identifies and describes both Common Environmental Receptors and Differentiating Environmental Receptors across all sections. The chapter also introduces the concept of Cable Corridor Combinations, presenting a comparative appraisal of environmental receptors across these combinations, again identifying the Common Environmental Receptors and Differentiating Environmental Receptors. This analysis supports the identification of the emerging preferred Cable Corridor Combination(s);

- **Chapter 7: OPTIONS APPRAISAL – CONVERTER STATION SITING ZONES** – presents a summary appraisal of the common and differentiating biological, physical, historical, access, and socio-economic designations and receptors considered in the development and assessment of the Converter Station Siting Zones. It identifies both Common Environmental Receptors and Differentiating Environmental Receptors across all siting options, and provides a comparative appraisal and summary that supports the identification of the emerging preferred Converter Station Siting Zone(s);
- **Chapter 8: EMERGING PREFERENCES** – outlines the emerging preferences for the Welsh AC6 terrestrial infrastructure, including the Landfall Siting Zone, Landfall Compound Siting Area, Cable Corridor Combination, and Converter Station Siting Zone;
- **Chapter 9: GRADUATED SWATHE** Error! Reference source not found. – outlines the methodology used to develop a Graduate Swathe for the Welsh Onshore Project; and
- **Chapter 10: SUMMARY AND NEXT STEPS** – provides a summary of the TCPRSS and outlines the next steps for the Welsh terrestrial elements of the AC6 project as it progresses into Stage 3: Strategic Proposal and Statutory Consultation and beyond.

1.7 Structure of this Report

As the Welsh Onshore Project has progressed through Stage 1: Strategic Proposal and Stage 2: Options Identification and Selection, certain landfall options (Stage 1) and project component options (Stage 2) have not been taken forwards. Within the TCPRSS, two terms are used to describe the status of these options: discounted and parked. Their definitions are provided below:

- **Discounted** refers to the permanent removal of an option during the appraisal process. A discounted option is definitively excluded from all future stages of the Project and will not be reconsidered. This decision is typically driven by substantial risks or constraints, such as technical infeasibility, environmental impacts, planning restrictions, or socio-economic challenges, which render the option unviable from a consenting, construction or operational standpoint.
- **Parked** refers to the temporary suspension of an option during the appraisal process. Unlike discounted options, parked options are not discarded, and they remain available for future consideration. This status is applied when an option is currently less favourable but may become viable if circumstances change. For example, if preferred options prove unfeasible due to technical, environmental, or scope related factors.

The difference between these terms is that discounted indicates a final decision with no possibility of progression, whereas parked allows for the option to be revisited in later stages of AC6 or other NGET projects. This terminology will be applied consistently throughout this report.

2. PROJECT DESCRIPTION

2.1 Introduction

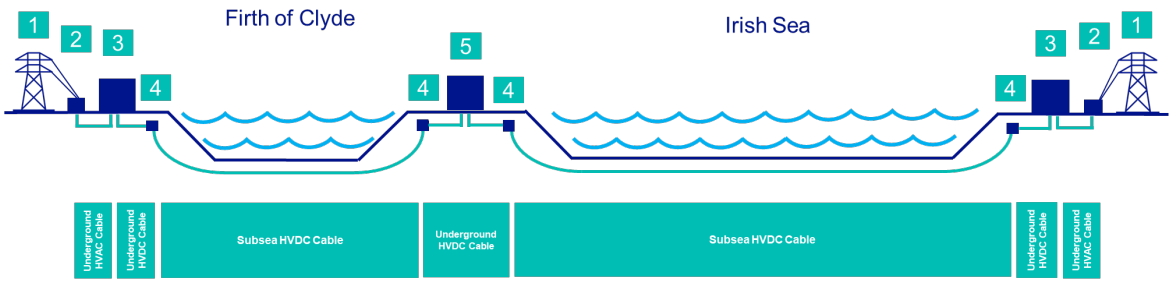
Existing electricity transmission systems in Scotland and Wales both operate using predominantly high voltage alternating current (HVAC). Submarine electrical transmission reinforcement links more commonly use HVDC cables due to their suitability for transmitting large amounts of electricity over longer distances. This reduces energy loss in comparison to HVAC systems and provides a greater degree of control over the magnitude and direction of power flow.

For context, this section provides detail of the associated terrestrial works in Scotland for the ongoing SP Transmission Plc 'Western Link 2' works, the marine connection and the terrestrial works in Wales for AC6. It is anticipated that the overall project will comprise construction of the following and illustrated in **Figure 2.1.1** (please note this is an evolving process and the information detailed below is not the final project design):

- SP Transmission Plc Western Link 2:
  - Connection to the existing network in north Ayrshire, Scotland;
  - Underground HVAC cable route from the existing network to a new converter station on the northern Ayrshire coast;
  - Underground HVDC cable from the new converter station to the northern Ayrshire landfall location;
  - Underground HVDC cable route from the southern Ayrshire coast landfall point to the 'T-point;'
  - 'T-Point' connection on the southern Ayrshire coast, this will allow for the connection of the AC5 and AC6 cables to an export cable from a proposed offshore generation project; and
  - Underground HVDC cable route from 'T-point'[2] to the landfall point on the southern Ayrshire coast.
- AC5:
  - Subsea HVDC cable route (AC5) between two locations on the northern and southern Ayrshire coast in Scotland.
- AC6 Marine:
  - Subsea HVDC cable route (AC6) between a landfall on the Ayrshire coast in Scotland to a landfall in Caernarfon Bay, Gwynedd, Wales.
- AC6 Terrestrial Wales:
  - Underground HVDC cable route from a landfall point in Caernarfon Bay, Gwynedd, Wales to a new converter station;
    - New converter station within 2 km of the Pentir 400 kV substation and underground HVAC connection back to the existing Pentir 400 kV substation; and
    - Extension of the existing Pentir 400 kV substation.

The options appraised and summarised within this report only consider siting and routeing of AC6 terrestrial components in Wales, as detailed above. They do not consider the details of any potential layouts, permanent access requirements or any auxiliary works that may be required to connect to existing infrastructure.

Figure 2.1.1: Schematic of the Proposed Works associated with the AC6 Project



HVAC – High Voltage Alternating Current
HVDC – High Voltage Direct Current
1. Existing network
2. Substation
3. Converter station
4. Transition joint bay
5. T-Point

2.2 Intertidal Area

The reinforcement link will need to cross the intertidal area when making landfall, transitioning from marine to terrestrial cable system within a Transition Joint Bay (TJB). As with the other sections of marine and terrestrial cable, the cable system and associated components will be buried in the intertidal area and at landfall. Temporary excavations will be required to allow the burial of cables and components. Once constructed these will remain under ground until they are to be decommissioned at the end of their service life. Detailed studies will be conducted to ensure that the cable and the TJB will be undergrounded to a sufficient depth to avoid exposure by coastline processes during this service life.

2.3 AC6 Welsh Onshore Project Components

2.3.1 High level description

The AC6 project integrates both marine and terrestrial infrastructure, with a transition occurring at the landfall zone along the coastline. At this interface, HVDC cables extend from the marine environment across the intertidal zone, through Mean Low Water Springs (MLWS), and connecting into a buried TJB. The TJB serves as the connection point between the marine and terrestrial HVDC cables.

From the TJB, the terrestrial HVDC cables will be routed inland towards a new converter station near Pentir, where the direct current will be converted to alternating current. The final link in the transmission system involves HVAC connections from the converter station to the existing 400 kV Pentir substation, completing the integration with the national grid.

The following sections provide a more detailed overview of the key Welsh terrestrial project components, including the landfall, cable infrastructure, and converter station.

2.3.2 Landfall

Landfall represents the critical interface between the marine and terrestrial components of the Welsh Onshore Project. At landfall, the marine HVDC cables connect to the terrestrial HVDC underground cables via a TJB. The TJB is a permanent, underground interface chamber typically constructed from reinforced concrete. It houses essential infrastructure including cable jointing systems, fibre optic link pits, and associated earthing and monitoring equipment. Further detailed design of the TJB will be undertaken by NGET and AtkinsRéalis during subsequent engineering phases of the Project. **Figure 2.3.1** illustrates a typical TJB during the operational phase of a project, following reinstatement.

Figure 2.3.1: Example of TJB following reinstatement

Depending on site-specific constraints and prevailing ground conditions at the identified Landfall Siting Zones, cable installation may be carried out using either open cut or trenchless methods. The suitability of these installation techniques has been considered within the options appraisal, considering local environmental features and potential construction impacts. Ongoing work on construction methodologies is being led by NGET, AtkinsRéalis, and Evolv Energies.

The methodology for identifying Landfall Siting Zones and Landfall Siting Areas is outlined in **Landfall Siting** Zones and **Landfall** Compound Siting Areas, respectively.

2.3.3 Terrestrial Cabling

The onshore cable route will connect potential landfall locations along the Caernarfon Bay coastline to the proposed converter station near Pentir via HVDC cables, and subsequently to the existing 400 kV Pentir substation vis HVAC cables. The methodology for identifying Cable Corridor Sections and Cable Corridor Combinations is outlined in**OPTIONS APPRAISAL** APPROACH**.**

2.3.3.1 HVDC

The HVDC system will consist of two pairs of underground HVDC cables, accompanied by a Distributed Temperature Sensing carrier tube and fibre optic cables for performance monitoring. Each HVDC cable typically has a diameter of approximately 15 cm. An example of HVDC cable construction, as implemented in the Viking Link Interconnector project, is shown in **Figure 2.3.2.**

The HVDC cables will be installed in segmented sections, typically ranging from 800 m to 1.5 km, and connected via buried cable joint bays. The cables will be buried at a minimum depth of 900 mm, and the route will be subject to a permanent easement, the width of which is yet to be finalised. Limited above ground infrastructure is required along the HVDC route, including link pillars to access communication cables and small marker posts placed at strategic locations such as field boundaries

and crossings to alert landowners and asset managers to the presence of underground infrastructure. The final cable configuration will be confirmed during detailed design following contractor appointment.

Figure 2.3.2: Example of HVDC Construction used in the Viking Link Interconnector project

2.3.3.2 HVAC

A shorter section of underground HVAC cables will connect the new Pentir converter station to the existing 400 kV Pentir substation. An example of typical HVAC cable construction is shown in **Figure 2.3.3**. The HVAC cables will also be installed in sections of 800 m to 1.5 km, joined at buried cable joint bays. These bays may include link pillars or underground link boxes, depending on design requirements. Link pillars are typically 1 m x 1.5 m in footprint and 1.5 m in height.

The minimum burial depth for HVAC cables is 900 mm, although in areas with specific constraints, such as Best and Most Versatile agricultural land, installation depths may increase to 1.2 m. As with HVDC, the HVAC route will be subject to a permanent easement, with final dimensions to be determined. Above-ground infrastructure will be minimal, limited to marker posts or link pillars at joint bay locations to ensure visibility for landowners and maintenance teams. Siting of these above ground components will take advantage of landscape screening to minimise visual impact.

Figure 2.3.3: Typical Underground HVAC cable construction

2.3.4 Converter Stations

The electricity transmission network in Great Britain predominantly operates using HVAC technology. However, for long-distance and high-capacity transmission, HVDC technology offers benefits of improved efficiency and control when compared to long-distance HVAC systems. As such, subsea transmission reinforcement links typically utilise HVDC and HVAC technologies. To enable this, converter stations are required at each end of an HVDC transmission link prior to connections to the grid to convert electricity between HVAC and HVDC systems, depending on the direction of power flow.

Converter stations incorporate specialist electrical infrastructure, including transformers, reactors and harmonic filters. These components may be housed both indoors and outdoors. Indoor equipment is typically accommodated in buildings that can reach heights of up to 30 m, while other elements may be installed in smaller structures or open compounds. The overall footprint and layout of a converter station vary depending on the HVDC technology used and the transmission capacity being developed.

For the AC6 project, a new converter station is proposed near the existing 400 kV Pentir substation in North Wales. It is anticipated that a combination of Air-Insulated and Gas-insulated components will be used for this installation. A similar example to the anticipated AC6 converter station is the site developed for the Viking Link Interconnector project, as illustrated in **Figure 2.3.4**. Details of the siting process used to identify potential converter station locations are outlined in **OPTIONS APPRAISAL** APPROACH.

Figure 2.3.4: Converter Station Facility developed for the Viking Link Interconnector Project, illustrating a typical layout and scale of infrastructure

Additional information is provided in **Engineering Parameters** of this report. The detailed engineering parameters will be further refined and developed during Stage 3: Defined Proposal and Statutory Consultation.

2.3.5 Extension to the Existing Pentir Substation

To accommodate the Welsh Onshore Project, the existing Pentir substation will require an extension. The appraisal is being delivered separately and is currently in progress. The substation extension will form part of Stage 3: Defined Proposal and Statutory Consultation and will be included within the consent sought for the AC6 project.

3. LEGISLATION, POLICY, AND STATUTORY DUTIES

3.1 Overview

AC6 Welsh Onshore Project Components outlines the Welsh Onshore Project components, for which consent will be sought, excluding the existing and operational 400 kV Pentir substation, which is not subject to further consenting.

The primary consenting regime currently assumed for the Welsh Onshore Project is the Town and Country Planning Act 1990. As part of the consenting strategy review, the recently introduced Infrastructure Consent (IC) regime, established under the Infrastructure (Wales) Act 2024, has been considered as a potential alternative route. Further assessment and internal discussions are ongoing, with a final decision on the preferred consenting route anticipated in due course.

Based on the current location of Landfall Siting Zones, Landfall Compound Siting Areas, Cable Corridor Combinations, and Converter Station Siting Zones, engagement with key stakeholders is expected. These stakeholders are listed in **Table 3.1.1**, though the list is not exhaustive. Additional stakeholders may express interest as the Welsh Onshore Project progresses as further details emerge.

Table 3.1.1: Key Statutory Bodies (Terrestrial)

Jurisdiction	Stakeholder
UK	Department for Energy Security and Net Zero (DESNZ)
National	Natural Resources Wales (NRW)* Cadw Heneb Dŵr Cymru Wales and West Utilities Sustrans The Ramblers Association Relevant community councils Public Health Wales Mining Remediation Authority Health and Safety Executive Transport for Wales Ministry of Defence
Regional	Eryri National Park Authority* Gwynedd Archaeological Trust North Wales Wildlife Trust
Local	Cyngor Gwynedd* The Isle of Anglesey County Council* Conwy County Borough Council* Relevant community councils

* Denotes stakeholders which have already been engaged in AC6 in relation to current work done to date.

It is anticipated that the TCPRSS report will be used as a supporting documentation during pre-application consultation and as a means of facilitating engagement with key stakeholders. It is anticipated that pre-application consultation will take place in Q1 2026.

3.2 Relevant Legislation, Policy and Guidance

The Local Planning Authority for the Study Area is Cyngor Gwynedd. In addition, The Isle of Anglesey County Council and Eryri National Park Authority will act as key statutory consultees, due to their proximity and their roles in overseeing landscape and environmental designations.

In line with Section 11A of the National Parks and Access to the Countryside Act 1949, NGET, as a statutory undertaker, has a legal duty to have regard to the purposes of National Park designation. This includes the requirement to actively "further the purpose" of conserving and enhancing the natural beauty, wildlife, and cultural heritage of National Parks. Although a detailed assessment of potential impacts on Eryri (Snowdonia) National Park will be undertaken in subsequent phases of the Welsh Onshore Project, this report acknowledges the statutory duty and confirms that the potential effects on the National Park have been, and will continue to be, a key consideration in the development of Welsh Onshore Project. Ongoing engagement with relevant stakeholders, alongside future environmental assessments, will ensure that this duty is appropriately carried out.

The Welsh terrestrial planning approach will be guided by both national and local planning policy, with key considerations summarised in **Table 3.2.1** below.

Table 3.2.1: Terrestrial Planning Policy Considerations

Policy level	Policy
UK Policy	Energy National Policy Statement's: EN-1 (2023); Overarching NPS for Energy; and EN-5 (2023); Electricity Networks.
	British Energy Security Strategy 2022
	Transmission Acceleration Action Plan
	Clean Power 2030 Action Plan
	Countryside and Rights of Way Act 2000 (CROW Act), s.85
	National Parks and Access to the Countryside Act 1949, s. 11A
	Environment (Wales) Act 2016
National Planning Policy	Future Wales – The National Plan 2040
	Technical Advice Notes (TANs)
	Planning Policy Wales (Edition 12)
Local Planning Policy	The Anglesey and Gwynedd Joint Local Development Plan
	Gwynedd Local Development Plan (emerging)
	Eyri Local Development Plan
	Local Area Energy Plans

3.3 NGET's Statutory Duties (Electricity Act 1989)

Under Schedule 9 of the Electricity Act 1989, NGET has a statutory duty to preserve amenity during its operations. NGET is legally obligated to distribute electricity through England and Wales in a cost-effective manner to organisations or individuals seeking connection to the transmission network. As per Schedule 9, Paragraph 1 of the Electricity Act 1989, NGET is legally obligated to –

'…have regard to the desirability of preserving natural beauty of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest'

Furthermore, NGET must:

'…do what it reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects.'

To fulfil these legal obligations, NGET has developed a Schedule 9 statement which sets out a series of commitments. These include:

'[NGET] Will seek to avoid, where reasonably practicable, the installation of new infrastructure in areas which are nationally or internationally designated for their landscape, wildlife, historic or cultural significance: National Parks; Areas of Outstanding Natural Beauty; Sites of Special Scientific Interest including Special Protection; Areas, Special Areas of Conservation and RAMSAR sites; National Nature Reserves; Heritage Coasts; World Heritage Sites; scheduled ancient monuments, listed buildings, registered parks and gardens, registered battlefields and conservation areas. WPD will seek to avoid significant impacts on regional and local sites, protected species and to biodiversity and geological interests within the wider environment, and take measures to safeguard landscape character, the historic environment, heritage assets and their settings. Where reasonably practicable, opportunities to enhance biodiversity, geological features and the historic environment of such sites will be exploited'.

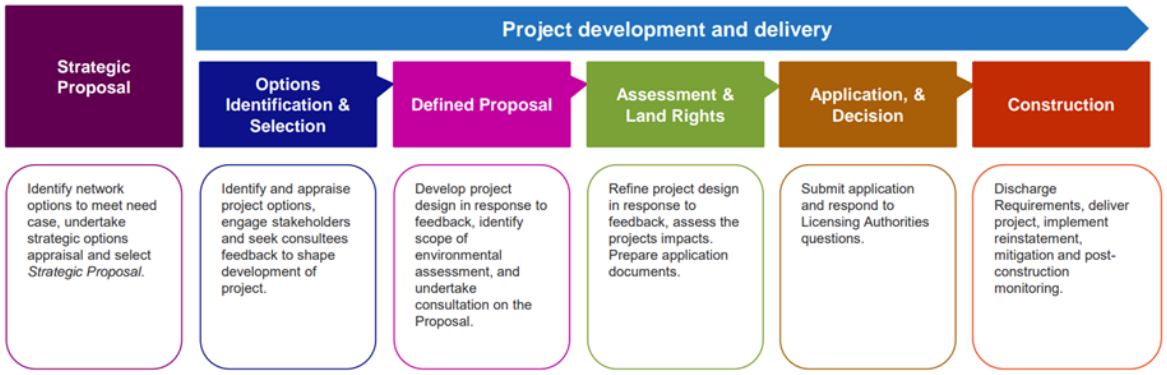
To date, the existing works conducted by RSK under the strategic optioneering process for AC5/AC6 have been carried out in accordance with this commitment. The development of Strategic Options has prioritised the avoidance of designated sites and sensitive areas as a primary mitigation measure.

Further information on the environmental and socio-economic designations and receptors considered during routeing and siting is provided in **OPTIONS APPRAISAL** – LANDFALL COMPOUND SITING AREAS to **OPTIONS** APPRAISAL – CONVERTER STATION SITING ZONES of this TCPRSS.

3.4 National Grid Electricity Transmission's Approach to Consenting

As detailed in NGET's 'Approach to Consenting' (National Grid, 2022), a standard project development and delivery approach has been developed for major infrastructure projects, from inception to consent and construction. This process can be divided into six stages as presented below in Error! Reference source not found.**Figure 3.4.1**.

Figure 3.4.1: National Grid's approach to consenting



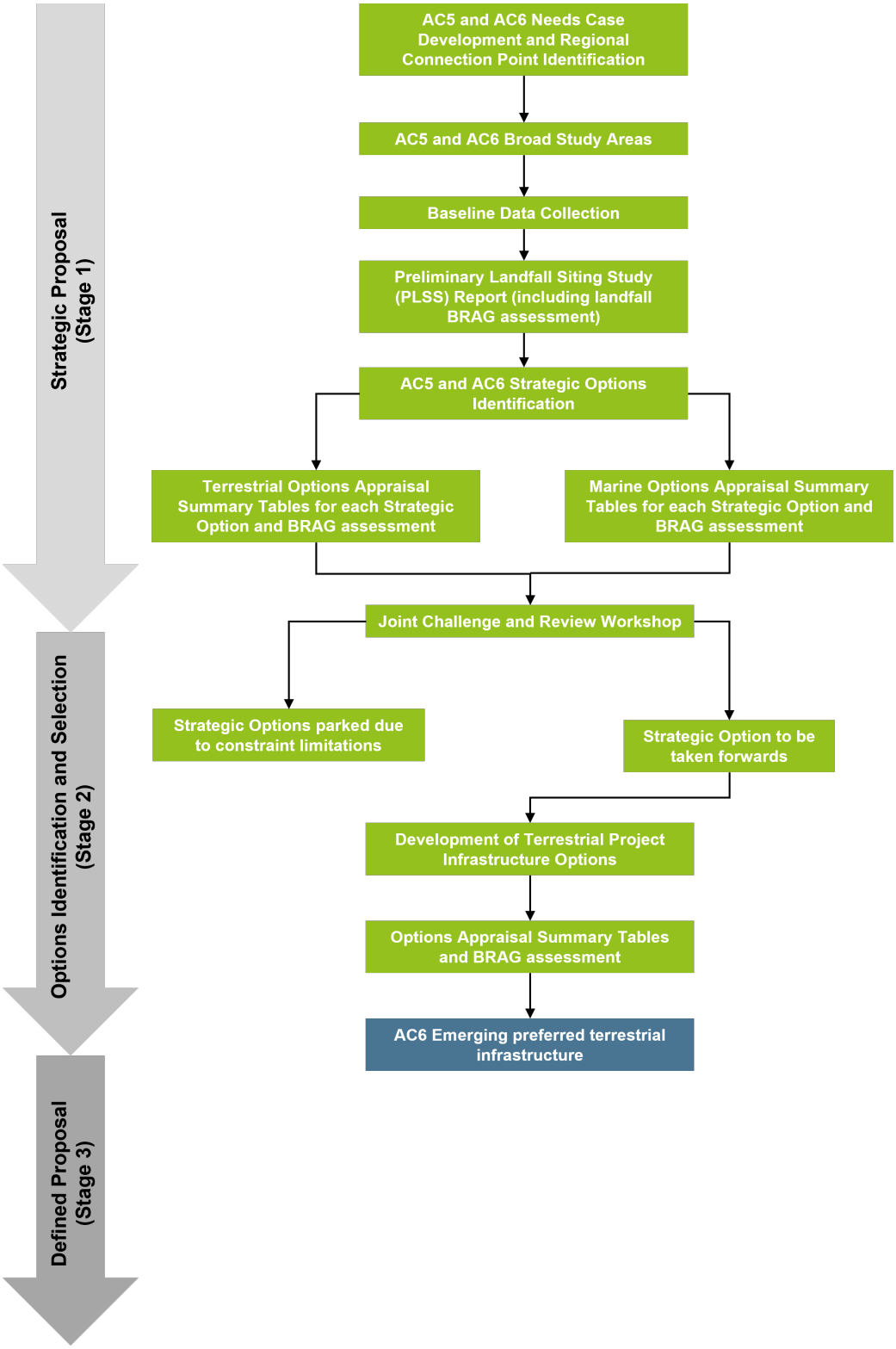
Present works in relation to AC6 are currently in the Options Identification and Selection stage (Stage 2). Within this stage, a stepped approach is used to support the identification of potential routeing and siting options for the project. The outputs from this second stage consider the potential impacts on environmental, planning, historical and socio-economic receptors as well as technical and engineering design considerations.

As detailed in **NGET's Statutory** Duties (Electricity Act 1989), National Grid has a series of statutory obligations that must be considered as part of the routeing and siting process. With these obligations in mind, the aim of this rounded appraisal approach is to achieve a balanced consideration of these factors and identify emerging preferences for Landfall Siting Zones, Landfall Compound Siting Areas, Cable Corridors and Converter Station Siting Zones for the Welsh Onshore Project.

This process allows for documentation of key project option decisions and provides opportunity to back-check ruled-out options throughout Welsh Onshore Project 's development. This approach means that an auditable, robust, transparent and consistent manner can be presented for the identification of routeing and siting of National Grid projects.

To support the progression of environmental and socio-economic works within the options identification and selection stage, the following step-by-step process was followed by RSK (**Figure 3.4.2**).

Figure 3.4.2: Overview of the phased approach to Welsh terrestrial appraisal for AC6



4. OPTIONS APPRAISAL APPROACH

4.1 Introduction

LEGISLATION, POLICY, AND STATUTORY DUTIES outlines NGET's Approach to Consenting guidance, which forms the foundation for the options appraisal work presented in this report. The Welsh Terrestrial and Marine AC6 project is currently concluding Stage 2: Options Identification and Selection and is preparing to enter Stage 3: Defined Proposal and Statutory Consultation. The initial phase, Stage 1: Strategic Proposal, was completed between January and August 2024, during which Pentir was selected as the preferred strategic option. The output of Stage 1: Strategic Proposal was the Preliminary Landfall Siting Study (PLSS) Report, as referenced throughout this document.

This document, the TCPRSS, sets out the findings of Stage 2, identifying emerging preferences for the siting and routing of key terrestrial infrastructure components including the landfall, cable corridor, and converter station. These findings will inform pre-application consultations.

To ensure a structured and transparent appraisal, Stage 2 employed a 9-step methodology, adapted from similar processes used on other NGET projects such as Eastern Green Link (EGL) 3, 4, and 5. While the core principles remain consistent, the approach has been tailored to suit the specific context of AC6, reflecting factors such as programme requirements, RSK's routing and siting experience, best practice, and the availability of baseline data.

The 9-step process is illustrated in **Figure 4.2.1**: 9-Step AC6 Options Appraisal and is designed to provide a clear, repeatable framework for decision-making. Key terms used throughout this chapter are defined both within the text and in the glossary and terms table at the beginning of the TCPRSS.

4.2 South Wales Strategic Option – AC6-9 (Bridgend)

Before detailing the 9-step methodology, it is important to note that an additional Strategic Option in South Wales, comprising connection to the transmission system at AC6-9 (Bridgend), was initially identified during Stage 1 and, along with AC6-1 (Pentir), was progressed to Stage 2, but was ultimately parked. The other 8 options) were subsequently parked during Stage 1.

Parked is defined as the temporary setting aside of a particular option during the appraisal process, not to discard it, but to defer its progression to later stages of project development. The option remains available for future consideration, particularly if those initially advanced become unfeasible due to changes in technical or environmental viability or shifts in project scope.

AC6-9 (Bridgend – South Wales) were shortlisted as potential strategic options during Stage 1. These options were subsequently advanced to Stage 2: Options Identification and Selection. RSK was appointed as the Terrestrial Environmental Consultant for both strategic options, supporting the routing and siting appraisal process.

During Stage 2, both options were assessed using the 9-step methodology outlined in **OPTIONS APPRAISAL** APPROACH of this TCPRSS and illustrated in **Figure 4.2.1**. While AC6-1 (Pentir) proceeded through the full appraisal process, AC6-9 (Bridgend) was parked at Step 4 following a decision by NGET. Although AC6-9 (Bridgend) was not taken forward within the scope of the AC6 project, it remains under consideration for potential inclusion in future NGET projects.

Figure 4.2.1: 9-Step AC6 Options Appraisal Methodology

Step 1

Identify and define of Study Areas

- Reference to Stage 1 Study Area and define Stage 2 Study Area.
- Define the Converter Station Siting Hierarchy and the engineering parameters.

Step 2

Scope environmental designations/receptors and collect baseline data

- Collate international, national and local technical, environmental and socio-economic datasets.

Step 3

Assign Black-Red-Amber-Green (BRAG) ranking to designations/receptors

- Prescribe a risk ranking category to the designations/receptors identified in Step 2.
- Develop BRAG list for cables and converter stations, building on BRAG work undertaken in Stage 1..
- Produce heatmaps to display risk ranking across the Stage 2 Study Area.

Step 4

Identify and define Landfall Siting Zones, Landfall Compound Siting Areas, Cable Corridor Sections and Converter Station Siting Zones

- Identify Preliminary Landfall Siting Zones, Landfall Compound Siting Areas, Cable Corridor Sections and Converter Station Siting Zones using outputs from Step 3.
- Develop two sets of preliminary Landfall Compound Siting Areas, Cable Corridor Sections and Converter Station Siting Zones based on technical and environmental constraints.

Step 5

Confirm Landfall Siting Zones, Landfall Compound Siting Areas, Cable Corridor Sections and Converter Station Siting Zones for options appraisal

- Compare technical and environmental Landfall Compound Siting Areas, Cable Corridor Sections and Converter Station Siting Zones.
- Develop consolidated, single set of Landfall Compound Siting Areas, Cable Corridor Sections and Converter Station Siting Zones that balance technical and environmental considerations.

Step 6

Appraise Landfall Compound Areas, Cable Corridor Sections and Converter Station Siting Zones

- Complete the OASTs.

Step 7

Create Cable Corridor Combinations

- Sequence Cable Corridor Sections into combinations to demonstrate viable routing options from each Landfall Siting Zone.
- Appraise Cable Corridor Combinations using five-stage process to identify common receptors and differentiators.

Step 8

Confirm emerging preferred Landfall Siting Zone, Landfall Compound Siting Area, Cable Corridor Combination and Converter Station Siting Zone to develop the Graduated Swathe

- Present the findings of Steps 1 to 7 in Challenge and Review workshops.
- Undertake site visit.
- Decide on emerging preferences for Landfall Siting Zone, Landfall Compound Siting Area, Cable Corridor Combination and Converter Station Siting Zone to include in the Graduated Swathe.
- Develop the Graduated Swathe model.

Step 9

Undertake non-statutory consultation

4.3 Step 1: Identify and define Study Areas

Where Study Areas are referred to in this report, they represent the maximum extent within which all onshore infrastructure associated with the AC6 project in Wales may be located. The identification of Study Areas for the Welsh Onshore component of AC6 was informed by several key factors:

- Broad connection areas and strategic zones defined by SP Transmission Plc and National Grid Electricity Transmission (NGET) during the early works of Stage 1: Strategic Proposal;
- Consideration of human and physical geography, including topography and major urban settlements, which act as natural constraint boundaries;
- Proximity to areas of high environmental and amenity value, such as internationally designated sites, which pose significant consenting risks; and
- Application of the Horlock Rules (National Grid, 2006) and Holford Rules (National Grid, 1959) acknowledging that these principles are not directly tailored to the specific infrastructure types proposed for onshore AC6 infrastructure.

The initial Study Area was defined during Stage 1 and is described in detail in Section 3.2.2 of the PLSS Report. In summary, it encompassed a 10 km onshore and 15 km offshore area, from the existing 400 kV overhead line which created a study area along the North Wales coast between Talacre and the Llŷn Peninsular. This formed the foundation for the development of the Stage 2 Study Area.

RSK, in collaboration with AtkinsRéalis, reviewed the Stage 1 Study Area. As part of the transition to Stage 2, the focus was narrowed to concentrate on the existing 400 kV Pentir substation and the Llŷn Peninsular, ensuring that the length of the onshore connection into the existing Pentir substation was feasible. This resulted in a reduction of the overall footprint of the Stage 1 Study Area.

Further refinement of the study area boundary was driven by topographical constraints and the encroachment of the eastern boundary into the Eryri National Park. To address these challenges, the eastern boundary was shifted westward into flatter, less constrained terrain. This adjustment was minor in scale and is illustrated in **Figure 4.3.1**. The revised boundary formed the basis of the Stage 2 Study Area.

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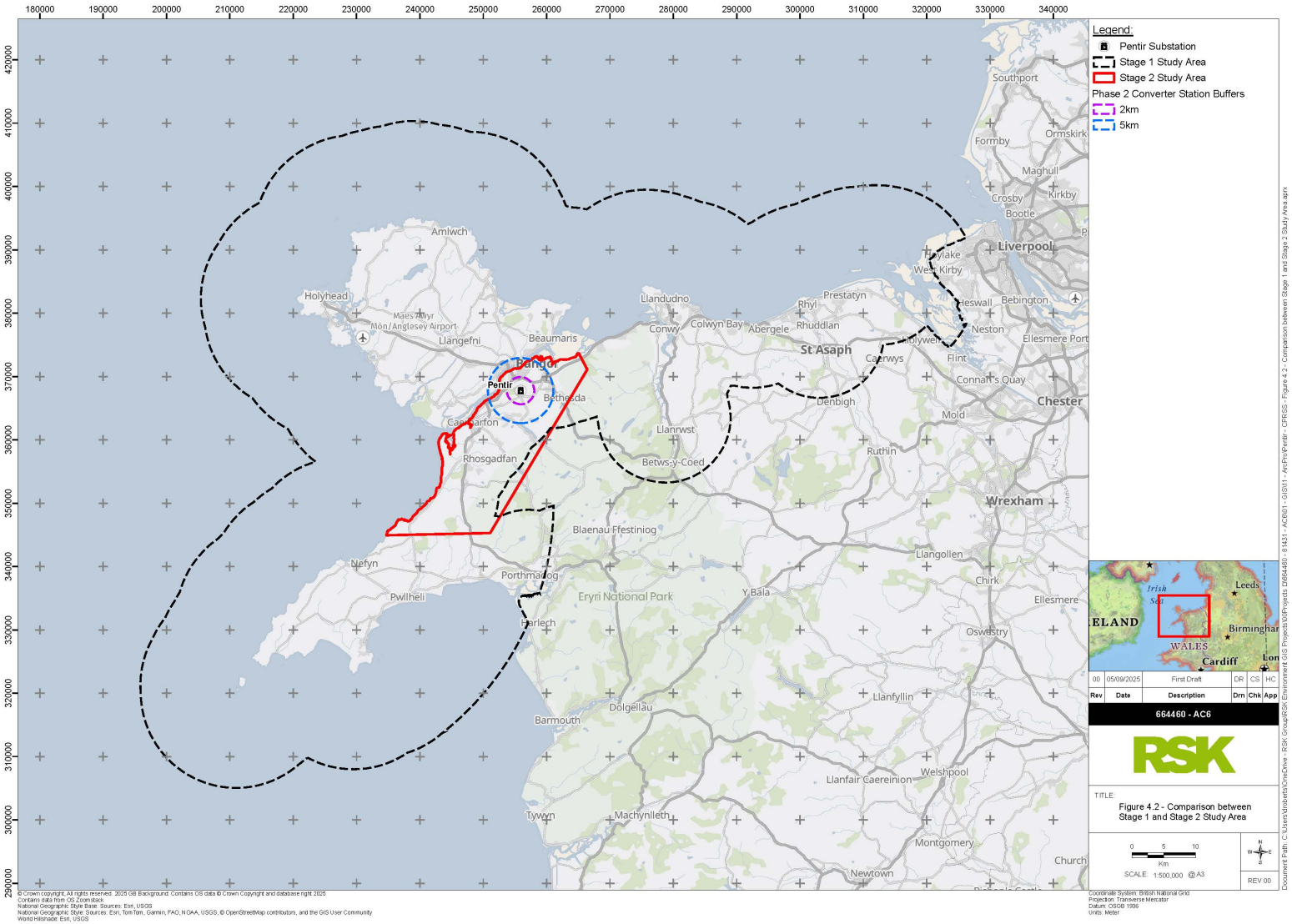
Figure 4.3.1: Comparison between Stage 1 and Stage 2 Study Area



4.3.1 Converter Station Siting Hierarchy

To support the refinement of search criteria for the converter station, NGET provided supplementary siting guidance. This guidance included a structured siting hierarchy, outlining a step-by-step approach based on best practices developed through similar NGET projects.

The hierarchy serves as a strategic framework for identifying suitable locations; considering technical feasibility, environmental constraints, and planning considerations. It prioritises receptors such as proximity to existing infrastructure, minimisation of environmental impact, and alignment with land use planning policies.

This siting hierarchy was adopted as the guiding philosophy for the converter station siting process at Pentir, ensuring a consistent and transparent methodology throughout the assessment and decision-making stages.

The full hierarchy is presented below and forms the foundation of the site selection rationale for the Welsh Onshore AC6 project.

1. *AC6-1(a): Converter near Pentir, 2 bay extension*
2. *AC6-1(b) variant: Converter and new substation to be located separately but within 2km.*
3. *AC6-1(b) variant: Converter and new substation to be located separately but within 5km*
4. *AC6-1(b): Converter and new substation co-located close to existing 400kV substation (Blue Zone).*
5. *AC6-1(c): Converter near Pentir, 1 bay extension*
6. *AC6-1(b) variant: Converter and new substation co-located, 400kV OHL extend to accommodate [example: Minster, Kent (Sea Link)].*

4.3.2 Engineering Parameters

To enable robust and constructable routing and siting of all onshore components for the AC6 project, credible worst-case engineering parameters were required. These were defined by AtkinsRéalis to support RSK in identifying viable provisional routes and sites. The parameters were informed by precedent projects, specifically EGL3, EGL4 and EGL5. RSK and AtkinsRéalis worked collaboratively to agree a comprehensive set of parameters for Pentir.

The parameters include:

- Converter Station (Total Footprint): 14.4 ha;
- HVDC Cable Construction Corridor Width: 45 m;
- HVDC Swathe Width: 60 m;
- HVAC Cable Construction Corridor Width: 75 m;
- HVAC Swathe Width: 120 m;
- Strategic Option Corridor Width: Minimum 1 km – 2 km; and
- Maximum HDD Drive Length (Adopted): 1400 m.

These parameters ensure that the routing and siting assessments are grounded in realistic engineering constraints, enabling the identification of locations that are both technically feasible, consentable and constructable.

4.4 Step 2: Scope environmental designations/receptors and collect baseline data

During Step 2, the project team scoped relevant environmental designations and receptors and commenced the collection of baseline data to inform the design and appraisal process for the Welsh Onshore AC6 project. This activity was undertaken in accordance with NGET's Options Appraisal:

Toolkit for Project Teams (National Grid, 2020), which provided a structured framework of topics and sub-topics, as outlined in **Table 4.4.1**.

The topics and sub-topics considered were selected based on established best practice and were informed by the requirements of NGET policy, the planning process, EIA Regulations and from RSK's previous routing and siting experience. These areas were intended to capture a comprehensive range of environmental, socio-economic, and planning constraints that could influence Welsh Onshore Project's consentability, construction feasibility, and operational viability. The constraints listed in **Table 4.4.1** have been sourced from publicly available datasets.

It was recognised that, as Welsh Onshore Project progressed, certain sub-topics might be scoped out if they were deemed not relevant or where sufficient evidence supported their exclusion.

The primary objective of Step 2 was to identify potential risks and constraints at an early stage of project development. This has enabled the integration of mitigation measures into the design and facilitated the development of appropriate engineering solutions. This proactive approach has helped to minimise risks both to and from Welsh Onshore Project throughout its lifecycle.

Table 4.4.1 Terrestrial environmental and socio-economic constraints

Sub-Topic	Description
Biological Environment	
National Site Network: • Special Areas of Conservation (SACs) • Special Protection Areas (SPAs)	The UK National Site Network comprises of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) which are designated under the Habitats Directive and Birds Directive. These sites provide protection to vulnerable habitats and species
Sites of Special Scientific Interest (SSSIs)	A Site of Special Scientific Interest (SSSI) is a UK conservation designation for areas of land, water, or coast that are considered to represent the best examples of natural features, habitats, and species. These may be designated under the Wildlife and Countryside Act (1981) in Wales and the Nature Conservation (Scotland) Act (2004) in Scotland
Ramsar Sites	Ramsar Sites are wetlands of international importance designated under the Convention on Wetlands (1975). Wetlands are vital for many birds' species particularly waterfowl. Wales has ten Ramsar sites which are essential to the survival of many wetland plants and animals
Royal Society for the Protection of Birds (RSPB) Reserves	Royal Society for the Protection of Birds (RSPB) reserves encompass land managed, leased or owned by RSPB. RSPB reserves endeavour to secure a wildlife-rich future by expanding and managing a network of nature reserves which contribute significantly to landscape-scale conservation
National Nature Reserves (NNR)	National Nature Reserves (NNR) represent the very best examples of national wildlife habitats and geological features. NNR are declared by Natural Resources Wales (NRW) under the National Parks and Access to the Countryside Act of 1949, or under the Wildlife and Countryside Act of 1981. They are typically managed by NRW, either directly or in partnership with an approved body, such as a County Wildlife Trust
Phosphorus Sensitive SAC Freshwater Catchments	Phosphorus Sensitive SAC Freshwater Catchments are designated areas where water quality has been significantly impacted by phosphorus pollution. New developments or where a water discharge is required, proposals need to demonstrate that they are nutrient neutral.

Sub-Topic	Description
Local Nature Reserves	Local Nature Reserves (LNRs) are a statutory designation made under Section 21 of the National Parks and Access to the Countryside Act 1949 by principal local authorities. For a site to become a LNR it must have natural features of special interest to the local area, and the authority must either have a legal interest in the land or have an agreement with the owner to manage the land as a reserve
Country Parks	Country Parks are public green spaces often located at the edge of urban areas which provide places to enjoy the outdoors and experience nature in an informal semi-rural park setting. Most Country Parks were designated in the 1970s, under the Countryside Act 1968 with the support of the former Countryside Commission. Most country parks are managed by local authorities, although other organisations and private individuals can also run them.
Biosphere Reserve	Biosphere Reserves are international designated areas, nominated by national governments and remain under sovereign jurisdiction. These sites are chosen to conserve examples of areas which are characteristic of the world's natural regions. They must also be areas where people are important components of everyday life
Biogenetic Reserves	Created under the Bern Convention by the Council of Europe, Biogenetic Reserves aim to conserve European flora, fauna and natural areas (especially heathlands and dry grasslands), that although common in one country may be scarce in another. In this way a store of genetic material - the genes of plants and animals - is kept for the future
Ancient Woodland Inventory 2021	The Ancient Woodland Inventory shows woodlands that have had continuous woodland cover for some centuries. These woodlands are usually more ecologically diverse, have a higher nature conservation value and may also be culturally important.
Physical Environment	
Air Quality Management Areas (AQMA)	An AQMA is a spatial designation for an area which has failed to meet or is unlikely to meet national air quality objectives. The size of the AQMA depends on the extent of the air quality issue
Agricultural Land Classification (ALC) • Grade 1 • Grade 2 • Grade 3 • Grade 4 • Grade 5	Agricultural land is graded using the Agricultural Land Classification (ALC) system based on the principles of the Agricultural Land Classification System of England & Wales, the Revised Guidelines & Criteria for Grading the Quality of Agricultural Land (MAFF 1988). This system classifies land into five grades according to the extent to which physical or chemical characteristics impose long term limitations on the agricultural use of a site for food production. The grades are numbered 1 to 5, with Grade 3 divided into two Subgrades (3a and 3b), High grade agricultural land (defined as grades 1 to 3a inclusive) is offered some protection from development in planning policy, as a finite strategic resource for food production. • Grade 1: Excellent Quality Agricultural Land • Grade 2: Very Good Quality Agricultural Land • Grade 3: Good to Moderate Quality Land – Subgrade 3a: Good Quality Agricultural Land – Subgrade 3b: Moderate Quality Agricultural Land • Grade 4: Poor Quality Agricultural Land

Sub-Topic	Description
	• Grade 5: Very Poor-Quality Agricultural Land
Peatland	Peatlands are areas of land supported by an in-situ, naturally accumulated layer of peat. Peat soils are formed over long timescales from carbon rich, dead and decaying plant material under waterlogged conditions. Peat soil is carbon rich and a significant carbon store, which, in good condition, can secure and store carbon dioxide from the atmosphere. However, if subject to degradation or wildfire, peat will release greenhouse gases.
Unified peat map / Peatlands of Wales Carbon Stock	The Peatlands of Wales map series provides an updated distribution of Welsh Peatlands (to 2022) based on current evidence sources. This dataset details the carbon stock levels across the Peatlands of Wales area. This map shows the carbon stock per unit area plus the total carbon stock in each polygon
GeoParks	UNESCO's Global Geoparks are areas with internationally important geology and landscapes, all of which are managed responsibly for conservation, education and sustainable development purposes. Whilst geology may be their foundation, UNESCO Global Geoparks build upon it by bringing together other aspects of heritage such as archaeology, history, culture and biodiversity
Regionally Important Geodiversity Sites (RIGS)	Regionally Important Geodiversity Sites (RIGS) are non-statutory sites selected to protect the most important places for geology, geomorphology and soils, complementing the network of legally protected SSSIs. RIGS are selected for their scientific, educational, historical and aesthetic features
Geological Conservation Review (GCR) Sites	The Geological Conservation Review (GCR) is the register of known nationally and internationally important earth science (geological and geomorphological) sites in Great Britain. A GCR underpins designation of earth science features in SSSIs. The majority of GCR sites, therefore, now have statutory protection through designations, as notified features in SSSIs
Coal Authority Areas	Coal Authority Areas are geographically defined zones used to manage and assess the risks associated with Britain's coal mining legacy. A Development High Risk Area is part of the coal mining reporting area which contains one or more recorded coal mining related features at surface or shallow depth. These features pose a potential risk to surface stability and public safety
Historic Landfill Sites	Historic Landfill Sites is a spatial dataset and are landfill sites which were taken off the Authorised Landfill Sites when the waste licence status changes to either: • Licence expired: Some licences issued under the Control of Pollution Act 1974 were time limited and expired on the date specified in the licence. • Licence Revoked: Whereby the licence has been entirely revoked and is no longer in force; or • Licence Surrendered: Operator has successfully surrendered the licence which is no longer in force. Under the Town and Country Planning (General Development Procedure) Order 1995 Local Planning Authorities have to consult

Sub-Topic	Description
	NRW, about all applications within 250 metres of landfill sites (including any land that has been used as a landfill site within the past 30 years or is likely to be used as one in the near future)
Main Rivers	'Main rivers' are usually larger streams and rivers, but some of them are small watercourses of significance. These are designated on the statutory main river map. They include certain structures that control or regulate the flow of water in, into or out of the channel
Flood Risks from Rivers, and Surface Water and Small Watercourses • High • Medium • Low	Flood Risk Assessment Wales provides a national assessment of flooding risks from Rivers, Surface Water and Small Watercourses. The assessment considers flood defences and combines new, national-scale modelling with detailed local-scale models to categorise risk into 3 bands, labelled 'High', 'Medium' and 'Low' risk: • 'High' risk means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%) • 'Medium' risk means that each year, an area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) • 'Low' risk means that each year, an area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) In assessing the significance of flood risks, the categorisation is applied in conjunction with TAN15 zoning and associated flood-defended areas, ensuring consistency with national planning guidance. A flood consequences assessment should be prepared for planning purposes, irrespective of residual risk.
Flood Risk from the Sea • High • Medium • Low	Flood Risk Assessment Wales provides a national assessment of risk of flooding from the sea. The assessment considers flood defences and combines new, national-scale modelling with detailed local-scale models to categorise risk of coastal flooding into three bands, labelled 'High', 'Medium' and 'Low' risk: • 'High' risk means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%) • 'Medium' risk means that each year, an area has a chance of flooding of between 1 in 200 (0.5%) and 1 in 30 (3.3%). • 'Low' risk means that each year, an area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 200 (0.5%) In assessing the significance of flood risks, the categorisation is applied in conjunction with TAN15 zoning and associated flood-defended areas, ensuring consistency with national planning guidance. A flood consequences assessment should be prepared for planning purposes, irrespective of residual risk.
Flood Zone Surface Water and Small Watercourses - Zones 2 and 3	The Flood Map for Planning supports Technical Advice Note 15 (TAN 15) which supplements the policies in the Planning Policy Wales in relation to flooding and coastal erosion. The Flood Zones within the Flood Map for Planning illustrates the undefended risk of flooding from Surface Water & Small Watercourses: • Flood Zone 2: The extent of land with a risk of flooding from surface water & small watercourses with less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance of happening in any given year, including an allowance for climate change. • Flood Zone 3: The extent of land with a risk of flooding from surface water and small watercourses with a 1% (1 in 100) chance or

Sub-Topic	Description
	greater of happening in any given year, including an allowance for climate change.
Flood Zone Rivers - Zones 2 and 3	The Flood Map for Planning supports Technical Advice Note 15 (TAN 15) which supplements the policies in the Planning Policy Wales in relation to flooding and coastal erosion. The Flood Zones within the Flood Map for Planning shows the undefended risk of flooding from Rivers. • Flood Zone 2: The extent of land with a risk of flooding from rivers with less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance of happening in any given year, including an allowance for climate change. • Flood Zone 3: The extent of land with a risk of flooding from rivers with a 1% (1 in 100) chance or greater of happening in any given year, including an allowance for climate change
Flood Zone Sea - Zones 2 and 3	The Flood Map for Planning supports Technical Advice Note 15 (TAN 15) which supplements the policies in the Planning Policy Wales in relation to flooding and coastal erosion. The Flood Zones within the Flood Map for Planning shows the undefended risk of flooding from Rivers. • Flood Zone 2: The extent of land with a risk of flooding from the sea with less than 0.5% (1 in 200) but greater than or equal to 0.1% (1 in 1,000) chance of flooding in any given year, including an allowance for climate change • Flood Zone 3: The extent of land with a risk of flooding from the sea with a 0.5% (1 in 200) chance or greater of happening in any given year, including an allowance for climate change
Source Protection Zones (SPZ)	Source Protection Zones (SPZs) are defined around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction.
Area of Outstanding Natural Beauty (AONBs)	Areas of Outstanding Natural Beauty (AONBs) are designated for the purpose of conserving and enhancing natural beauty and differ from National Parks in that they do not have a recreation remit. AONBs are managed by their constituent Local Authorities. AONBs are also known as National Landscapes
Heritage Coast	Heritage coasts are ‘defined’ rather than designated, therefore their status carries no legal protection, however planning authorities must take these into account when making decisions on development. These sites defined as heritage coasts were developed to protect coastlines from insensitive developments. Most are defined simply by the coastline between two named points; however, some have clearly defined inland boundaries.
LandMap - Visual and Sensory	Visual & Sensory relates the physical attributes of landform, land cover, elements and features, visible patterns and interrelationships together to identify landscapes with distinctive characteristics and qualities. This dataset maps the landscape as perceived through our senses based on the physical attributes of landform and land cover. The perceived characteristics of the landscape are primarily

Sub-Topic	Description
	determined visually, but the senses of hearing, smell and touch are also considered
LandMap – Geological Landscape	Geological Landscape considers the physical, primarily geological, influences that have shaped the current landscape. It identifies landscape qualities which are linked to the influence exerted by bedrock, surface processes and hydrology. Emphasis is on recording the strongest influences on the landscape.
LandMap – Landscape Habitats	Landscape Habitats focus on recording habitat features, characteristics and their spatial relationships within the context of the wider landscape network. Landscape scale areas may encompass whole valleys, a dominant habitat or a mosaic of habitats.
Access	
Registered Common Land 2014	The Countryside and Rights of Way Act 2000 (CRoW Act) normally gives a public right of access to land mapped as 'open country' (mountain, moor, heath and down) or registered common land. These areas are known as 'open access land'
National Cycle Network (NCN)	The National Cycle Network (NCN) is a UK-wide network of signed paths and routes for walking, wheeling, cycling and exploring the outdoors. The development, maintenance and promotion of the NCN is led by the charity Sustrans. Most of the network is hosted on local authority and third sector land
National Trails	National Trails are long distance walking, cycling and horse-riding routes. Each Trail has a Trail Partnership made up of the local authority or national park responsible for the path. Maintenance work is carried out by the local highway authorities together with landowners often with the help of volunteers
Coastal Path	The 870-mile-long Wales Coast Path was officially opened in May 2012. It runs from the outskirts of Chester to Chepstow. It is managed on the ground by 16 local authorities and two National Parks.
National Parks	National Parks are statutory landscape designations in Wales. National Parks are designated for the purposes of conserving and enhancing the natural beauty, wildlife, and cultural heritage and for the public to enjoy the special qualities of these nationally important landscapes.
National Trust Land - Limited Access	National Trust Limited Access Land is land owned or managed by National Trust where the public can access at certain times, or after paying an admission charge, or where access is limited to footpaths
National Trust Land - Always Open	Areas of National Trust land – Always Open refers to land for which the public has access on foot only – either by right (in the case of designated 'Access Land' under the CRoW) or by permission from National Trust
Historic Environment	
Listed Buildings • Grade I • Grade II • Grade III	Buildings and structures of national importance are given legal protection by being placed on a 'List' of Buildings of Special Architectural or Historic Interest. Under Section 1 of the Planning (Listed Buildings and Conservation Areas) Act 1990, the Welsh Ministers are required to compile and maintain this list.

Sub-Topic	Description
	• Grade I - Are of exceptional interest • Grade II* - Are particularly important • Grade II - Are of special interest
Scheduled Monuments	Archaeological sites of national importance are given legal protection by being placed on a 'Schedule' of monuments. Under the Historic Environment (Wales) Act, 2023, Welsh Ministers are required to compile and maintain this schedule.
Conservation Areas	A conservation area is an area of special architectural or historic interest, of which the character, appearance or setting is desirable to preserve or enhance. Conservation areas are normally designated by the local planning authority and the impact of a development proposal on them is a material planning consideration.
World Heritage Sites	World Heritage Sites are places that the World Heritage Committee of UNESCO has inscribed on a list of international sites because of their outstanding universal value, the importance of which is so great as to transcend national boundaries
Registered Landscapes of Outstanding and of Special Interest	The Register of Historic Landscapes is a non-statutory, advisory register. Its primary aim is to provide information and raise awareness of an initial selection of the most important and significant historic landscape areas in Wales to aid their protection and conservation. Information on historic landscapes included in the Register should be considered by local planning authorities when considering the implications of developments that are of such a scale that they would have more than local impact on an area on the Register
Historic Landscape Area (HLA)	Historic Landscape Area (HLA) represents the amalgamated character areas of the Registered Landscapes of Outstanding and of Special Interest in Wales as compiled jointly by Cadw, the Countryside Council for Wales (now part of Natural Resources Wales) and the International Council on Monuments and Sites (ICOMOS). HLAs encompass the physical remains of all aspects of human activities and exploitation in the past both above and below ground.
Registered Parks and Gardens	Registered parks and gardens are designed landscapes of special historic interest that are listed on a national register by heritage bodies like Historic England and Cadw. The Historic Environment (Wales) Act 2023 places a duty upon the Welsh Ministers to maintain and publish a register of parks and gardens of special historic interest in Wales
LandMap – Historic Landscape	Historic Landscape records prominent landscape characteristics that depend on key historic land uses, patterns and features. These contribute to the overall historic character of the present landscape. This dataset focuses on archaeological and historical sites and how they relate to each other and to the surrounding landscape. The features mapped include those resulting from past human activity and structurally prominent patterns and features that contribute to the historic character of the present landscape
Socio-Economic Environment	
Areas Benefitting from Flood Defences	Areas Benefiting from Flood Defences show areas in Wales that benefit from flood defences that protect against flooding from Rivers

Sub-Topic	Description
	and the Sea. The areas shown benefit from different levels of flood protection
Urban Areas	Urban areas are determined as settlements with populations of 10,000 or more, based on the 2021 Census
Residential Areas	A residential area is land used in which housing predominates, as opposed to industrial and commercial areas
Railway	Railways are a system of transport employing parallel rails which provide support and guidance for vehicles carried on flanged wheels and form a track which either is of a gauge of at least 350 millimetres or crosses a carriageway (whether or not on the same level) but does not include a tramway. The operation of the railway in Wales is a Welsh Government responsibility. However, infrastructure planning and the funding of Network Rail in Wales remains reserved to the UK Parliament
Railway Station	Any land or other property which consists of premises used as, or for the purposes of, or otherwise in connection with, a railway passenger station or railway passenger terminal (including any approaches, forecourt, cycle store or car park), whether or not the land or other property is, or the premises are, also used for other purposes
Road Network	The total collection of all roads in the UK, specifically referred to as the Strategic Road Network (SRN). In North Wales, the SRN is managed by the Mid and North Wales Trunk Road Agency (MNWTRA). The SRN is connected to the local road network, which is managed by the Local Planning Authorities (LPAs). This distinction is relevant to Welsh Onshore Project, as responsibility for the local road network rests with LPAs.
Port	A Port is a designated maritime facility that provides safe docking, loading, and unloading areas for ships and other sea-faring vessels. Ports play a critical role in global trade and logistics, acting as hubs where goods and passengers are moved from one location to another
Airports	Airports refer to aerodromes within the meaning of the Civil Aviation Act 1982 together with other land, buildings and structures used for the purposes of, the landing and taking off of aircraft, manoeuvring, parking or servicing of aircraft between landing and take-off, the transport of persons carried or to be carried as passengers, the arrival or departure of cargo carried, the processing of such persons, baggage and cargo between their arrival and departure, and the arrival or departure of persons who work at the airport
Military Land	Military land refers to the designated areas set aside for military training and testing purposes

To better visualise and understand the spatial distribution of these constraints within the broad study area, an ArcGIS Online (AGOL) web map was developed comprising available environmental and socio-economic data. Technical datasets were stored in another software by AtkinsRéalis. Datasets for each topic was gathered through a desk-based review of third-party international, national, regional and locally important features. It should be noted that at this stage, no project specific data was collated or used for the appraisal.

4.5 Step 3: Assign Black-Red-Amber-Green (BRAG) ranking to designations/receptors

Each identified designation and receptor detailed in **Table 4.4.1,** was assigned a Black-Red-Amber-Green (BRAG) ranking based on a review of available environmental and socio-economic information, expert interpretation, and the potential risk it may pose to project development from a technical, environmental, socio-economic and consenting perspective. The rationale for assigning risk categories is outlined in **Table 4.5.1** BRAG Risk Categories.

Table 4.5.1 BRAG Risk Categories

Ranking	Description
High Risk	Designations or receptors which must be avoided. Major areas of highest amenity value which cannot be disturbed to install a cable, or which will have severe legal, financial or physical implications. Examples include: World Heritage Sites, MOD land, Peatlands
Medium Risk	Designations or receptors that should be avoided where feasible or may be subject to negotiation or require further information, surveying/technical studies, or consultation where avoidance cannot be achieved. They may have significance due to their legal, financial, and physical implications on infrastructure siting. These designations or receptors have the potential to impact development timescales or costs of and/or risk development and construction of the landfall compound, cable route and converter station. Examples include: European sites (, SPA, SACs, Ramsar site), SSSI, AONB, National Parks, Ancient Woodland, Ancient Monuments, Major Road and River crossings, Historic/Authorised Landfill, Residential Areas, Flood Zones 2 & 3, Listed buildings etc.
Medium-Low Risk	Designations or receptors that are of less significance, and which will have little legal, financial, or physical impact on cable routeing. While these designations or receptors will likely benefit from additional consultation, technical studies, information and/or surveying, their effects are presumed to be mitigated during the detailed design phase. Examples include National trails, PRoW, Coastal Paths, Minor River and Road crossings etc.
Low Risk	Designations or receptors with no implications on Landfall Siting Zone or onward onshore connection.

RSK developed a BRAG list building on the work undertaken in Stage 1: Strategic Proposal. This list was updated and refined during the Stage 2: Options Identification by introducing nine additional constraint datasets. A consistent BRAG ranking methodology aligned with the Strategic Proposal stage was applied. Several constraints were re-weighted based on intelligence from comparable projects.

Weightings were tailored to reflect the differing construction and operational requirements of buried cables and converter stations. For instance, Flood Risk from Surface Water and Small Watercourses – High was assigned a red weighting for converter stations due to their vulnerability to operational disruption from flooding, whereas an amber weighting was applied to buried cables, which are less susceptible to flood related damage. This distinction was informed by:

- The requirements of the National Policy Statement for Energy – EN-1 (2023); and
- Guidance and consensus with the project team in terms of sensitivity of different project elements.

The weighting process acted as a robust scoping mechanism, ensuring that the analysis concentrated on features with an influence on decision-making. It gave greatest emphasis to features of national or international significance, while recognising and incorporating features of local importance. A full breakdown of the BRAG weightings for buried cables and converter stations is provided in **Appendix A: Stage 2 BRAG List**.

This approach is consistent with the BRAG methodology used for Western Link 2 Scotland, which is the northern AC6 landfall and terrestrial connection on Scotland's west coast, led by SP Transmission Plc and supported by RSK.

The updated BRAG list was shared with the project team (NGET, RSK, and AtkinsRéalis) to ensure appropriate application of weightings relative to constraint sensitivity, technical feasibility and consentability. Once agreed with NGET, the weightings were integrated into the BRAG GIS model. The model was executed, heatmaps were generated, and outputs were uploaded to the project's AGOL platform.

Figure 4.5.1: Pentir Cable Corridor BRAG HeatmapError! Reference source not found. and **Figure 4.5.2**: Pentir Converter Station Siting Zones BRAG Heatmap illustrate the BRAG heatmaps which directly informed the identification of Cable Corridor Sections and Converter Station Siting Zones.

Figure 4.5.1: Pentir Cable Corridor BRAG Heatmap

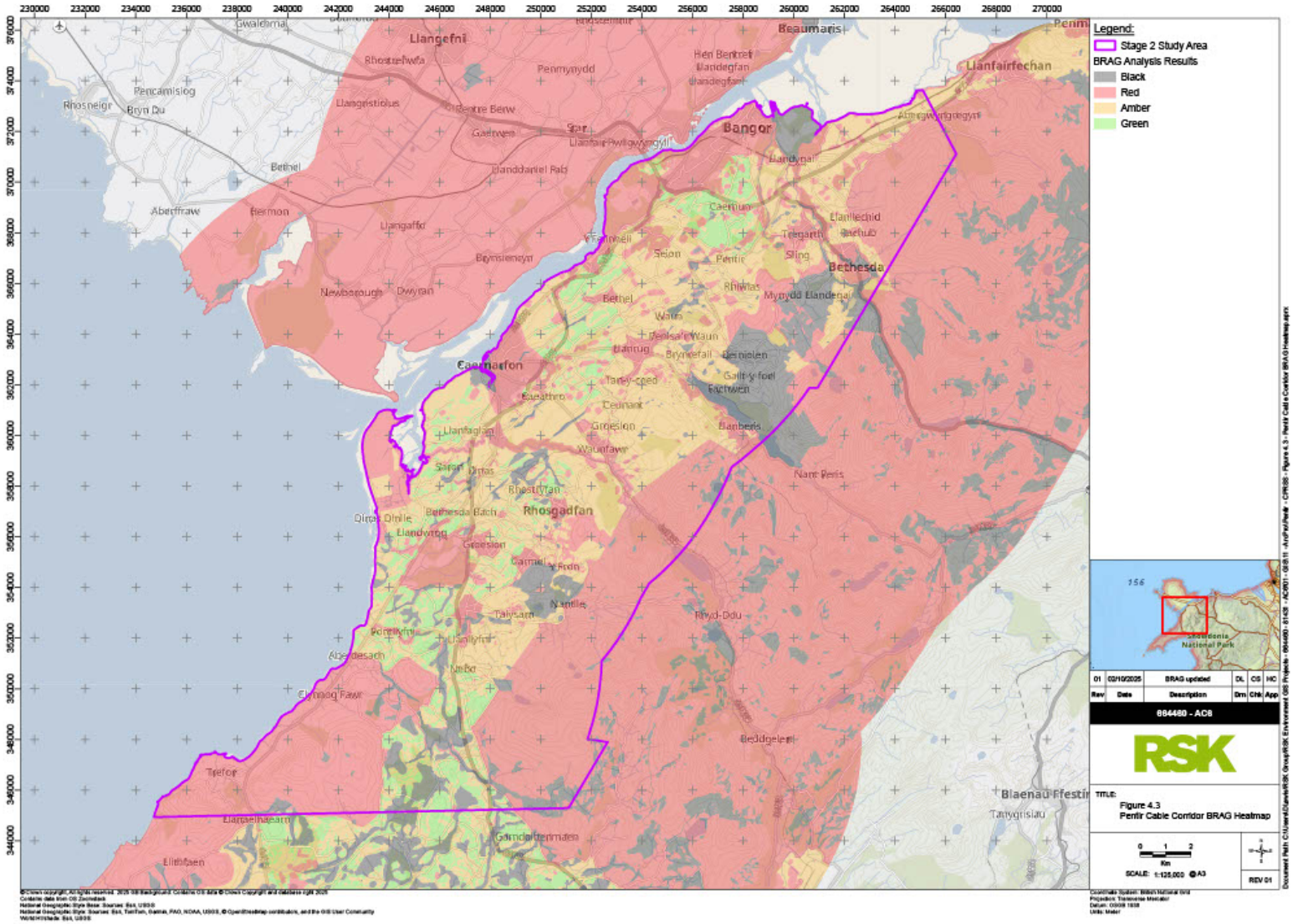
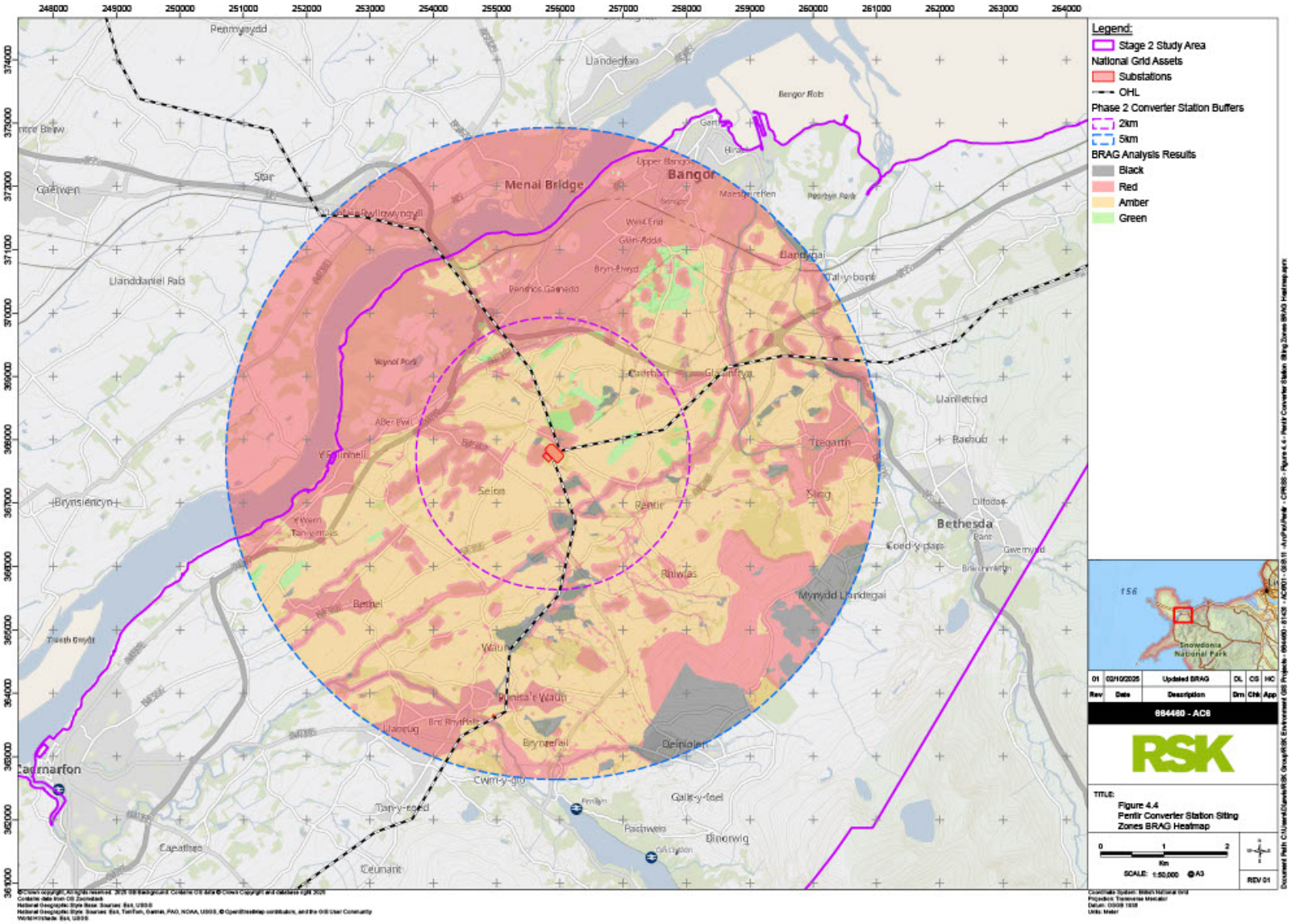


Figure 4.5.2: Pentir Converter Station Siting Zones BRAG Heatmap



4.6 Step 4: Identify and define Landfall Siting Zones, Landfall Compound Siting Areas, Cable Corridor Sections and Converter Station Siting Zones

As described in **INTRODUCTION**, the objective of Stage 2: Options Identification and Selection is to determine the most suitable emerging options for landfall, cable and the location of a converter station. Step 4 initiated the process of identifying siting zones, siting areas and corridors within the Stage 2 Study Area, laying the groundwork for a more focused and strategic evaluation of routes and sites.

4.6.1 Landfall Siting Zones

Landfall Siting Zones were initiated during the Stage 1: Strategic Options study and subsequently verified and refined during the Stage 2: Options Identification and Selection phase. Following the selection of Pentir substation as the preferred onshore connection point for North Wales, a targeted assessment of the potential Landfall Siting Zones within the Stage 1 Study Area was undertaken.

A Landfall Siting Zone is a geographically defined area of coastline that has been identified as having the physical, environmental, and technical characteristics necessary to accommodate the transition point where an offshore HVDC cable makes landfall and connects to the onshore HVDC system. These zones are strategically sized to provide sufficient flexibility and optionality for the precise location of a single landfall site within their boundaries.

Each Landfall Siting Zone is selected based on its ability to support:

- Trenchless installation methods (e.g. HDD) with appropriate entry angles and geological conditions;
- Superficial sediment and favourable topography, allowing for cable burial and minimising environmental disruption;
- Proximity to viable offshore and onshore cable corridors, ensuring connectivity to the marine route and the onshore substation (e.g. Pentir); and
- Avoidance of critical constraints, including steep cliffs, protected habitats, flood zones, and socio-economic receptors.

Landfall Siting Zones are not fixed locations but rather broad areas within which detailed design and environmental appraisals can be undertaken to identify the optimal landfall location. Their identification allows for engineering flexibility, risk mitigation, and refinement during later project stages.

4.6.1.1 Stage 1: Strategic Proposal

The identification of suitable Landfall Siting Zones was carried out to ensure a coordinated and integrated approach to both offshore routeing and onshore siting. This alignment was essential to maintain consistency across the marine-terrestrial interface and to optimise the overall project design.

To systematically identify Landfall Siting Zones along the Welsh coastline, a multi-layered GIS-based analysis was used. This involved the review and synthesis of several spatial datasets, as shown in **Table 4.4.1**. The process was underpinned by the Stage 1 BRAG classification, which provided a high-level screening of potential siting zones:

- Black areas were avoided due to significant constraints rendering them unsuitable; and
- Red, Amber, and Green areas were subject to further detailed assessment, incorporating GIS data and expert interpretation.

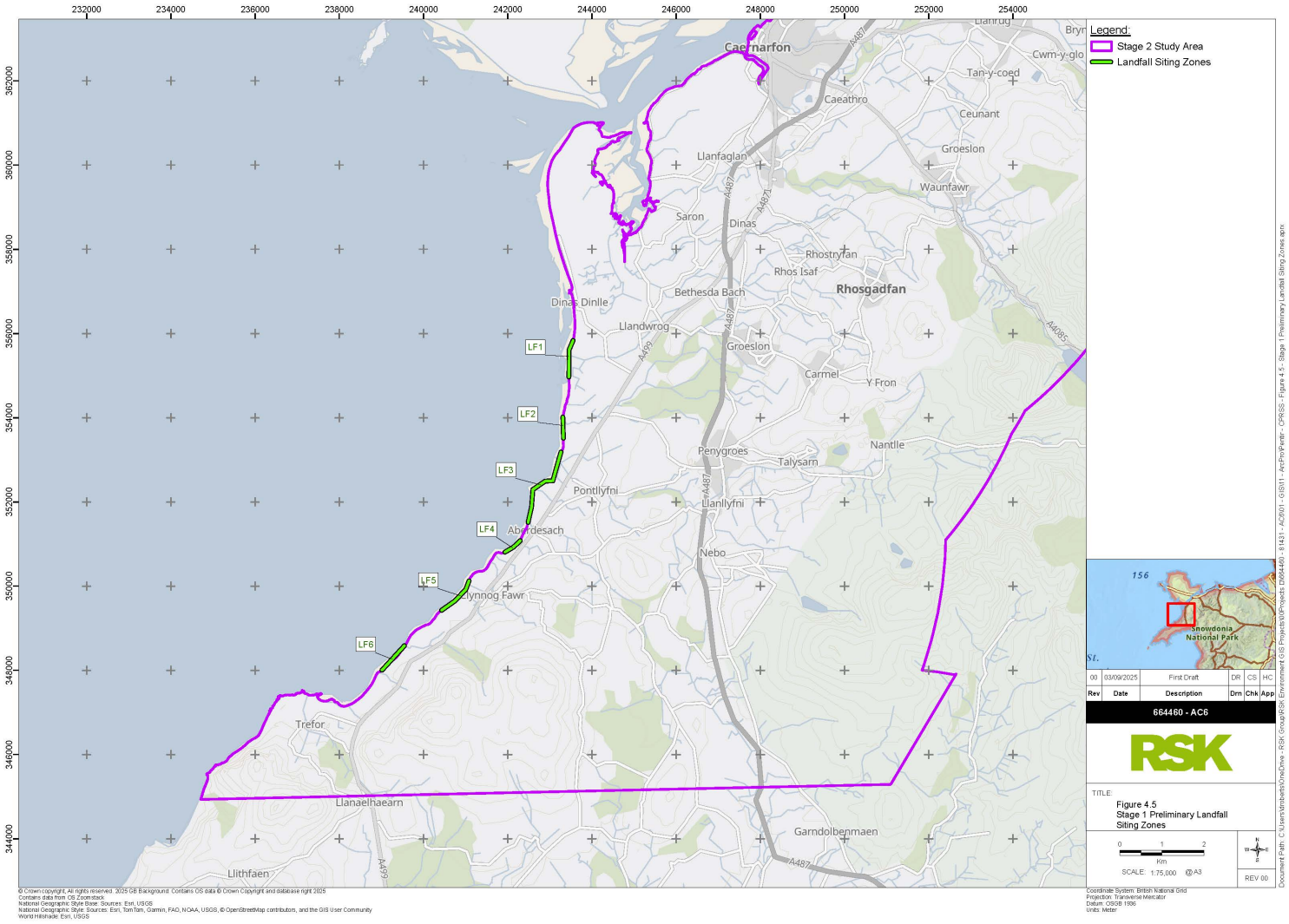
In addition to constraint mapping, the following strategic considerations were applied:

- Availability of physical space to accommodate both temporary construction works and the permanent infrastructure footprint;
- Feasibility of offshore routeing for up to 15 km from the siting zone, ensuring viable marine corridors; and

- Feasibility of onshore routeing to the existing 400 kV Pentir substation, ensuring connectivity and constructability.

By assessing the BRAG classification and taken into account the strategic considerations; siting zones of potential landfall were identified (refer to **Figure 4.6.1**: Stage 1 Preliminary Landfall Siting Zones). These siting zones were selected to minimise exposure to the identified technical and environmental constraints, while also identifying any residual risks that may require mitigation during later design stages.

Figure 4.6.1: Stage 1 Preliminary Landfall Siting Zones



Six Landfall Siting Zones in Pentir were identified in Stage 1 as potentially suitable for landfall and extend across a 5.5 km stretch of the Caernarfon Bay coastline between Dinas Dinlle and Clynnog Fawr. These Landfall Siting Zones were carried forward to Stage 2.

4.6.1.2 Landfall Siting Zones – Naming Convention

In the naming convention for Landfall Siting Zones, "LF" designates the zone as related to landfall, while the numerical identifier "1–6" provides a unique reference for each individual siting zone option. LF1 is the northernmost siting zone, with zones LF2 through LF5 positioned progressively further south, culminating in LF6 as the southernmost siting zone.

Landfall siting for the Scottish coastline was undertaken separately to this scope of works, by SP Transmission Plc, drawing upon previous studies conducted during the development of the Western Link 2 project. No new marine landfall identification work was required for Scotland in the TCPRSS reported in this document, as existing data and assessments were deemed sufficient.

4.6.1.3 Stage 2: Options Identification and Selection

During Stage 2, the six Landfall Siting Zones identified in Stage 1 underwent detailed technical validation and refinement. This phase was led by AtkinsRéalis and Evolv, which conducted comprehensive terrestrial and marine assessments, respectively.

Building on the Stage 1 BRAG analysis, the following constraints were reviewed and mapped in detail:

- Residential areas, buildings, and caravan parks;
- Ancient Woodlands and conservation areas;
- Areas of Outstanding Natural Beauty (AONB);
- Coastal erosion zones without active intervention;
- Geological faults and heavily deformed superficial geology;
- Flood defences and flood risk (fluvial and coastal);
- Water vole habitats and open-ground dependent bird habitats;
- Heritage coastlines and listed buildings;
- Main rivers and unified peat deposits;
- Road access and slope gradient;
- Bathymetry data and reef areas; and
- Sites of Special Scientific Interest (SSSI).

While some overlap with RSK's Stage 1 constraints was identified, the project team agreed that duplication was preferable to omission, ensuring a robust and comprehensive constraint analysis.

Each of the six siting zones was assessed against these constraints. The outcomes were as follows:

- LF 1 to 4 were considered technically viable, subject to further geophysical surveys to inform seabed and subsurface conditions and preferred landfall location and construction methodology.
- LF 5 and 6 were discounted due to significant limitations in landfall feasibility, specifically:
  - Excessively steep terrain, which posed significant risks to cable integrity and constructability; and
  - Thick superficial geology and glaciogenic soils forming vertically extensive soft marine cliffs, including containing boulders and clasts. These cliffs are prone to erosion and collapse, especially under elevated pore pressure and external stresses.

As a result, Landfall Siting Zones 1-4 were progressed to Step 5, while LF5 and LF6 were discounted for potential future consideration, pending any changes in technical feasibility or project scope.

4.6.2 Landfall Compound Siting Areas

Following the identification of Landfall Siting Zones along the study area coastline, the next phase involved identifying suitable terrestrial Landfall Compound Siting Areas to support construction activities.

A Landfall Compound Siting Area is a designated parcel of land identified as having the necessary spatial, technical, and environmental characteristics to accommodate the temporary and permanent infrastructure required for the onshore landing of an offshore HVDC cable system. These compound siting areas are critical for enabling the transition of the offshore HVDC cable to the onshore HVDC network, ultimately facilitating connection to the existing 400 kV Pentir substation.

These areas were identified through GIS-based spatial analysis and expert engineering judgment, forming a critical component of the overall landfall planning and design process. Each compound siting area will be designed to accommodate temporary construction infrastructure, including plant, equipment, parking, welfare facilities, and storage areas. The compounds also serve as the installation site for the TJB. Although unmanned during operation, the TJB requires secure and reliable access for routine inspection and maintenance.

A standard TJB occupies a footprint of approximately 15 m x 4 m (60 m²). However, during construction, a significantly larger working area is required to accommodate:

- Heavy machinery and cable handling equipment;
- Temporary storage of materials and components;
- Site welfare and health & safety facilities; and
- Vehicle access and parking.

To meet these requirements, a temporary construction compound of approximately 150 m x 150 m (2.25 ha) is proposed for each Landfall Compound Siting Area. These compounds are designed to be fully demobilised and land reinstated upon completion of construction, with only minimal surface infrastructure remaining which is typically the cover of the link box pit, which provides access to the fibre optic monitoring system.

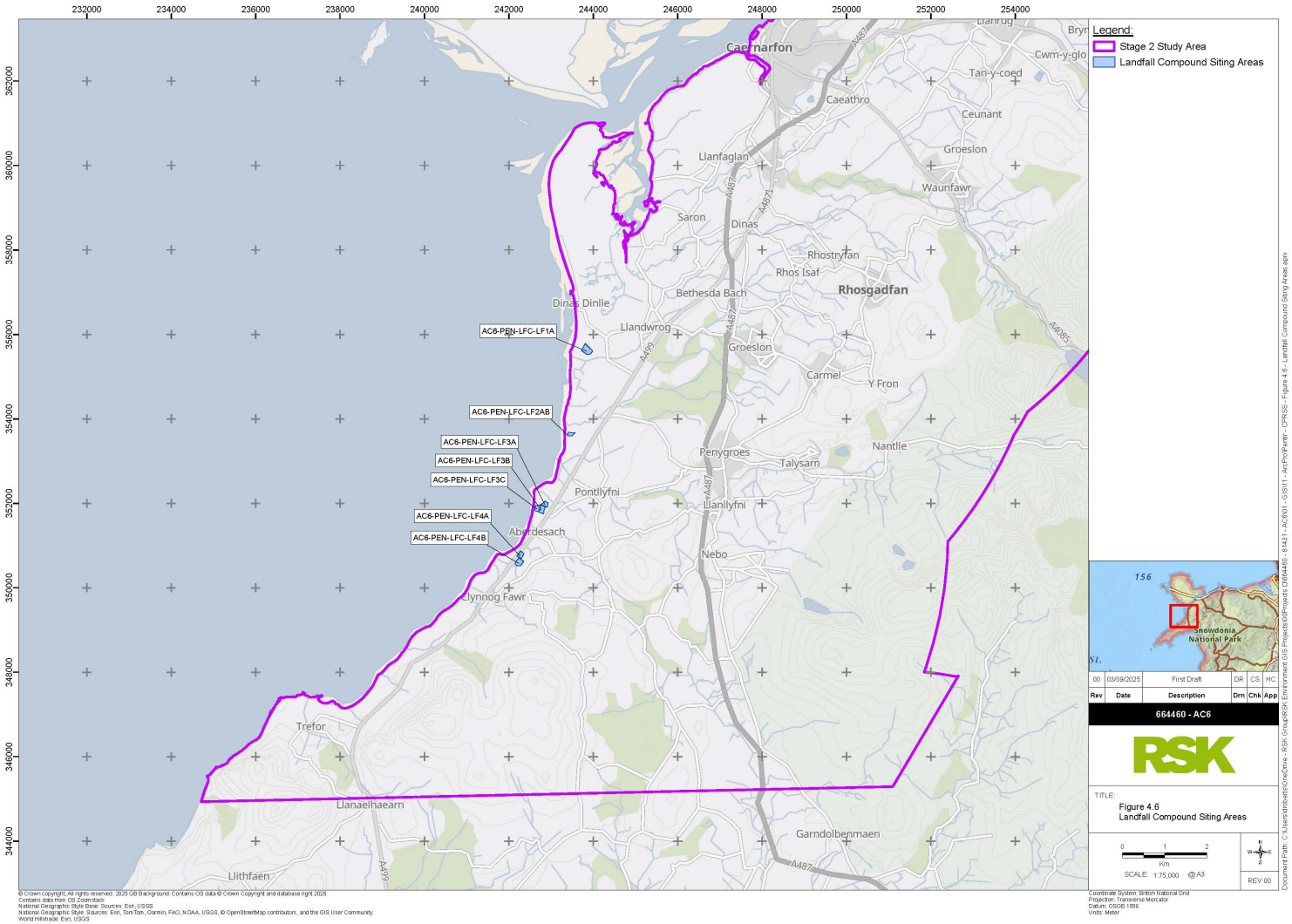
The siting of landfall compound area was undertaken by AtkinsRéalis, using a GIS-based spatial analysis approach. A minimum footprint of 3ha was applied to identify viable compound areas, ensuring sufficient space for both temporary and permanent infrastructure. Compound areas were required to be located within the identified Landfall Siting Zone, with preference given to sites which minimise environmental disturbance, and optimise constructability.

The compound area siting process considered a comprehensive set of constraints, including:

- Technical constraints: topography, ground conditions, access roads, constructability, proximity to existing infrastructure;
- Environmental designations and receptors as listed in **Table 4.4.1**; and
- Socio-economic constraints: proximity to residential areas, planning applications, local development plan allocations and other socio-economic constraints as listed in **Table 4.4.1**.

These constraints were mapped and analysed using GIS tools, allowing for the identification of unconstrained and technically feasible Landfall Compound Siting Areas. The results of this analysis are presented in **Figure 4.6.2** which illustrates the spatial distribution of potential Landfall Compound Siting Areas.

Figure 4.6.2: Landfall Compound Siting Areas



A total of seven Landfall Compound Siting Areas were identified across the Stage 2 Study Area:

- LF1: 1 compound siting area;
- LF2: 1 compound siting area;
- LF3: 3 compound siting areas; and
- LF4: 2 compound siting areas.

Details of each Landfall Compound Siting Area are provided in Table 4.6.1 and the naming convention is described in **4.6.2.1**.

Table 4.6.1: Further Landfall Compound Siting Area information

Landfall Compound Siting Area reference	Associated Landfall Siting Zone
AC6-PEN-LFC-LF1A	LF1
AC6-PEN-LFC-LF2AB	LF2
AC6-PEN-LFC-LF3A	LF3
AC6-PEN-LFC-LF3B	LF3
AC6-PEN-LFC-LF3C	LF3
AC6-PEN-LFC-LF4A	LF4
AC6-PEN-LFC-LF4B	LF4

4.6.2.1 Landfall Compound Siting Area – Naming Convention

The naming convention applied to each Landfall Compound Siting Area during Step 4 of Welsh Onshore Project follows a structured format designed to ensure clarity, traceability, and consistency across project datasets and documentation. Each convention is composed of distinct elements that convey key information about the siting area:

- “AC6” - Denotes the project name;
- “PEN” - Indicates that the siting area is located within the Stage 2 Pentir Study Area;
- “LFC” - Specifies that the site is designated as a Landfall Compound Siting Area;
- “LF1” – Refers to the Landfall Siting Zone to which the compound area is associated to;
- “A” – A unique alphabetical identifier assigned to distinguish individual siting areas within the same Landfall Siting Zone.

For example, the label “AC6-PEN-LFC-LF1A” refers to the first Landfall Compound Siting Area within Landfall Siting Zone 1 in the Stage 2 Pentir Study Area, under the Welsh Onshore AC6 project.

These sites represent the most viable options for supporting landfall construction activities, balancing engineering feasibility with environmental and socio-economic considerations. Each compound siting area will be subject to further detailed design and environmental appraisal during subsequent project stages.

4.6.3 Preliminary Converter Station Siting Zones

The identification of Preliminary Converter Station Siting Zones was undertaken during Step 4 of the routing and siting process, led jointly by environmental and engineering specialists from the project team. This work was carried out in parallel by RSK and AtkinsRéalis, with RSK focusing on spatial environmental, planning and socio-economic constraints, and AtkinsRéalis leading on technical feasibility and engineering parameters. This integrated approach ensured that both environmental sensitivities and engineering requirements were considered from the outset.

A Converter Station Siting Zone is a strategically defined area of land that possesses the spatial, environmental, and technical capacity to accommodate one or more Siting Areas, each of which is suitable for hosting a single converter station, associated components and construction areas. These zones are intentionally broad to preserve layout flexibility, enable micrositing and Graduated Swathe modelling, and support design optimisation during later project stages. By identifying siting zones, the project team ensures that sufficient optionality is retained to respond to evolving technical requirements, environmental findings, and stakeholder feedback as the Welsh Onshore Project develops through future phases. These zones serve as the foundation for more detailed siting work, including the identification of specific siting areas and the development of cable route corridors.

The siting study for the converter station was informed by:

- The output of the Stage 3 BRAG analysis (see **Step 3**: Assign Black-Red-Amber-Green (BRAG) ranking to designations/receptors), which provided an assessment of environmental, technical, and socio-economic constraints. This analysis was used to generate heatmaps identifying areas of relative suitability for converter station siting, helping to prioritise zones with lower constraint density and higher development potential;
- The Converter Station Siting Hierarchy (see **Converter Station** Siting Hierarchy), which outlines the strategic and locational preferences for converter station development including proximity to the existing 400 kV Pentir substation, to reduce HVAC cable length and improve constructability;
- The engineering design envelope (see **Engineering Parameters**), which defines the spatial and technical requirements for converter station infrastructure; and
- The Horlock Rules (National Grid, 2006), which promote the co-location of new electricity infrastructure with existing assets to minimise environmental and visual impacts, reduce land take, and support efficient grid integration.

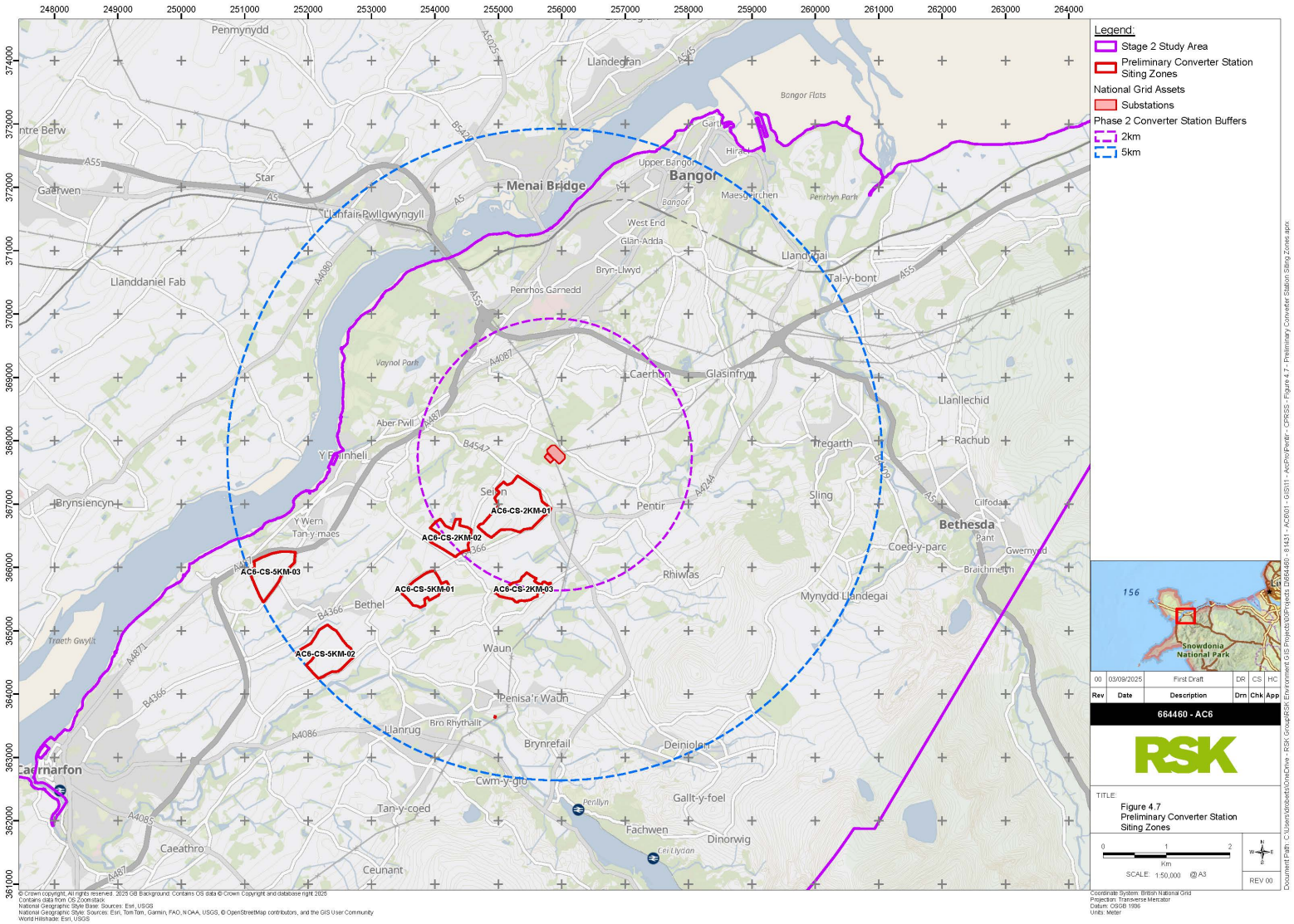
A minimum area of 14 ha was assumed for each converter station site. This footprint was designed to accommodate:

- A Gas-insulated converter station with an Air-insulated components in the AC switching yard;
- Associated construction compounds;
- Internal access roads and turning areas;
- Peripheral landscaping and visual screening;
- Drainage and surface water attenuation infrastructure; and
- Buffer zones for future design flexibility.

The siting process utilised AGOL tools, including the editor and measurement functions, to analyse heatmaps generated from the BRAG model outputs produced during Step 3. These heatmaps were overlaid with technical and environmental datasets to identify areas of low constraint and high suitability.

Following the analysis, six preliminary Converter Station Siting Zones have been identified in proximity to the existing 400 kV Pentir substation. These siting zones have been selected based on their suitability for further evaluation and design development, taking into account key environmental and planning considerations. The locations of the identified zones are illustrated in **Figure 4.6.3**.

Figure 4.6.3: Preliminary Convertor Station Siting Zones



Three of the siting zones are located within a 2 km radius of the existing Pentir substation, offering close integration with existing infrastructure. An additional three siting zones are situated within a 5 km radius, providing further flexibility for site selection. Detailed information on each of the six siting zones is presented in **Table 4.6.2** and the naming convention is described in **Section 4.6.3.1**.

Table 4.6.2: Preliminary Converter Station Siting Zone further information

Converter Station Siting Zone reference	Distance from Pentir substation (from nearest point) (km)	Hierarchy position	Area(ha)
AC6-CS-2KM-01	0.47	1	59.58
AC6-CS-2KM-02	1.67	2	24.02
AC6-CS-2KM-03	1.78	2	19.55
AC6-CS-5KM-01	2.53	3	22.26
AC6-CS-5KM-02	4.29	3	40.30
AC6-CS-5KM-03	4.22	3	31.06

4.6.3.1 Step 4 Preliminary Converter Station Siting Zones – Naming Convention

The naming convention applied to each Converter Station Siting Zone during Step 4 of the Welsh Onshore Project follows a structured format designed to ensure clarity, traceability, and consistency across project datasets, appraisal and design development. Each convention is composed of distinct parts that convey key information about the siting zone:

- “AC6” – Denotes the project name;
- “CS” – Indicates that the site is designated for a Converter Station Siting Zone;
- “2km” / “5km” – Refers to the Converter Station Hierarchy (as outlined in **Converter Station** Siting Hierarchy), specifying whether the siting zone lies within 2 km or 5 km of the existing 400kV Pentir substation; and
- “01” – A unique identification number assigned to each siting zone option.

For example, the label “AC6-CS-2KM-01” refers to the first Converter Station Siting Zone within 2 km of the existing 400kV Pentir substation, under the Welsh Onshore AC6 project. This naming convention was developed further during Step 5 of the options appraisal process, as described in **4.7.1.22**.

A comparative assessment of the Converter Station Siting Zones was undertaken independently by RSK and AtkinsRéalis, with each organisation leading on distinct aspects of the study. RSK led on environmental and socio-economic constraints and sensitivities, and AtkinsRéalis on engineering feasibility and technical parameters. While there was some overlap between the environmental and engineering assessments, this was intentional and ensured that no critical constraints or opportunities were missed.

These parallel assessments were then brought together and reviewed, as described in Step 5. This facilitated a structured comparison of findings, enabling the project team to align environmental and engineering priorities. The outcome of this collaborative process was a combined set of Converter Station Siting Zones, forming the basis for further refinement in subsequent project stages.

Each identified Converter Station Siting Zone will be subject to further detailed assessment, as outlined in the subsequent steps, and will continue to be refined as the Welsh Onshore Project progresses into Stage 3: Defined Proposal and Statutory Consultation.

4.6.4 Preliminary Cable Corridor Sections

The identification of Preliminary Cable Corridors Sections (inclusive of both HVDC and HVAC cables) was undertaken during Step 4 of the routing and siting process, led jointly by environmental and engineering specialists from the project team. This work was carried out in parallel by RSK and AtkinsRéalis, with RSK focusing on spatial environmental, planning and socio-economic constraints (see **Table 4.4.1**), and AtkinsRéalis leading on technical feasibility and engineering parameters. This integrated approach ensured that both environmental sensitivities and engineering requirements were considered from the outset.

A Cable Corridor Section refers to a designated spatial boundary that outlines the maximum permissible area within which the final onshore terrestrial cable infrastructure, including the cable route and its associated easement, may be constructed. This corridor encompasses all potential alignments and construction zones necessary for installation, maintenance, and operational access, ensuring flexibility during detailed design and aims to minimise technical, environmental, consenting and land use impacts.

The HVAC cable connection to the existing 400 kV Pentir substation was also assumed to be accommodated within the same cable corridors as the HVDC. This was necessary because all Converter Station Siting Zones were located south of the substation, requiring onward HVAC connection northwards.

Using the previously identified Landfall Siting Zones (see **Landfall Siting** Zones) and Converter Station Siting Zones (see **Preliminary Converter** Station Siting Zones), potential HVDC Cable Corridor Sections were mapped to connect these key infrastructure locations. The corridors were developed using AGOL tools, including the editor and measurement functions, to draw indicative routes between landfall and siting zones.

The routing methodology was informed by the Step 3 BRAG analysis, which provided spatial heatmaps highlighting areas of constraint and opportunity. A line was drawn following the path of least resistance, aiming to minimise interaction with key environmental, planning technical, and socio-economic designations and receptors. The BRAG-informed routing process aimed to:

- Avoid Black and Red weighted areas (representing zones of highest constraint or sensitivity), where possible;
- Avoid major settlements and densely populated areas;
- Maintain a corridor width sufficient to allow for micrositing and avoidance of localised constraints (e.g. sensitive habitats, residential properties) during detailed design; and
- Enable interconnectivity between corridors, allowing flexibility to reroute around constrained areas if required.

To support corridor refinement and maintain routing flexibility, buffer zones of 250 m, 500 m, and 1 km were applied to each route. These buffer distances were informed by relevant prior project experience, ensuring sufficient optionality at this early stage of route development. This multi-scale buffer approach allowed for the identification of wider corridor envelopes, within which detailed alignment can be optimised in later stages (e.g. Graduated Swathe). The result was a set of multiple cable corridor options within the Stage 2 Study Area, providing flexibility and resilience to allow for evolving constraints and stakeholder feedback. These options are illustrated in **Figure 4.6.4.**

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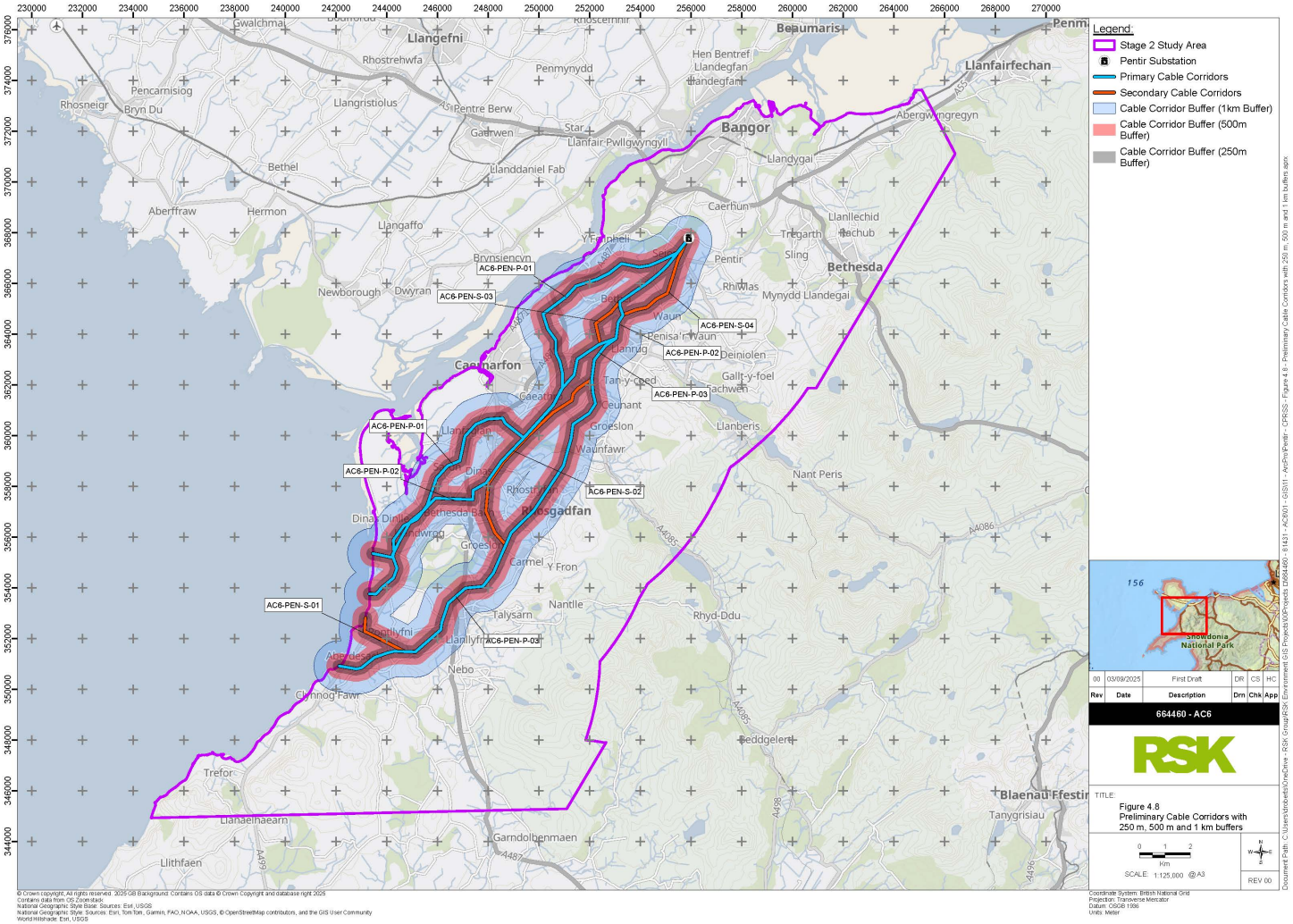
Figure 4.6.4: Preliminary Cable Corridor Sections with 250 m, 500 m and 1 km buffers



4.6.4.1 Primary and Secondary Cable Corridor Sections

As part of the preliminary routing and siting process, the identified corridors were categorised into Primary and Secondary Cable Corridors Sections to support a structured and flexible approach to route development. As shown on **Figure 4.6.4**, Primary Cable Corridors Sections represent the three main 'trunk' corridors that formed the backbone of the preliminary cable corridor routing strategy. These corridors were designed to follow the most direct and least constrained paths from Landfall Siting Zones LF1, LF2, and LF4, extending northwards toward the existing Pentir 400kV substation. These routes were prioritised based on their strategic alignment and minimal interaction with high-sensitivity areas.

Secondary Cable Corridor Sections were developed to provide connectivity and optionality between the Primary Cable Corridor Sections. These routes allow for flexibility in routing, serving as contingency options and to facilitate the creation of a robust and adaptable cable corridor network for appraisal, key for future consenting phases of the Welsh Onshore Project.

LF3 did not generate a standalone Primary Cable Corridor Section due to its proximity to LF4. Instead, a Secondary Cable Corridor Section, designated AC6-PEN-S-01, was developed to connect LF3 to Primary Cable Corridor Section AC6-PEN-P-03, ensuring LF3 remained integrated within the preliminary routing network.

Further information on each of the Primary and Secondary Cable Corridor Sections are presented in **Table 4.6.3** and the naming convention is described in **Section 4.6.4.24.6.4.2**.

Table 4.6.3: Further information on Primary and Secondary Preliminary Cable Corridor Sections

Cable Corridor Section Reference	Length (km)	Number of Crossing Points			
		Main Rivers	Railways	Roads (National and Regional)	OHLs
Primary Cable Corridor Sections					
AC6-PEN-P-01	21.88	8	1	8	0
AC6-PEN-P-02	15.34	6	1	4	0
AC6-PEN-P-03	23.96	7	1	6	2
Secondary Cable Corridor Sections					
AC6-PEN-S-01	2.31	0	0	1	0
AC6-PEN-S-02	8.56	4	1	1	0
AC6-PEN-S-03	2.12	1	0	0	0
AC6-PEN-S-04	4.18	1	0	2	0

4.6.4.2 Primary and Secondary Cable Corridor Sections – Naming Convention

The naming convention applied to the Primary and Secondary Cable Corridor Sections during Step 4 of the Welsh Onshore Project follows a structured format designed to ensure clarity, traceability, and consistency across project datasets, appraisal and design development. Each convention is composed of distinct parts that convey key information about the siting zone:

- "AC6" – Denotes the project name;
- "PEN" - Indicates that the siting area is located within the Pentir study area;
- "P" / "S" – Specifies whether the route is a Primary Cable Corridor Sections ("P") or Secondary Cable Corridor Sections ("S"); and
- "01" – A unique identification number assigned to each corridor.

For example, the label “AC6-PEN-P-01” refers to the first Primary Cable Corridor Section within the Stage 2 Pentir Study Area, under the Welsh Onshore Project. Similarly, “AC6-PEN-S-01” refers to the first Secondary Cable Corridor Section. This naming convention was developed further during Step 5 of the options appraisal process, as described in Stage 1: Strategic Proposal.

This classification approach supports the Welsh Onshore Project's options identification and selection process by maintaining route flexibility, enabling micrositing, and ensuring that all viable routing options are considered. It also allows for the refinement of corridor widths and alignments in later stages, based on detailed environmental, technical, and stakeholder inputs.

A comparative assessment of the cable corridors was undertaken independently by RSK and AtkinsRéalis, with each organisation leading on distinct aspects of the study. RSK led on environmental and socio-economic constraints and sensitivities, and AtkinsRéalis on engineering feasibility and constructability. While there was some overlap between the environmental and engineering assessments, this was intentional and ensured that no critical constraints or opportunities were missed.

These parallel assessments were then brought together and reviewed, as described in Step 5. This facilitated a structured comparison of findings, enabling the project team to align environmental and engineering priorities. The outcome of this collaborative process was a combined set of Cable Corridor Sections, forming the basis for further refinement and detailed appraisal in subsequent steps.

4.7 Step 5: Confirm Landfall Siting Zones, Landfall Compound Siting Area, Cable Corridor Sections and Converter Station Siting Zones for options appraisal

Step 5 focused on integrating two distinct datasets, one environmental and one technical, each comprising Converter Station Siting Zones and Cable Corridor Sections. The aim was to consolidate these into a unified set of Cable Corridor Sections and Converter Station Siting Zones that effectively balanced environmental sensitivities with technical feasibility.

The Landfall Siting Zones and Landfall Compound Siting Areas required no further refinement, as they had already been collaboratively developed by the project team earlier in the process. This unified dataset provided a robust and balanced foundation for Step 6 in the options appraisal.

4.7.1 Preliminary Routing and Siting

To facilitate this integration NGET, RSK, and AtkinsRéalis worked collaboratively, with a specific focus on the Stage 2 Pentir Study Area. This work aimed to identify areas of alignment between the environmental and engineering assessments and to agree on a balanced set of Cable Corridor Sections and Converter Station Siting Zone options that could be taken forward for appraisal.

AtkinsRéalis and RSK issued the outcomes of their respective Step 4 appraisals to the project team. Both AtkinsRéalis and RSK documented their independent, provisional recommendations for Cable Corridor Sections and Converter Station Siting Zones. The project team collaboratively reviewed, compared, and refined the corridors and siting zones. Through collaborative process, consensus was reached on a preferred set of options that appropriately balanced environmental, technical, socio-economic, planning, consenting, and cost considerations. AtkinsRéalis was then tasked with incorporating the agreed changes and preparing a revised and consolidated set of Converter Station Siting Zones and Cable Corridor Sections.

It was agreed that AC6-CS-5KM-02 and AC6-CS-5KM-03 would be parked and not progressed to Step 6. These zones were located 4.29 km and 4.22 km respectively from the existing Pentir substation (as detailed in **Table 4.6.2**). Reactive compensation requirements for AC transmission from these siting zones to the substation was assessed to be technically excessive. This would have increased the development footprint, and it led to their exclusion from further consideration given other more suitable siting zones had been identified in proximity to the existing substation.

AC6-CS-2KM-03 was also parked due to its HVDC connection being dependent on AC6-PEN-S-04, a Secondary Cable Corridor that was parked and not being progressed. Since the Primary Cable Corridor AC6-PEN-P-02 was selected instead, the associated siting zone was parked by association.

During earlier siting exercises, RSK had identified a fourth Converter Station Siting Zone within 2 km of the Pentir substation. Although located approximately 150 m northeast of the substation, the HVDC cable would need to route past the substation, with the HVAC cable returning southward to connect. This option was discussed and agreed for progression to Step 6. It has been designated AC6-PEN-CVT-RA01, as described in **Table 4.6.2** and illustrated in **Figure 4.7.1**.

Work then focused on finalising the refined routing and siting options. AtkinsRéalis issued the updated Converter Station Siting Zones and Cable Corridor Sections, incorporating feedback and decisions from the earlier phases. The project team reviewed the modifications, confirmed the rationale for each adjustment, and agreed the final set of corridors and siting zones for inclusion in the Options Appraisal Summary Tables (OASTs). Consensus was achieved on a consolidated set of options, ensuring that all relevant designations and receptors were considered and that the outcomes are robust and defensible.

A total of 7 Landfall Compound Siting Areas, 11 Cable Corridor Sections and 4 Converter Station Siting Zones were confirmed for inclusion in the OASTs, as illustrated in **Figure 4.7.1**. Further detail regarding OASTs is provided in **Step 6**: Appraise Landfall Compound Siting Areas, Cable Corridor Sections and Converter Station Siting Zones**.**

Figure 4.7.1: Cable Corridor Sections and Converter Station Siting Zones for OASTs

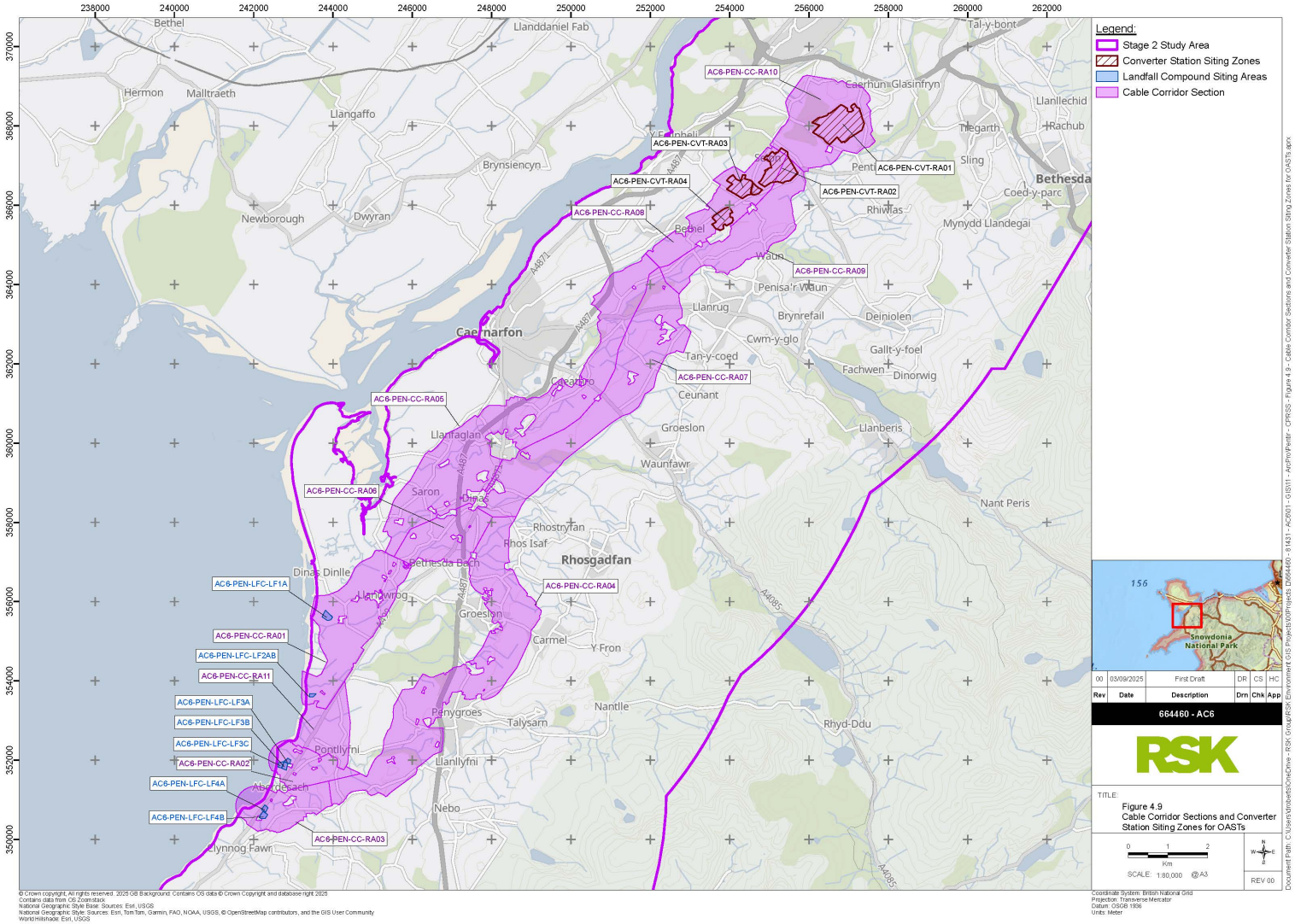


Table 4.7.1 provides an overview of each consolidated Cable Corridor Sections and Converter Station Siting Zone and the naming convention is described in **Sections 4.7.1.1** and **4.7.1.14.7.1.2**, respectively. **Table 4.6.1** provides an overview of each Landfall Compound Siting Area. For a more detailed appraisal of the Landfall Compound Siting Areas, Cable Corridor Sections, and Converter Station Siting Zones, please refer to **OPTIONS APPRAISAL** – LANDFALL COMPOUND SITING AREAS to **OPTIONS** APPRAISAL – CONVERTER STATION SITING ZONES of this TCPRSS.

Table 4.7.1: Further information on Cable Corridor Sections and Converter Station Siting Zones selected for OASTs

Cable Corridor Section reference	Length (km)
AC6-PEN-CC-RA01	4.40
AC6-PEN-CC-RA02	1.15
AC6-PEN-CC-RA03	2.16
AC6-PEN-CC-RA04	10.00
AC6-PEN-CC-RA05	11.74
AC6-PEN-CC-RA06	3.11
AC6-PEN-CC-RA07	8.18
AC6-PEN-CC-RA08	4.5
AC6-PEN-CC-RA09	5.23
AC6-PEN-CC-RA10	2.5
AC6-PEN-CC-RA11	1.65

Converter Station Siting Zone reference	Area (ha)	Distance from Pentir substation (from nearest point) (km)	Hierarchy position
AC6-PEN-CVT-RA01	81.74	0.15 SW	1
AC6-PEN-CVT-RA02	52.04	0.5 NE	2
AC6-PEN-CVT-RA03	28.78	1.7 NE	2
AC6-PEN-CVT-RA04	18.54	2.5 NE	3

4.7.1.1 Step 5 Cable Corridor Sections – Naming Convention

During Step 5, naming conventions were revised to establish a more systematic and consolidated approach. These updated conventions supersede those previously outlined in Step 4, supporting clearer referencing, streamlined design development, and improved traceability across project documentation.

In Step 4, Cable Corridor Sections were categorised as Primary or Secondary, each with different naming rules. While appropriate at an early stage, this approach became increasingly complex as the appraisal progressed.

In Step 5, this structure was replaced with a unified naming convention that eliminated the Primary/Secondary distinction and introduced a consistent format capturing key attributes of each corridor.

The revised naming format for Cable Corridor Sections is structured as follows:

- “AC6” – Denotes the project name;
- “PEN” – Indicates the Pentir study area;
- “CC” – Stands for Cable Corridor Section;
- “RA” – Represents a collaborative corridor developed jointly by RSK (“R”) and AtkinsRéalis (“A”); and
- “01” – A unique identifier assigned to each corridor.

For example, AC6-PEN-CC-RA01 refers to the first collaborative RSK and AtkinsRéalis Cable Corridor Section within the Stage 2 Study Area under the Welsh Onshore Project.

4.7.1.2 Step 5 Converter Station Siting Zones – Naming Convention

Similarly, the naming convention for Converter Station Siting Zones was revised to reflect the consolidation of previously separate 2 km and 5 km zones. The updated format removes distance-based identifiers and adopts a simplified structure:

- “AC6” – Denotes the project name;
- “PEN” – Indicates the Pentir study area;
- “CVT” – Stands for Converter Station Siting Zone;
- “RA” – Represents a collaborative corridor developed jointly by RSK (“R”) and AtkinsRéalis (“A”); and
- “01” – A unique identifier assigned to each siting zone.

For example, AC6-PEN-CVT-RA01 refers to the first collaborative RSK and AtkinsRéalis Converter Station Siting Zone within the Stage 2 Study Area under the Welsh Onshore Project.

The refined conventions support clear referencing in the OASTs and preserve the identity of parked options, enabling reintroduction if required later. They reflect the maturity of the design process and ensure relevance to the current phase of works.

4.8 Step 6: Appraise Landfall Compound Siting Areas, Cable Corridor Sections and Converter Station Siting Zones

Following the completion of Step 5, the consolidated Landfall Compound Siting Areas, Cable Corridor Sections and Converter Station Siting Zones were progressed to Step 6. This step was undertaken in accordance with NGET’s Approach to Consenting document (National Grid, 2022). The outcomes of this appraisal process are presented in **OPTIONS APPRAISAL** – LANDFALL COMPOUND SITING AREAS to **OPTIONS** APPRAISAL – CONVERTER STATION SITING ZONES of this TCPRSS.

The Options Appraisal is a structured and transparent process used to evaluate the environmental, planning, socio-economic, technical and programme-related implications of each routing and siting option. It supports objective decision-making by documenting the rationale behind each judgement and ensuring consistency across the Welsh Onshore Project. Reporting of the options appraisal is provided in the OASTs.

It is important to note that Landfall Siting Zones were not reappraised in Step 6, as they had already undergone comprehensive assessment and evaluation during Stage 1: Strategic Proposal study which informed their initial identification. The refinement of these zones will be guided by marine survey data, which played a decisive role in determining the preferred Landfall Siting Zone. For the Stage 2 onshore appraisal, the focus shifted to the Landfall Compound Siting Areas, which represent the key terrestrial component of the landfall. These areas were appraised from a terrestrial perspective, as they are the only elements within the landfall zone that present potential environmental risks to the onshore environment.

The primary objective of Step 6 was to undertake a detailed appraisal of the key technical, environmental, planning and socio-economic designations and receptors associated with each Landfall Compound Siting Area, Cable Corridor Sections and Converter Station Siting Zone, and identified in

Step 5. This included identifying potential risks and impacts, considering appropriate mitigation measures, and evaluating residual impacts. These residual impacts do not account for further project-specific mitigation measures that may be introduced during Stage 3: Defined Proposal and Statutory Consultation.

4.8.1 OAST Template

To ensure consistency across both terrestrial and marine appraisal work, and across the wider NGET portfolio, an OAST template was collaboratively developed by the project team. Completed OASTs can be provided upon request.

The OAST template comprises two key components: the Detailed OAST and the OAST.

- Detailed OAST: This component builds upon the Stage 1: Strategic Proposal and provides a high-level review of constraints and risks associated with each Landfall Compound Siting Area, Cable Corridor Section, and Converter Station Siting Zone. It assesses the presence and proximity of designations, constraints and receptors, summarises potential impacts, outlines mitigation measures, and identifies residual effects. Each option is then assigned a risk rating, either Black, Red, Amber, or Green, based on its overall consentability risk and with reference to the criteria in **Table 4.4.1**.
- OAST: This stage involved a technical appraisal undertaken by subject matter experts, who evaluated each routing and siting option from a range of perspectives, including technical feasibility, biological and physical environment, historic environment, socio-economic considerations, and access. Given the proximity of certain options to internationally designated ecological sites, a Habitats Regulations Assessment (HRA) specialist was also engaged to provide targeted input. Their appraisal focused on the implications of the HRA process for each corridor, siting zone, and siting area.
- The OAST examined potential impacts on relevant environmental and socio-economic features, assessing whether such impacts could be avoided or mitigated through careful routeing or siting. Where avoidance was not feasible, alternative mitigation strategies, such as trenchless crossings for major roads and watercourses were considered. Following this, a risk rating of Black, Red, Amber, or Green was assigned to each option, reflecting the anticipated severity of residual impacts.

All appraisals at this stage are based solely on desk-based information and do not incorporate data from site visits or surveys. The OAST methodology is designed to mirror the style and structure of an EIA, facilitating efficient transfer of information and findings into later project stages.

The purpose of both the Detailed OAST and the OAST is to provide robust evidence to support decisions on which Landfall Compound Siting Areas, Cable Corridor Sections, and Converter Station Siting Zones should be taken forward to Stage 3: Defined Proposal and Statutory Consultation.

The results of the environmental, socio-economic, and technical appraisals are presented as follows:

- **OPTIONS APPRAISAL** – LANDFALL COMPOUND SITING AREAS
- **OPTIONS APPRAISAL** – CABLE CORRIDOR SECTIONS AND COMBINATIONS
- **OPTIONS APPRAISAL** – CONVERTER STATION SITING ZONES

4.9 Step 7: Create Cable Corridor Combinations

Following the completion of Step 6, the individual Cable Corridor Sections were systematically assembled into complete Cable Corridor Combinations. While the sections provided a basis for comparison during the options appraisal, they needed to be sequenced into coherent combinations to demonstrate viable routing options from each Landfall Siting Zone northwards to the Converter Station Siting Zones.

Cable Corridor Combinations refer to the integrated sequences of Cable Corridor Sections (as identified and appraised in Step 4) that establish a continuous connection between each Landfall Siting Zone and the respective Converter Station Siting Zones. These combinations define the maximum permissible spatial boundary within which the final onshore terrestrial cable infrastructure, including the cable route and its associated easement, may be developed.

This corridor encompasses all feasible alignments and construction zones required for the installation, maintenance, and operational access of the onshore cable infrastructure. It is designed to provide flexibility during detailed design stages while aiming to minimise technical, environmental, consenting, and land use impacts. By accommodating a range of potential routing options, the Cable Corridor Combination ensures resilience and adaptability throughout the design, planning and implementation process.

These combinations are detailed in

Table 6.1.1, and illustrated in **Figure 4.9.1** to **Figure 4.9.6.** A total of six Cable Corridor Combinations were identified and appraised and taken forwards to Step 8.

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Figure 4.9.1: Cable Corridor Combination AC6 – PEN – CC – LF2_W

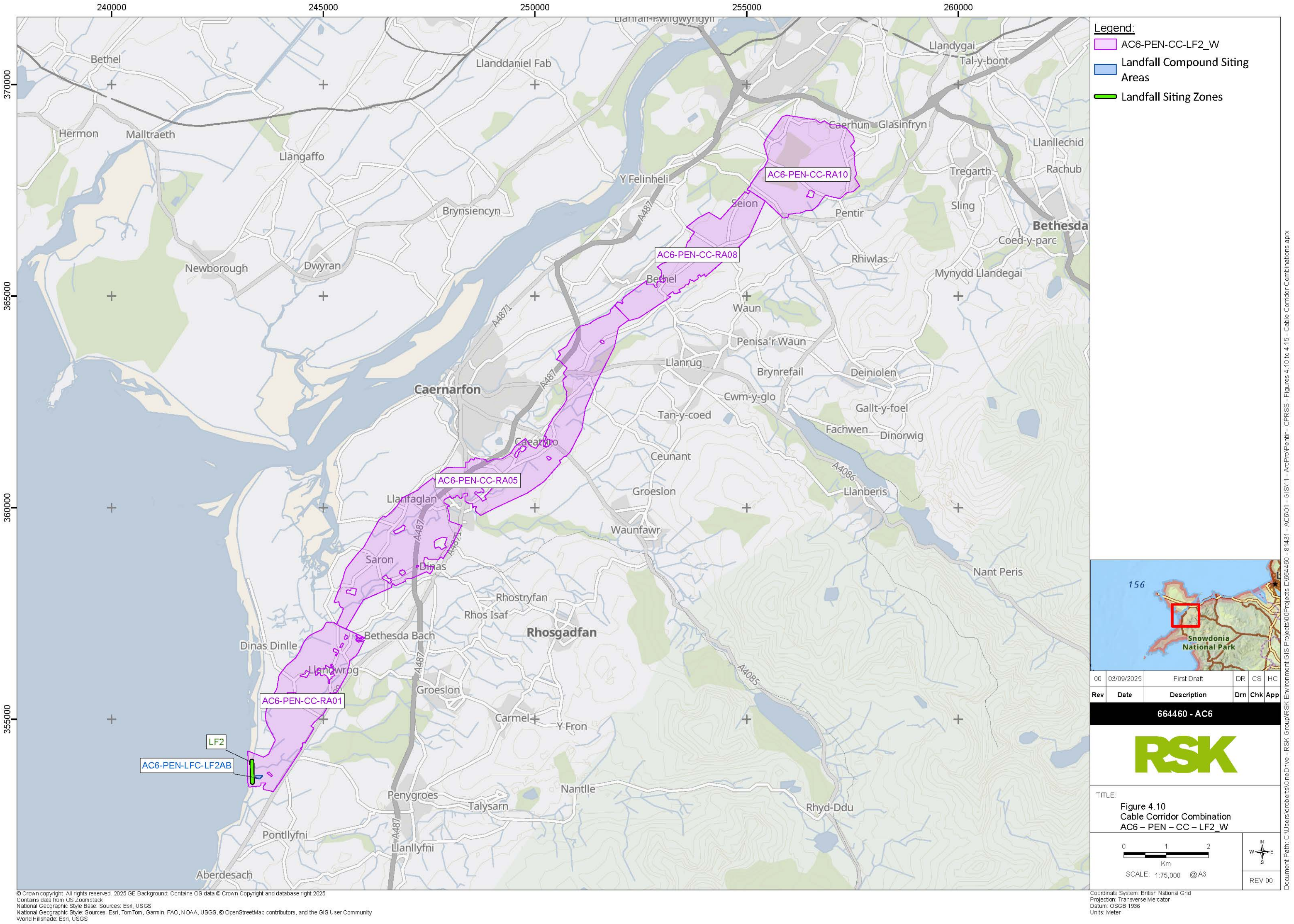


Figure 4.9.2: Cable Corridor Combination AC6 – PEN – CC – LF2_E

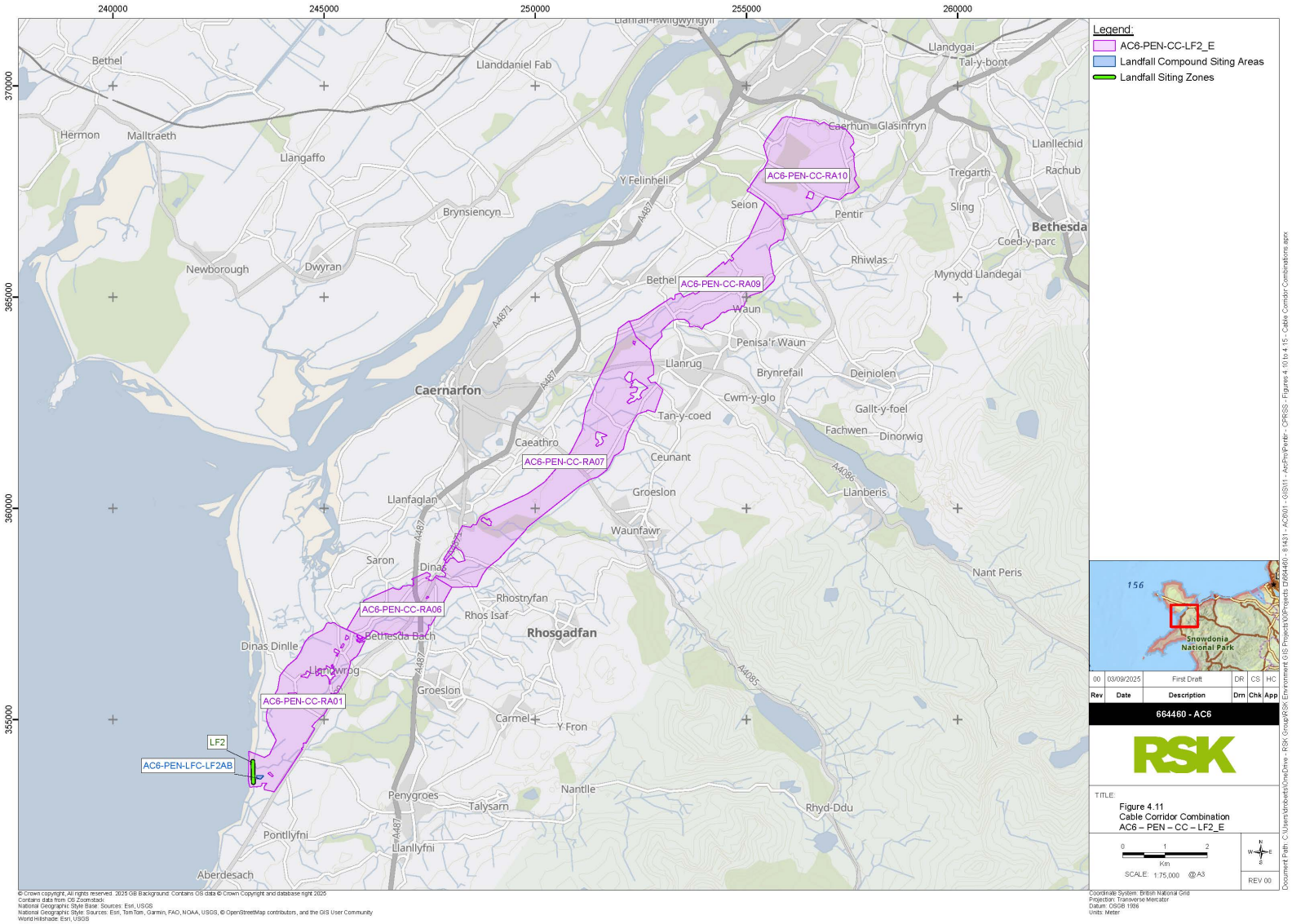


Figure 4.9.3: Cable Corridor Combination AC6-PEN-CC-LF3_W

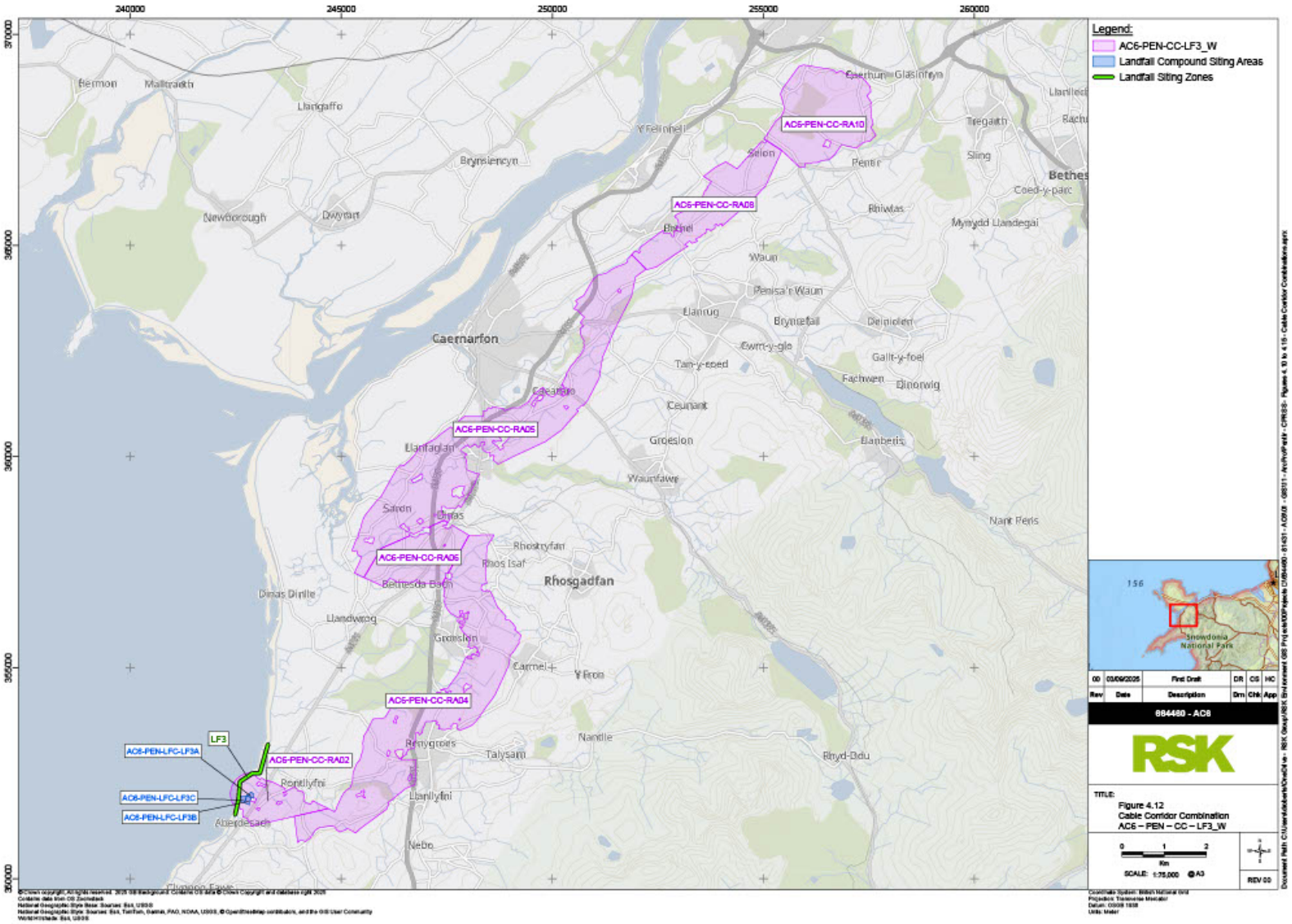


Figure 4.9.4: Cable Corridor Combination AC6-PEN-CC-LF3_E

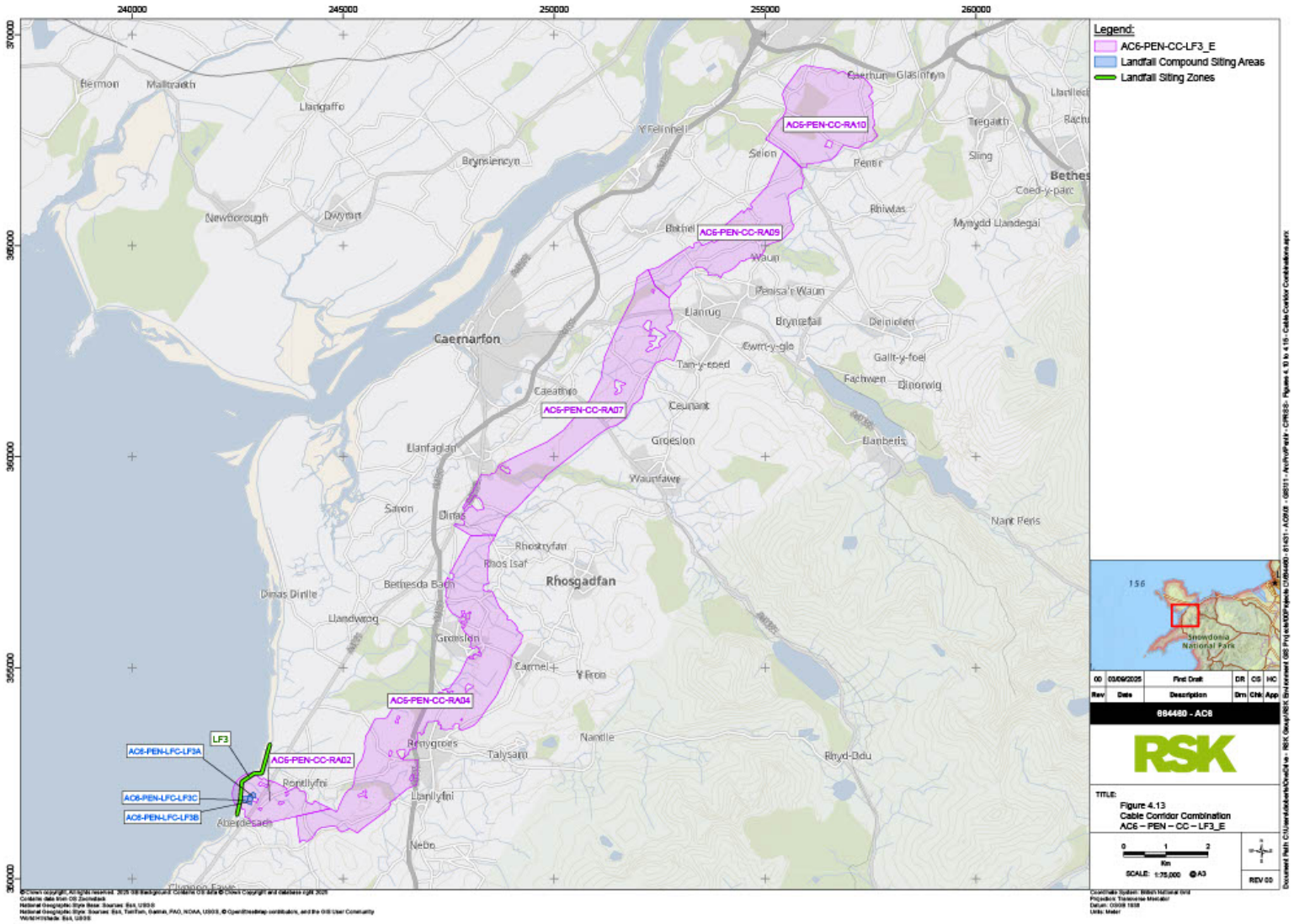


Figure 4.9.5: Cable Corridor Combination AC6 – PEN – CC – LF4_W

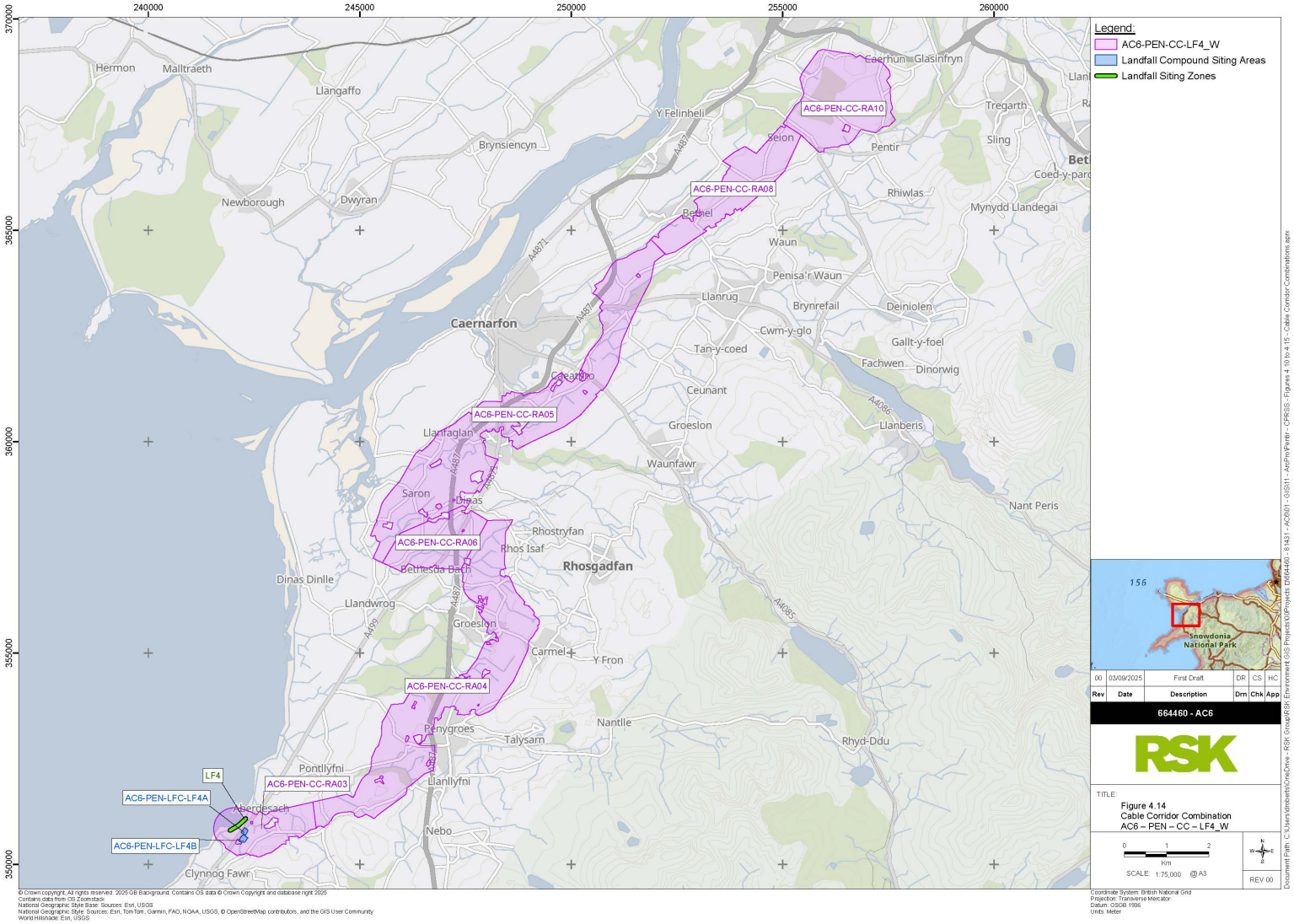
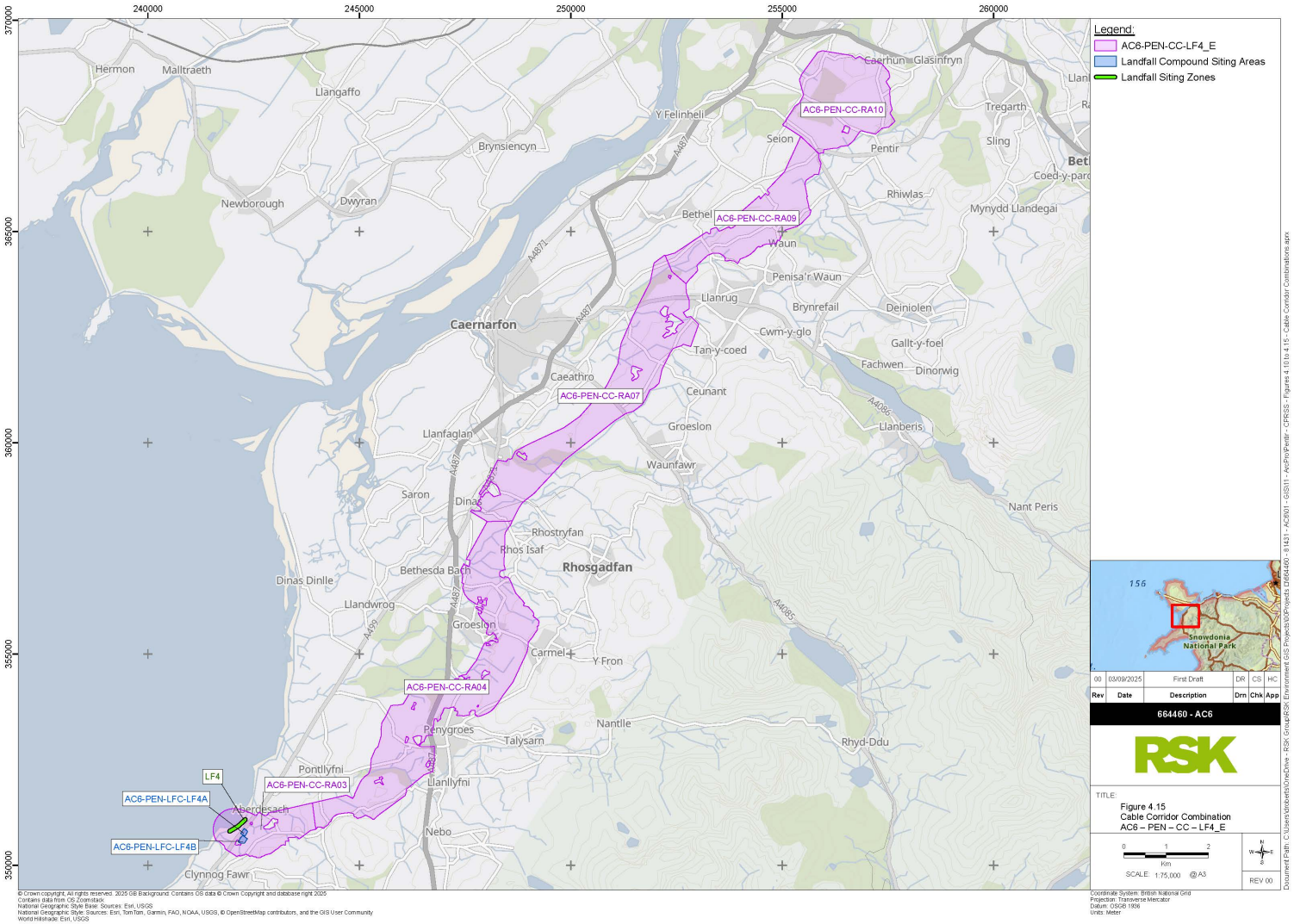


Figure 4.9.6: Cable Corridor Combination AC6 – PEN – CC – LF4_E

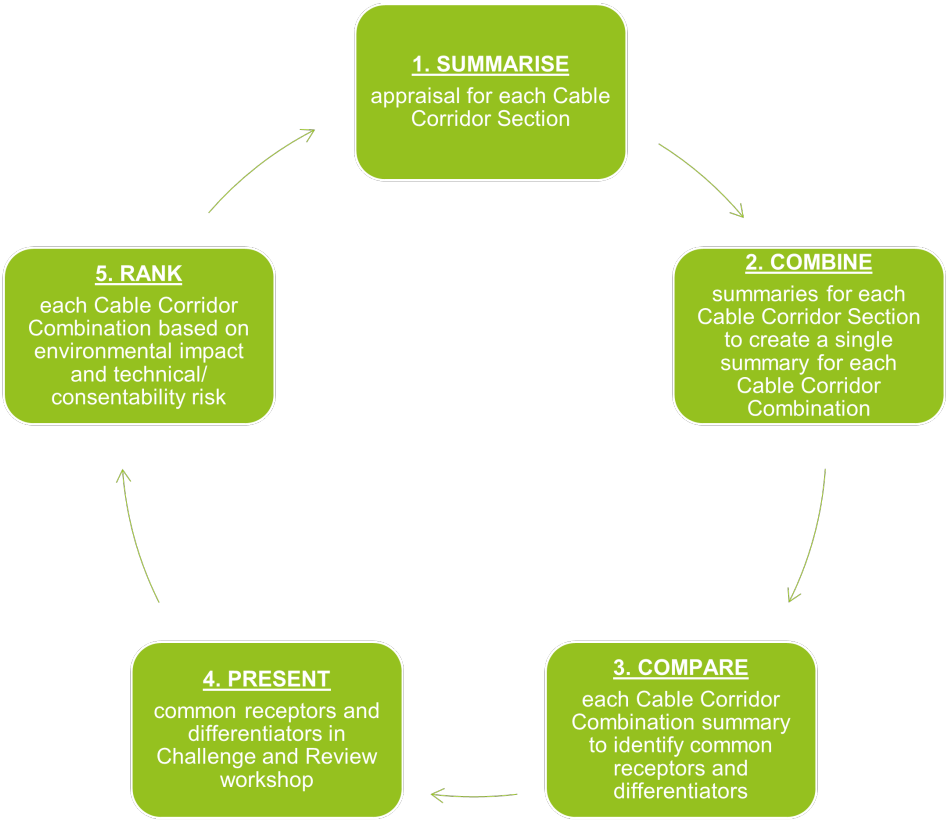


The combinations were selected based on their technical and environmental viability, ensuring connectivity between landfall and converter station locations. Broadly, the combinations were grouped into:

- Western options which align more closely with the Menai Strait coastline; and
- Eastern options, which are routed further inland to differentiating constraints such as the Glynllifon SAC and SSSI.

To assess the cumulative impact of each combination, a structured five-phase appraisal approach was adopted, as illustrated in **Figure 4.9.7**. This approach enabled a consistent and proportionate comparison of each Cable Corridor Combination. Each combination needed to be appraised to understand the combined impact of each Cable Corridor Section on the area it was routed through.

Figure 4.9.7: Five-Phase appraisal approach to Cable Corridor Combinations



Phases 1 to 3 were completed in Step 7, while Phases 4 and 5 were undertaken in Step 8.

4.9.1 Common Environmental Receptors

Common Environmental Receptors are environmental, planning or socio-economic designations or receptors that are present across all Cable Corridor Combinations. These may include designated sites, infrastructure, or land use features that are unavoidable regardless of the option selected. Common Environmental Receptors establish a baseline level of constraint affecting all combinations. While they do not differentiate between combinations, they are essential for understanding the overall feasibility and informing mitigation strategies. When Differentiating Environmental Receptors show similar levels of risk, Common Environmental Receptors may be reviewed to assess their relative impact. This helps refine the understanding of cumulative effects and supports the development of mitigation measures.

4.9.2 Differentiating Environmental Receptors

Differentiating Environmental Receptors are constraints that vary between Cable Corridor Combinations. These may include unique environmental designations, land use conflicts, or planning sensitivities not encountered in all Cable Corridors Combinations. The Differentiating Environmental Receptors form the primary basis for comparing and ranking the Cable Corridor Combinations. They highlight the unique challenges and opportunities associated with each option and are central to assessing consentability risk. By evaluating Differentiating Environmental Receptors, the study can determine which route presents the lowest environmental or planning risk, the greatest technical feasibility, or the most manageable constraints. This enables a structured and evidence-based comparison and supports informed decisions on Cable Corridor Combination preference and feasibility.

The identification and analysis of Common Environmental Receptors and Differentiating Environmental Receptors provided a robust framework for comparing Cable Corridor Combinations. This approach ensured that the appraisal was:

- Proportionate to the complexity of the Study Area;
- Transparent in its methodology; and
- Effective in supporting informed decision-making.

The results of this analysis are presented in **Comparative Appraisal** and Summary, where each combination is discussed in detail and ranked according to its technical, environmental, and planning performance.

With the creation of distinct Cable Corridor Combinations in Step 7, a new naming convention was introduced to provide each combination with a unique and traceable identity. This was essential to ensure consistency and clarity across all project documentation, assessments, and stakeholder communications. The naming convention was designed to build upon the structure established for individual Cable Corridor Sections in Step 5, maintaining a clear link between the corridor sections and the combinations they form. Each name is composed of a series of components that convey key information about the combination's location, origin, and routing direction:

- "AC6" – Denotes the project name;
- "PEN" - Indicates that the siting area is located within the Pentir study area;
- "CC" – Stands for Cable Corridor Combination;
- "LF1" – Refers to the Landfall Siting Zone from which the combination originates from; and
- "_E" – Refers to whether the combination follows the eastern or western route, as defined in Step 7.

For example, the label "AC6-PEN-CC-LF2_E" refers to a Cable Corridor Combination that is part of the Welsh Onshore Project, located within the Pentir study area, originating from Landfall Siting Zone LF2, and following the eastern routing option.

This structured naming system provides a consistent method for referencing each combination throughout the project lifecycle. It enhances traceability, supports efficient cross-referencing between terrestrial and marine, technical and environmental assessments, and facilitates clear communication during stakeholder engagement and statutory consultation.

4.9.3 AC6-PEN-LFC-LF1A and AC6-PEN-CC-RA11

The Landfall Compound Siting Area AC6-PEN-LFC-LF1A, associated with Landfall Siting Zone LF1, and the Cable Corridor Section AC6-PEN-CC-RA11 are not included in any of the defined Cable Corridor Combinations. Specifically, no combinations originate from LF1, and AC6-PEN-CC-RA11 is not part of any proposed combinations. These options were excluded due to significant terrestrial constraints, including proximity to sensitive habitats such as peatland, SAC and SSSI designations, high flood risk, and the need for multiple major road crossings, which together presented substantial engineering and consenting risks compared to alternatives.

Nevertheless, for the purposes of the TCPRSS, both AC6-PEN-CC-RA11 and AC6-PEN-LFC-LF1A remain under consideration as viable options within the broader Stage 2 decision-making framework. Although they were not considered during Step 7 of the appraisal process, they are actively considered during the emerging preference decisions in Step 8, following the Challenge and Review. Importantly, both options underwent the same level of appraisal as all other options during Stage 2, ensuring consistency and robustness in the evaluation process. Further details on this consideration are provided in Error! Reference source not found. of the TCPRSS.

4.10 Step 8: Confirm emerging preferred Landfall Siting Zone, Landfall Compound Siting Area, Cable Corridor Combination and Converter Station Siting Zone to develop the Graduated Swathe

4.10.1 Challenge and Review

As part of the decision-making process within the Welsh Onshore Project, Challenge and Review was held to evaluate the findings from Steps 1 to 7 and determine the progression of siting and routing options. This involved representatives from NGET, RSK, and AtkinsRéalis, and serve as a critical for collaborative review and decision-making.

The purpose is to provide the project team with an opportunity to interrogate the outcomes of the environmental and technical assessments, critique, and ensure that all decisions are well-informed and reflect the collective expertise and perspectives of key stakeholders. This enables the team to determine whether specific options should be taken forward for further development or parked due to constraints or risks identified during the appraisal process.

This process played a pivotal role in validating the findings of the appraisal work and shaping the direction of subsequent project phases. The outcomes and conclusions of this process are reflected in the decisions on emerging preferences as detailed inEMERGING **PREFERENCES** of the TCPRSS.

4.10.2 Site Visits

In August 2025, representatives from RSK, AtkinsRéalis, and NGET undertook a series of site visits to inspect all key components of the Welsh Onshore Project. These visits were a critical step in validating and contextualising the findings from the desk-based assessments, particularly those captured in the OASTs.

Site visits play a vital role in ground-truthing, which is the process of verifying assumptions, constraints, and opportunities identified through remote and desktop analysis. By physically inspecting the landscape, infrastructure, and environmental features, the project team was able to gain a better understanding of the spatial and contextual realities of each siting and routing option. This was especially important in areas identified as particularly constrained or complex, where on-the-ground observations provided insights that could not be fully captured through mapping or data alone.

The observations from the site visits have been incorporated into the appraisal process and have helped refine the understanding of environmental sensitivities, technical feasibility, and land-use constraints. As the Welsh Onshore Project progresses into Stage 3: Defined Proposal and Statutory Consultation, which involves more detailed design and assessment, further surveys and site-based investigations will be undertaken. These future activities will continue to build on the existing evidence base and will be used to back-check and validate the findings of this study, ensuring that decisions remain robust and responsive to emerging data.

4.10.3 Outcomes and Conclusions

Following the completion of Step 8 of the Option Appraisal Approach (see **Figure 4.2.1**), a series of evidence-based decisions were made regarding which project components would progress to Stage 3: Defined Proposal and Statutory Consultation of the Welsh Onshore Project. These decisions reflect the outcomes of the appraisal process and the discussions held during the Challenge and Review.

The following components were confirmed for progression to Stage 3:

- Landfall Siting Zones: LF1, LF2, LF3, and LF4;
- All Landfall Compound Siting Areas;
- Converter Station Siting Zones: AC6-PEN-CVT-RA01 and AC6-PEN-CVT-RA02; and
- Cable Corridor Combination: A single combination, based on an amended boundary of AC6-PEN-CC-LF2_E, which includes access to all four Landfall Siting Zones (further detail provided in **EMERGING PREFERENCES**).

While this section outlines the components taken forward, the underpinning rationale, including the detailed evidence base and appraisal findings, is documented in **OPTIONS APPRAISAL** – LANDFALL COMPOUND SITING AREAS to **OPTIONS** APPRAISAL – CONVERTER STATION SITING ZONES of this TCPRSS.

Final conclusions and the justification for emerging preferences are presented in **EMERGING PREFERENCES**, which consolidates the findings and decisions from across the siting and routing process.

Additional details and final conclusions regarding LF1 are presented in Chapter 8, following the decision to discount LF1. This decision was made after the earlier appraisal work described in Chapter 4 and 5. As the appraisal of LF1 and its associated Landfall Compound Siting Area has already been undertaken, this information is retained within the TCPRSS for completeness and transparency. However, the conclusions set out in Chapter 8 reflect subsequent marine engineering review and outcomes and therefore takes precedence and supersedes the previous appraisal work. Accordingly, the conclusions in Chapter 8 should form the basis for decisions as the Project progresses into Stage 3: Defined Proposal and Statutory Consultation.

4.10.4 Graduated Swathe

The Converter Station Siting Zones and the selected Cable Corridor Combination have been progressed to the Graduated Swathe. This marks a key transition in the Project, where the preferred siting and routing options begin to be refined through more detailed design and assessment.

The specific elements identified for integration into the Graduated Swathe model include:

- Converter Station Siting Zones: AC6-PEN-CVT-RA01 and AC6-PEN-CVT-RA02; and
- Cable Corridor Combination: An amended version of AC6-PEN-CC-LF2_E, which incorporates access to all four Landfall Siting Zones (LF1 to LF4).

These selections reflect the outcome of the evidence-based appraisal process from Step 1 to Step 7 and the decisions made during the Challenge and Review (Step 8).

The Graduated Swathe has been developed to enhance the siting process for key infrastructure components by preserving flexibility and supporting informed decision-making as the Project progresses into Stage 3. Further information on the development and outcomes of the Graduated Swathe is provided in **GRADUATED SWATHE**.

Within the Converter Station Siting Zones, the Graduated Swathe model enables the identification of potential siting areas by subdividing each zone into optimal locations (formally named siting areas) for the permanent converter station. These dimensions for these locations are determined using the engineering parameters outlined in**South Wales Strategic Option – AC6-9 (Bridgend**. This structured approach ensures that a diverse range of viable options remains available, thereby preserving flexibility and supporting informed decision-making as the Project progresses.

For cable routing, the model supports the identification of route options within the defined boundaries of the Cable Corridor Combinations. This enables the presentation of multiple routing alternatives, which will inform both the pre-application consultation process and the more detailed routing studies planned for Stage 3.

Landfall Siting Zones are currently excluded from the Graduated Swathe model due to ongoing offshore geophysical surveys. These surveys are expected to help determine emerging preferred Landfall Siting Zone(s). Further details regarding this exclusion are provided in **8.18.1**. Landfall Compound Siting Areas are also excluded from the model. These areas have already been sized appropriately to accommodate

all necessary temporary and permanent infrastructure required for both construction and operation. As the identified areas are considered optimally sized, no further optionality is required, and therefore, the application of the Graduated Swathe is not necessary at this stage.

4.11 Step 9: Undertake pre-application consultation

The TCPRSS provides a key evidence base that will inform the EIA Scoping Report, pre-application consultation and wider engagement activities related to the Welsh Onshore component of the Project.

In addition to informing internal project development, the TCPRSS is designed to support pre-application consultation, initiate the consenting process and facilitate meaningful engagement with a range of stakeholders, part of Stage 3: Defined Proposal and Statutory Consultation. These include statutory consultees, landowners, interested parties, and the general public. By presenting a transparent and structured account of the siting and routing process, the report enables stakeholders to understand how options have been identified, assessed, and refined.

The TCPRSS will continue to act as a reference document throughout future stages of the Project, helping to ensure there is a clear understanding of the Project's development.

4.12 Additional Work undertaken during Stage 2: Options Identification and Selection

In addition to the structured 9-step option appraisal methodology outlined in **OPTIONS APPRAISAL** APPROACH above, a number of supplementary workstreams were undertaken during Stage 2 to enhance the overall robustness and defensibility of the routing and siting study. While these activities fall outside the formal scope of the core methodology, they have played a vital role in strengthening the evidence base and ensuring that the Project remains adaptable to emerging challenges and opportunities through the programme.

These additional elements of work have contributed to the development of a more resilient and well-justified routing and siting strategy by providing further assessment, feedback, and technical validation. They have supported the refinement of options, introduced greater flexibility into the appraisal process, and ensured that the conclusions drawn from the core study are grounded in a comprehensive understanding of the project context.

In no particular order, the following subsections describe each of these additional workstreams, outlining their purpose, scope, and contribution to the overall siting and routing process.

4.12.1 Stakeholder Engagement

Initial stakeholder engagement activities for the Welsh Onshore AC6 commenced in May 2025 and remains ongoing at the time of writing this report. **Table 4.12.1**: Record of stakeholder engagement activities throughout Stage 2 programme outlines consultation undertaken to date. Further stakeholder engagement is anticipated as the Project progresses to Stage 3: Defined Proposal and Statutory Consultation.

Table 4.12.1: Record of stakeholder engagement activities throughout Stage 2 programme

Date	Organisation	Agenda overview
21 May 2025	Cyngor Gwynedd	Introduction to the AC6 project
22 May 2025	NRW	Introduction to the AC6 project
29 May 2025	The Isle of Anglesey County Council	Introduction to the AC6 project

18 June 2025	Eryri National Park Authority	Introduction to the AC6 project
e 2025	Conwy County Borough Council	Introduction to the AC6 project
23 June 2025	Cyngor Gwynedd	Follow up meeting to present preliminary routing and siting outcomes
26 June 2025	NRW	Follow up meeting to present preliminary routing and siting outcomes

4.12.2 Pentir B Substation and Converter Station Siting Study

As part of the broader Stage 2 work, NGET commissioned a separate siting study to explore alternative substation and converter station options within the Pentir Study Area, should that prove necessary.

There were two primary reasons which prompted this additional investigation. Firstly, NGET wished to consider how the subsurface geological conditions within the Pentir area might affect the constructability and long-term operability of the onshore cable route required to connect to the existing substation. Secondly, NGET wished to consider an alternative if there was insufficient available capacity at the Pentir substation.

NGET commissioned RSK to identify viable substation and converter station site options along the existing 400 kV overhead line, which runs north to south through the Stage 2 Study Area. This alternative is referred to as “the Pentir B option.”

5. OPTIONS APPRAISAL – LANDFALL COMPOUND SITING AREAS

5.1 Introduction

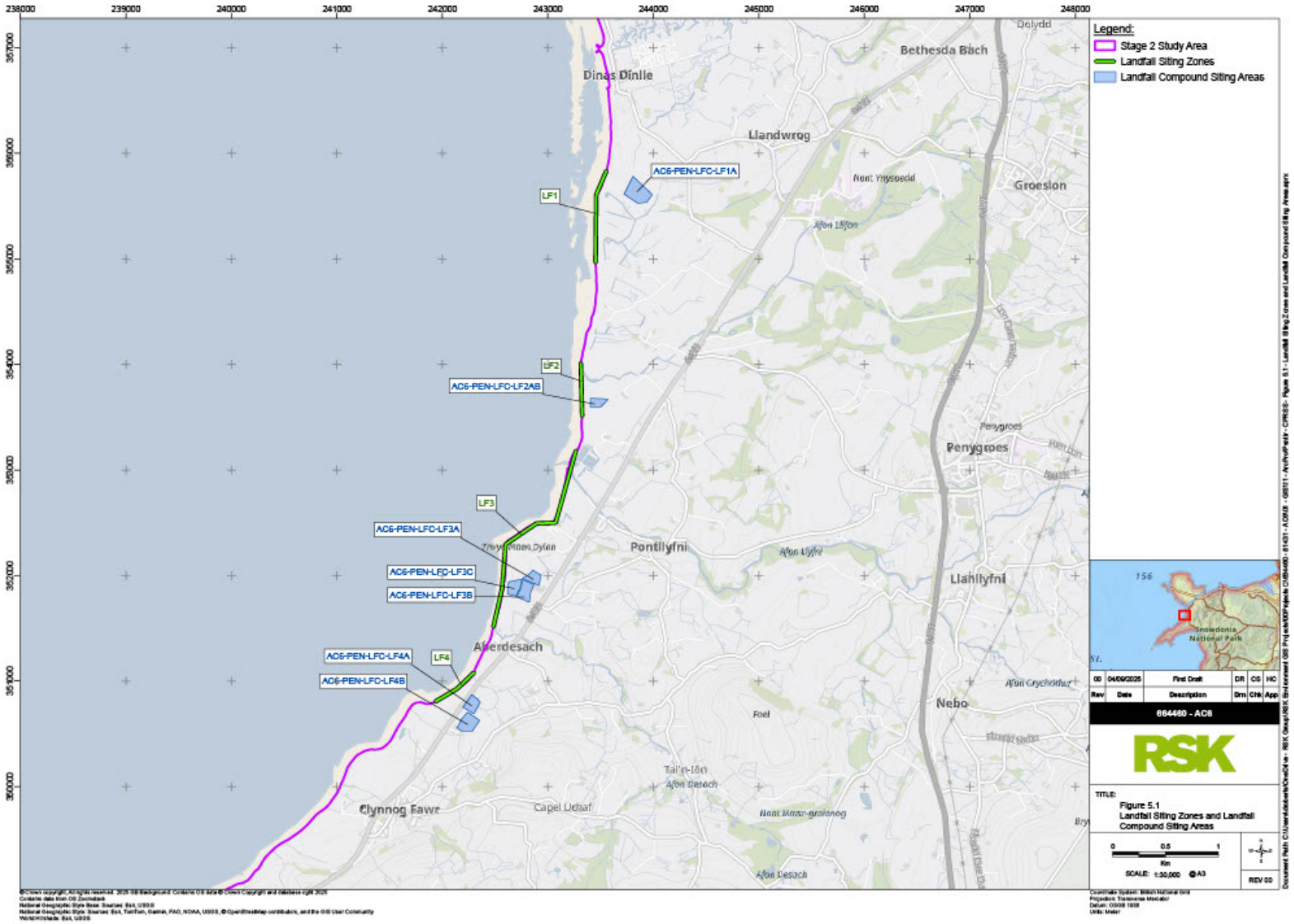
5.1.1 Overview

As outlined in **Landfall Siting** Zones, four Landfall Siting Zones were identified and taken forwards into the Options Appraisal following the landfall identification process within the Stage 1: Strategic Options study. AtkinsRéalis provided RSK with seven Landfall Compound Siting Areas for appraisal, associated with the four zones (see **Table 4.6.1**: Further Landfall Compound Siting Area information) using the approach described in **Landfall Compound** Siting Areas. Details of the naming conventions for the Landfall Siting Zones and Landfall Compound Siting Areas are provided in **Landfall Compound** Siting Area – Naming Convention.

A general overview of each Landfall Siting Zone, along with its associated Landfall Siting Compound(s), is provided below and illustrated in **Figure 5.1.1**: Landfall Siting Zones and Landfall Compound Siting Areas

- Landfall Siting Zone 1 (LF1): This siting zone lies on the Dinas Dinlle/Morfa Dinlle frontage, immediately southwest of Caernarfon and inland of the coastal dune and flood-defence ridge. AC6-PEN-LFC-LF1A sits behind the foredune system, with level agricultural fields and field drains to landward and Caernarfon Airport infrastructure to the east. Access is expected to be from the A499 via minor roads toward Dinas Dinlle. The shoreline is a wide, exposed sandy/gravel beach with intertidal sandflats, backed by grassed dunes and engineered embankments.
- Landfall Siting Zone 2 (LF2): This siting zone is located near the Pontllyfni coast and fronts a more open, rural shoreline between Dinas Dinlle and Aberdesach. AC6-PEN-LFC-LF2AB occupies relatively flat pasture behind a low embankment line and a narrow beach. Access is from the A499 with short connections via single-track lanes; internal access would likely use existing farm gateways. The immediate hinterland comprises grazed fields bounded by stone walls and hedgerows with a network of drainage ditches trending parallel to the coast.
- Landfall Siting Zone 3 (LF3): This siting zone is set on the Aberdesach frontage, where the coast transitions locally from a shallow sandy/shingle beach to low beach cliffs formed by glacial soils. The AC6-PEN-LFC-LF3A, LF3B, and LF3C compounds provide options on gently undulating farmland just landward of the coastal margin, screened in parts by low dune grassland and field banks. Access is via short lanes from the A499 through dispersed farmsteads. Intertidal areas include an incised platform of harder material overlain by occasional to frequent boulders and glacial erratics; inland, the setting is predominantly pastoral with sporadic shelterbelts and soft outcropping cliffs.
- Landfall Siting Zone 4 (LF4): This siting zone is situated close to Clynnog Fawr and faces a more exposed stretch of the Llŷn north coast. AC6-PEN-LFC-LF4A and LF4B occupy low-lying agricultural parcels behind the coastal edge, where cobble beach sections and soft glaciogenic cliffs are backed by shallow banks and grassed margins. Access is provided directly from the A499; compounds tie into existing field entrances where feasible. The surrounding land use is mixed grazing with stone-walled fields and scattered dwellings, rising gently toward the Afon Desach/Clynnog hinterland.

Figure 5.1.1: Landfall Siting Zones and Landfall Compound Siting Areas



5.2 Common Environmental Receptors for Landfall Compound Siting Areas

This section presents the environmental designations and receptors that are consistently present within all seven Landfall Compound Siting Areas (see **Table 4.6.1**). These designations and receptors are considered *common* because they occur across every option, either directly intersecting the compound footprint or located within 250 m of the siting area boundary.

While these designations and receptors form an important part of the baseline environment and may influence design or mitigation measures, they do not provide a basis for distinguishing between siting area options, as they are unavoidable across all locations.

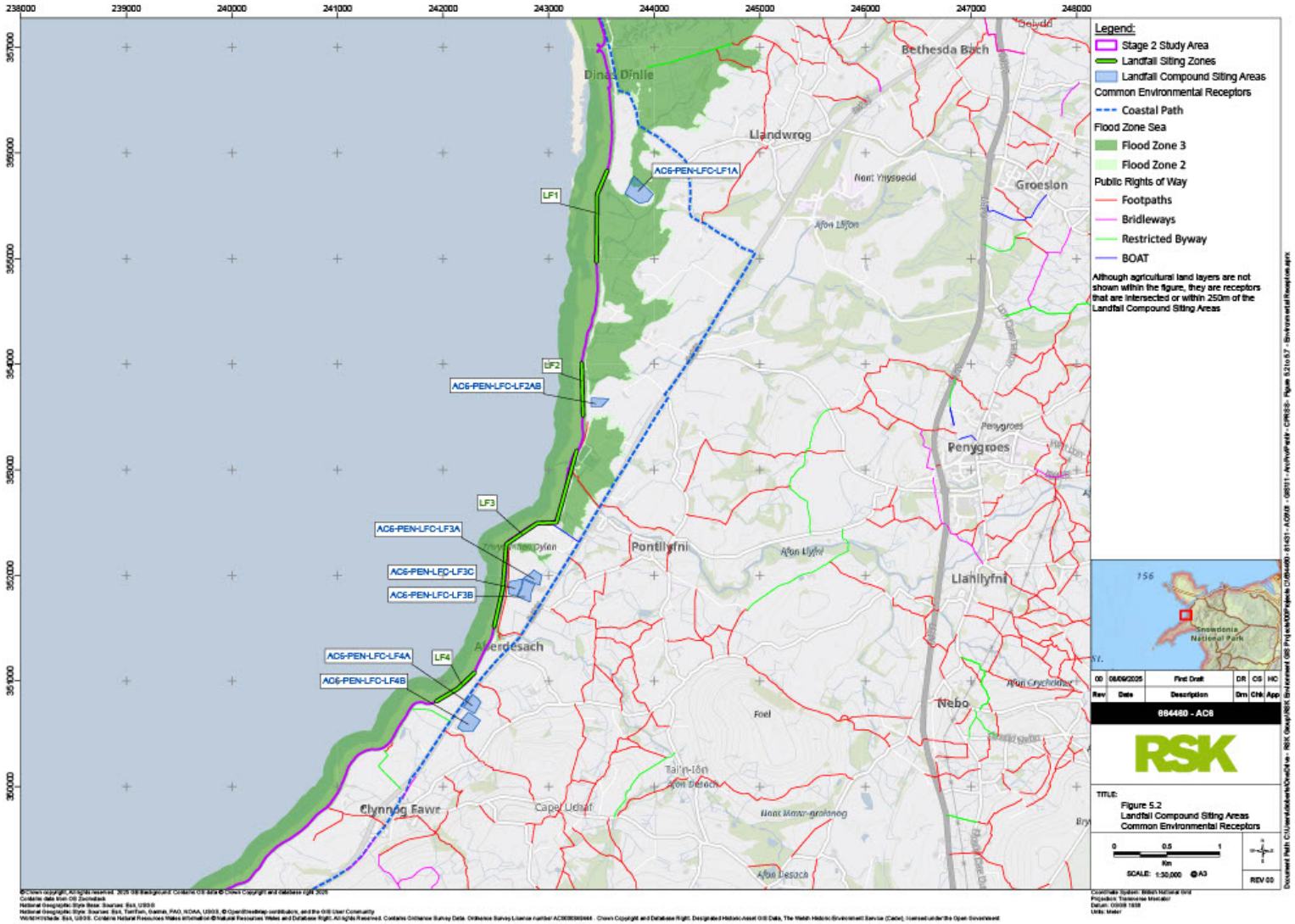
The term 'Common Environmental Receptors' is defined in **Common Environmental** Receptors of this TCPRSS.

The following Common Environmental Receptors have been identified:

- Grade 3a and 3b Agricultural Land;
- Flood Zone from the Sea;
- Public Rights of Way (PRoW);
- Wales Coast Path; and
- A499 Road Corridor.

The Common Environmental Receptors for all seven Landfall Compound Siting Areas as described above were mapped using GIS and are presented in **Figure 5.2.1**: Landfall Compound Siting Areas Common Environmental Receptors

Figure 5.2.1: Landfall Compound Siting Areas Common Environmental Receptors



5.3 Differentiating Environmental Receptors for Landfall Compound Siting Areas

This section presents the environmental designations and receptors that vary between the Landfall Compound Siting Areas. These differentiating receptors represent the key features that enable a comparison of siting options.

The appraisal of Differentiating Environmental Receptors forms the core of the comparative assessment, providing insight into how each siting area interacts with distinct environmental, socio-economic, or planning constraints. These receptors therefore underpin the evaluation of relative risk, opportunity, and feasibility of each option.

Any environmental constraints that do not intersect or fall within the 250 m buffer of the Landfall Compound Siting Areas boundaries have not been described in this section. A detailed summary of the Landfall Compounds Siting Area options is provided in the subsections below.

The selection of a 250 m buffer around the Landfall Compound Siting Areas was based on professional judgement, informed by relevant previous project experience and applicable best practice. This defined extent ensures that the appraisal focuses on environmental designations and receptors that vary between siting areas, enabling comparison of options. Receptors located outside the 250 m buffer are less likely to be subject to effects and are therefore unlikely to serve as differentiating factors in the evaluation of risk and feasibility. The buffer supports a focused and proportionate appraisal, avoiding unnecessary detail while maintaining consistency across all siting options.

Further information on Differentiating Environmental Receptors is available in **Differentiating Environmental** Receptors of this TCPRSS.

5.3.1 Options Appraisal Assumptions

As the Welsh Onshore Project is still at an early design stage, with construction and operational methods yet to be finalised, a number of assumptions have been made to support the appraisal of potential Landfall Compound Siting Areas. These are outlined below:

- A trenchless cable installation would be the preferred construction method and would be employed wherever feasible in order to avoid or minimise impacts of designated sites and sensitive receptors;
- A fully trenchless installation approach would be applied at the Landfall Siting Zone;
- The permanent infrastructure (see **Landfall** for more information) installed at the Landfall Compound Siting Area would be:
  - Minimal in scale; and
  - Located entirely below ground.
- Follow completion of construction works, the site would be fully re-instated to its pre-existing condition;
- The only permanent above-ground infrastructure would be a TJB cover, which is expected to have negligible visual impact; and
- Due to the below-ground nature of the infrastructure and the fact that the TJB will remain unmanned during operation, the potential for adverse environment impacts during the operational phase is minimal.

As such, this options appraisal has focused on the temporary impacts likely to arise during the construction phase.

5.3.2 AC6-PEN-LFC-LF1A

5.3.2.1 Biological Environment

Special Areas of Conservation (SACs)/ Sites of Special Scientific Interest (SSSIs)

AC6-PEN-LFC-LF1A lies on the boundary of the Dinas Dinlle SSSI, which is designated primarily for its coastal geomorphological features and glacial landforms. The site lies at approximately 1.2 km from Glynllifon SSSI, designated for lesser horseshoe bats (*Rhinolophus hipposideros*); likely risks mirror those identified for Glynllifon SAC (see below) and relate to disturbance and the potential loss or degradation of functionally linked foraging/commuting habitat. The Y Foryd SSSI is located approximately 2.1 km from AC6-PEN-LFC-LF1A, therefore there is no anticipated direct impacts. However, there may be temporary disturbance to bird species during construction, if construction coincides with sensitive periods.

With regard to European sites, AC6-PEN-LFC-LF1A does not intersect with any Habitats sites; with the closest site being Glynllifon SAC (UK0021661) located approximately 1.2 km east. As the compound falls within the typical 1-2 km foraging range of lesser horseshoe bats; hedgerows, treelines and woodland blocks in and around AC6-PEN-LFC-LF1A may comprise of functionally linked offsite habitats and could be affected by construction effects of lighting, noise, dust and vegetation removal. The compound also lies approximately 2.6 km south of Y Twyni o Abermenai i Aberffraw / Abermenai to Aberffraw Dunes SAC (designated for extensive dune systems, associated dune habitats and petalwort *Petalophyllum ralfsii*), and Y Fenai a Bae Conwy / Menai Strait and Conwy Bay SAC (designated for large shallow inlets and bays, tidal/subtidal sandbanks, reefs and for supporting common seal *Phoca vitulina*). These coastal SACs are not designated for mobile features, and as such there is unlikely to be a hydrological link with AC6-PEN-LFC-LF1A.

RSPB Reserves

An RSPB reserve lies within approximately 1.2 km of AC6-PEN-LFC-LF1A. While no direct land-take within the reserve is expected, temporary disturbance to wintering and passage birds could arise from traffic, noise and lighting if construction is close to the coastal/estuarine habitats used by qualifying or important assemblages.

Priority Habitats & Ancient Woodland

Although AC6-PEN-LFC-LF1A footprint does not cross mapped priority habitat; multiple priority habitats, including coastal floodplain and grazing marsh, are located in close proximity to this landfall compound, with Ancient Woodland recorded within 250 m. Due to the sensitivity of these receptors to disturbance due to lighting, dust, noise, invasive species risk, and hydrological changes, these impacts could reduce habitat quality even without direct encroachment. Where hedgerows/woodland are affected, the minimisation of disturbance and rapid reinstatement will be crucial to ensure the ecological function of these features are not compromised.

As outlined above, it is assumed that a partial or wholly trenchless cable installation method would be used to avoid direct impacts upon ecologically designated sites. In addition, it is also considered that additional mitigation measures could be applied to avoid and minimise ecological impacts, including, but not limited to:

- Careful routeing and siting of infrastructure within the selected preferred Landfall Compound Siting Area, as well in relation to the onshore and offshore cable corridors and routes, to avoid areas of priority habitat and ecological designations;
- Implementation of standard construction management measures by way of a Construction Environmental Management Plan (CEMP) which would set out specific procedures for the protection of habitats and species, including pollution prevention measures (safe storage of chemicals and materials, silt fencing, pollution/spill response plan (including a Frac-out Emergency Plan) etc), toolbox talks, biodiversity protection zone fencing etc;
- Mitigation measures will be developed through the course of the EIA preparation and are likely to focus on avoidance and timing including:

- The micrositing of temporary works and compounds should avoid priority habitats and maintain continuous dark corridors for bats by retaining hedgerows/trees and applying bat-sensitive lighting (low-lux, warm spectrum, cut-off optics, curfews);
- Where unavoidable, trenchless installation methods (e.g. HDD) will be deployed beneath priority habitats;
- Targeted bat surveys to be undertaken (if required) to confirm use and value of functionally linked habitat, informing micro-routeing and lighting design;
- Implement wintering and passage bird surveys to set seasonal work windows and buffer distances from sensitive foraging/roosting areas; programme noisy/night-time works outside peak periods; and
- Establish buffers and dust/noise controls adjacent to Ancient Woodland, design surface-water management (silt fencing, settlement tanks, cut-off drains) to protect hydrology, and implement biosecurity to prevent invasive species transfer.

5.3.2.2 Physical Environment

Landscape & Visual Amenity

Construction will be most visible nearest the coast, including views from scattered farmsteads, local PRoWs and the Wales Coast Path, within a low-lying, open agricultural landscape (LANDMAP GWYNDDVS034 Morfa Dinlle with moderate Visual & Sensory). The construction works will introduce plant, compounds and short-term vegetation loss, The landscape and visual settings will be reinstated post-installation (easement will constrain replacement tree planting). Phased reinstatement and low-lying routing will minimise prominence.

Peatland

Mapped peatland is located within ~10 m of the compound boundary (no direct intersection). Notably, the peatland forms a U-shaped corridor around the northern, southern and eastern boundary of AC6-PEN-LFC-LF1A meaning that any cable route would need to traverse the sensitive area introducing increased environmental, consenting and engineering risk. The key risks relate to hydrological change, instability and carbon loss through compaction and drainage alteration. Avoidance through design is preferred: locating works on non-peat, maintaining buffer zones, and undertaking peat depth/condition and hydrological mapping pre-construction to refine exclusion areas. Where proximity is unavoidable, it is recommended that low-ground-pressure plant, and floating track/surfacing are utilised, the adherence to CEMP pollution controls and for Ecological Clerk of Works (ECoW) oversight.

Hydrology & Flood Risk

Main River Bodfan and multiple watercourses/surface-water features are located within 250 m, and areas of fluvial and coastal flood risk encroach AC6-PEN-LFC-LF1A. Within the *'Landfall Compound Siting Areas Common Environmental Receptors'* figure (**Figure 5.2.1**: Landfall Compound Siting Areas Common Environmental Receptors), Flood Risk from Sea is also shown to intersect AC6-PEN-LFC-LF1A. River crossings/access works may require a Flood Risk Activity Permit (to be issued by NRW) and strict method statements. Given the presence of numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required. Potential mitigation measures could include avoidance of high-risk flood areas where practicable, pollution prevention (silt control, spill response), timing to avoid storm/tidal surges and maintaining natural drainage pathways.

5.3.2.3 Historic Environment

Scheduled Monument

No designated assets lie within AC6-PEN-LFC-LF1A compound; however, the Dinas Dinlle Camp is located approximately 450 m away, within the Dinas Dinlle SSSI. The principal risk is setting change during construction (plant, lighting and movement visible from and around the hillfort). Through consultation with Cadw, as well as the implementation of proportionate setting assessment, temporary visual screening, and aesthetic design considerations for any visible temporary elements, are expected to reduce effects.

Listed Buildings
Three Grade II listed buildings are located within the 250 m. Construction may temporarily affect amenity via noise, dust and visual setting. A CEMP with noise/dust/vibration controls, traffic management, siting of compounds away from key views, and limited work hours will ensure effects are managed.

Historic Landscape & Non-Designated Archaeology
The compound intersects the Dinas Dinlle–Aberdesach Historic Landscape Area (agricultural regular fieldscape with prehistoric to post-medieval potential). Non-designated archaeological remains (e.g. standing stones, bridges and buried features) may be affected by groundworks. Pre-determination desk-based assessment and a walkover survey would be carried out to characterise the need, and, where relevant, the frequency of targeted evaluations. Consultation with the Gwynedd Archaeological Planning Service will also be required to ensure that appropriate measures are identified and agreed. It may be required to create a Written Scheme of Investigation (WSI) and undertake an archaeological watching brief during intrusive works to mitigate potential effects to non-designated archaeology and the historic landscape, this need will be assessed and proposed, as necessary.

5.3.2.4 Access

Primary access to the AC6-PEN-LFC-LF1A compound is from the A499 (high-quality A-road), transitioning to a narrow C-class road toward Dinas Dinlle that is unsuitable for sustained two-way HGV movements without upgrades. A new site access junction/short haul road from the C-class road is likely; with direct access from the A499 requiring a new junction and cross-field haul, subject to feasibility. Early engagement with MNWTRA and affected landowners, a Construction Traffic Management Plan (CTMP), and localised road improvements/temporary traffic controls may be required to manage safety, capacity and amenity. No PRoWs cross the compound; however, a PRoW and the Wales Coast Path lie within approximately 250 m located on the coastal cliff, temporary protection or diversion may be required during peak activity.

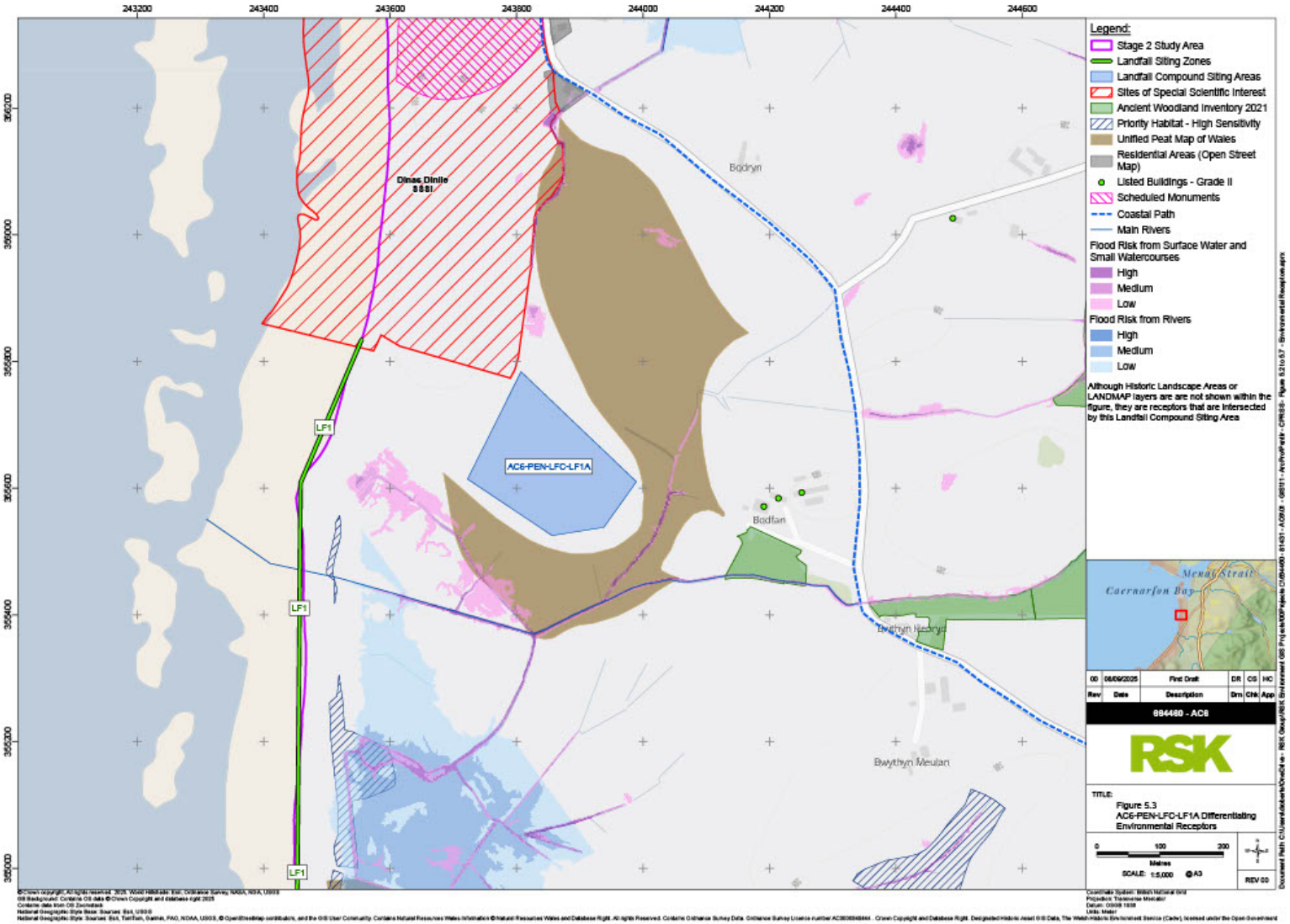
5.3.2.5 Socio-Economic Environment

Local Planning Receptors
There are no local development plan allocations intersecting the siting area and no settlements within the 250 m buffer, however there are two individual residential properties within 250 m and a nearby caravan/motorhome park. Potential effects associated with construction will be temporary noise, dust, traffic and visual activity, with potential short-term implications for tourist amenity and visitor spending.

To mitigate potential effects, the following measures could be implemented: works undertaken outside of peak tourism periods (where practicable), restricted working hours, maintaining clear access routes and traffic management via the CTMP, provide advance notification and engagement with residents/park operators, and implement best-practice noise/dust suppression.

The Differentiating Environmental Receptors for AC6-PEN-LFC-LF1A as described above were mapped using GIS and are presented in **Figure 5.3.1:** AC6-PEN-LFC-LF1A Differentiating Environmental Receptors

Figure 5.3.1: AC6-PEN-LFC-LF1A Differentiating Environmental Receptors



5.3.3 AC6-PEN-LFC-LF2AB

5.3.3.1 Biological Environment

Special Areas of Conservation (SACs)/ Sites of Special Scientific Interest (SSSIs)
AC6-PEN-LFC-LF2AB is located approximately 1.2 km from the Glynllifon SSSI, which is designated for its population of lesser horseshoe bats (*Rhinolophus hipposideros*). No other SSSIs are located within 2 km of the siting area, and there are no mapped priority habitats or Ancient Woodland within or immediately adjacent to the proposed compound. Baseline mapping and aerial photography indicate the area comprises pasture fields bordered by hedgerows, coastal cliffs and intertidal habitats.

In relation to European ecological designations, AC6-PEN-LFC-LF2AB does not intersect any Habitats sites. However, the closest is Glynllifon SAC (UK0021661), with one component approximately 1.2 km north-east and another 1.3 km south-east of the compound. The SAC is designated for lesser horseshoe bats, with both hibernation and maternity roosts.

AC6-PEN-LFC-LF2AB lies within the typical 1-2 km foraging range of lesser horseshoe bats, and therefore is functionally linked to offsite habitat, such as hedgerows, trees and pasture, which may be affected by removal or temporary disturbance during construction. Potential construction impacts include lighting, dust, noise, and vegetation removal. Given the absence of permanent above-ground infrastructure, effects would be confined to the construction phase only. Nevertheless, at this stage potential effects on ecological receptors cannot be discounted and a Stage 2 Appropriate Assessment may be required.

5.3.3.2 Physical Environment

Landscape & Visual Amenity
Visual receptors include a farmhouse at Maes Mawr, occasional residential properties along the A499, and the Cae Clyd campsite. Views are possible from upland areas east of the A499, although the compound would appear in the context of existing farm buildings. The Wales Coast Path follows a minor road parallel to the A499 and is largely screened by roadside vegetation, reducing direct visibility.

The compound lies within the LANDMAP GWYNDDVS034 Morfa Dinlle Visual and Sensory Area. Potential landscape effects include temporary loss of ground cover and/or boundary features, particularly hedgerows, to accommodate the compound and access track. The principal issue for this option would be the introduction of infrastructure into a flat, open coastal strip, where there is limited landform or vegetation to provide screening.

Mitigation measures would include micrositing of the compound close to farm buildings, so it appears as an extension of the existing cluster of outbuildings, and a phased programme of reinstatement to restore agricultural land and boundaries post-construction.

5.3.3.3 Historic Environment

Scheduled Monuments
There are no designated heritage assets within the AC6-PEN-LFC-LF2AB boundary. However, the site lies within 2 km of the Craig y Dinas Camp Scheduled Monument, and setting effects may arise due to construction activity.

Historic Landscape Areas & Archaeology
The siting area falls within the Nantlle Valley Historic Landscape Area, recognised for its slate quarrying heritage and associated archaeological remains. Non-designated assets in the surrounding area include enclosures and historic field systems. There is also potential for unknown archaeological remains to be present.

Mitigation measures should include early consultation with Cadw and heritage stakeholders, a detailed setting assessment, and potential micrositing or design considerations to minimise temporary setting effects on Craig y Dinas Camp. Archaeological investigation, survey and recording should be undertaken prior to construction, with a WSI implemented during the works. Where required, a watching brief should be maintained.

5.3.3.4 Access

Highway Access

Access to AC6-PEN-LFC-LF2AB would be via the A499 which is located to the west. A new private access junction and short haul road would need to be constructed. No bridges or PRoWs would cross the compound siting area, which simplifies access arrangements. Construction traffic will increase HGV movements on local roads, which may cause temporary congestion and disruption to local residents.

Early engagement with Cyngor Gwynedd, MNWTRA and private landowners will be required to agree a preferred access route and any necessary upgrades. A CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures. These will minimise impacts on local road users, including seasonal tourist traffic.

5.3.3.5 Socio-Economic Environment

Local Planning Receptors

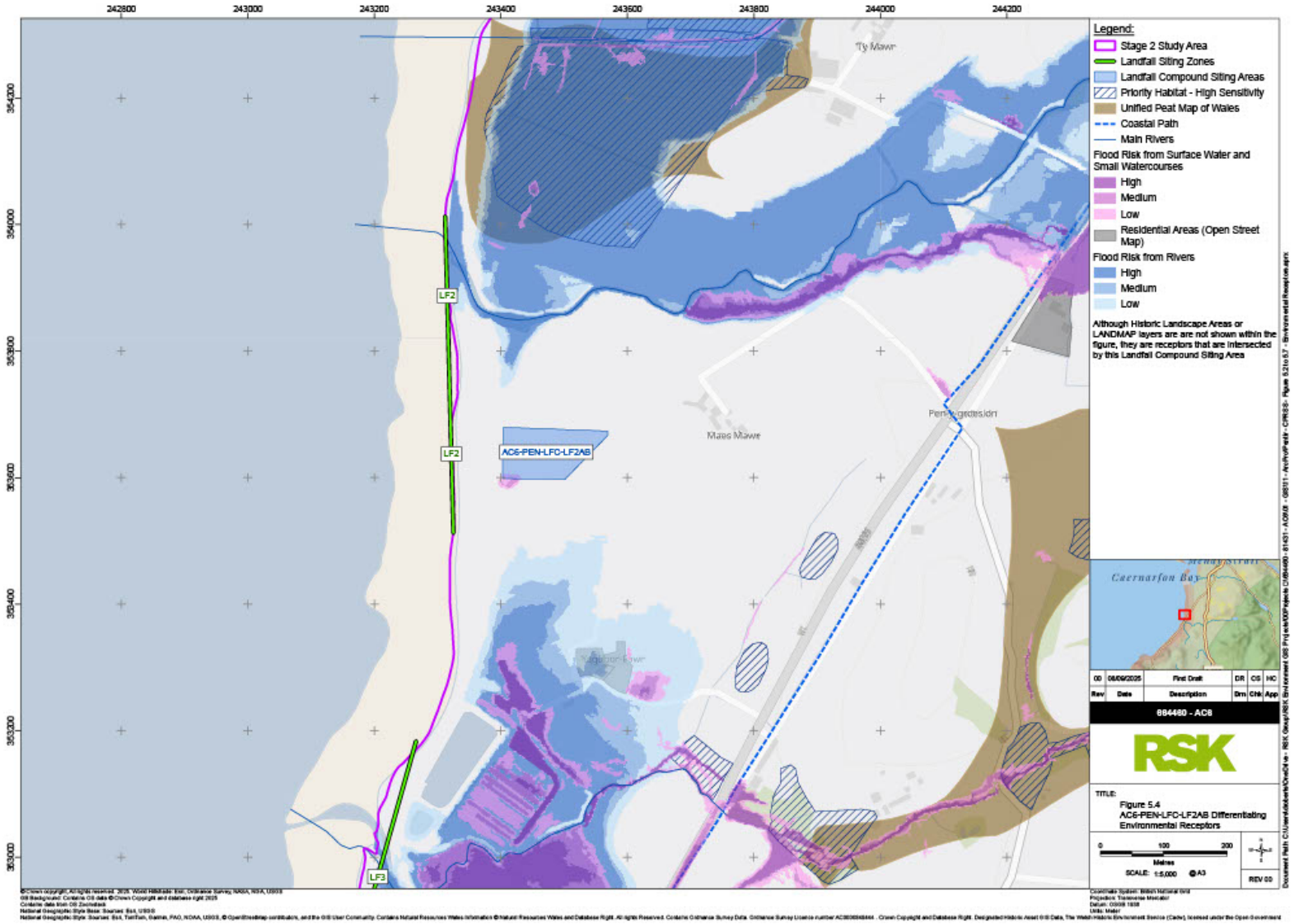
There are no local development plan designations intersecting AC6-PEN-LFC-LF2AB. AC6-PEN-LFC-LF2AB and it will not be located within an urban settlement, although it is located within 250 m of a caravan/motorhome park and several residential properties. One PRoW is located within 250 m, though not directly intersecting the siting area.

Effects associated with construction will be temporary such as noise, dust, traffic and visual activity, with potential short-term implications for tourist amenity and visitor spending.

Mitigation measures are anticipated to involve effective communication with local residents and businesses, traffic management, construction noise/dust controls, and consideration is given to peak tourist seasons when scheduling works.

The Differentiating Environmental Receptors for AC6-PEN-LF2AB as described above were mapped using GIS and are presented in **Figure 5.3.2**: AC6-PEN-LFC-LF2AB Differentiating Environmental Receptors

Figure 5.3.2: AC6-PEN-LFC-LF2AB Differentiating Environmental Receptors



5.3.4 AC6-PEN-LFC-LF3A, AC6-PEN-LFC-LF3B and AC6-PEN-LFC-LF3C

In order to streamline the appraisal and avoid unnecessary repetition, the three Landfall Compound Siting Areas AC6-PEN-LFC-LF3A, AC6-PEN-LFC-LF3B and AC6-PEN-LFC-LF3C have been assessed together within this section. These options are located in close proximity to one another and share similar environmental, physical, and socio-economic receptors, meaning that potential effects and mitigation measures are largely comparable. Grouping them in this way allows for a more concise and coherent assessment, while still highlighting the relative differences between the individual sites, where relevant.

5.3.4.1 Biological Environment

Special Areas of Conservation (SACs)/ Sites of Special Scientific Interest (SSSIs)

The three Landfall Compound Siting Areas are located on the coastal strip to the west of the A499, all approximately 1 km from Glynllifon SSSI. This SSSI is designated for its population of lesser horseshoe bats (*Rhinolophus hipposideros*), supporting both maternity and hibernation roosts. Although none of the compounds intersect directly with the SSSI, aerial imagery indicates the surrounding environment comprises arable fields, hedgerows, and coastal habitats adjacent to cliff faces and intertidal areas, all of which can provide functionally linked habitat for bats.

The closest European designation is the Glynllifon SAC (UK0012661) which is located <1 km north-east of AC6-PEN-LFC-LF3A and AC6-PEN-LFC-LF3B, and approximately 1.1 km north-east of AC6-PEN-LFC-LF3C. The SAC is designated for lesser horseshoe bats, with maternity roosts located at Melin y Cim and Pen y Bont, and hibernation sites including the Simdde-dylluan Copper Mine in the Nantlle Valley. While there will be no direct habitat loss within the Glynllifon SAC, the proposed compound siting areas are within the 1–2 km which are within the typical foraging range of lesser horseshoes and may include functionally linked habitats such as hedgerows and small woodland blocks. These could be temporarily lost or disturbed by construction activities through lighting, noise, dust, and vegetation clearance.

Potential impacts would be confined to the construction phase only, as no permanent above-ground infrastructure is required. Nevertheless, potential effects on ecological receptors cannot be discounted for any of the three landfalls, and a Stage 2 Appropriate Assessment may be required. Of the three options, LF3A and LF3B are the closest to the SAC boundary, while LF3C is marginally further away.

Mitigation will include careful site design to avoid removal of trees and hedgerows, implementation of bat-sensitive lighting schemes, and timing works to minimise disturbance. Should vegetation loss be unavoidable, reinstatement will be required, although the ecological function of hedgerows may take decades to fully recover. Further targeted bat activity surveys will be necessary to determine whether the habitats function as key foraging areas. As the compounds will be removed post-construction, it is anticipated that effects on integrity of the SAC can be avoided, provided mitigation is fully secured.

5.3.4.2 Physical Environment

All three Landfall Compound Siting Areas are located within the LANDMAP Visual and Sensory Area GWNDDVS035 (Clynnog Fawr). This area is characterised by flat coastal farmland, strong coastal views, and a backdrop of rugged hills, giving a strong sense of place. The introduction of temporary infrastructure into this open, low-lying landscape risks visibility particularly from the Wales Coast Path (A499), adjacent beachside PRoW and elevated footpaths to the south and east.

Residential and visitor receptors include Cae'n y Morfa farmhouse, nearby caravan parks (Llŷn y Gele and West Point Beach Resort), and beachside properties at Aberdesach. All three Landfall Compound Siting Areas would be visible from these receptors to varying degrees:

- AC6-PEN-LFC-LF3A and AC6-PEN-LFC-LF3B: These compounds would benefit from potential micrositing opportunities adjacent to the existing farm buildings at Caen y Morfa, where their presence could be visually assimilated into an established cluster of built form. This would help mitigate visual prominence compared to more open locations.

- AC6-PEN-LFC-LF3C: AC6-PEN-LFC-LF3C is less preferable as it is more detached from the Caen y Morfa cluster and would require a longer access route. Its separation from the existing built form means it would appear more prominent in open coastal views, including from beaches and the Wales Coast Path.

Mitigation for all options would include hedgerow or native thicket planting around the compound perimeters and careful siting of access tracks to mimic existing farm and caravan park access patterns. However, the flat, open coastal setting limits the effectiveness of planting, particularly in views from elevated PRoW to the south. In comparative terms, AC6-PEN-LFC-LF3A and AC6-PEN-LFC-LF3B represent preferable choices over AC6-PEN-LFC-LF3C due to reduced visual prominence.

5.3.4.3 Historic Environment

None of the siting areas intersect with designated heritage assets, although all lie within 2 km of Scheduled Monuments including the Penarth Burial Chamber, Craig y Dinas Camp, and Pont y Cim. The compounds also fall within the Nantlle Valley Historic Landscape Area, designated for its nationally important slate quarrying heritage and associated archaeology.

There is potential for non-designated archaeological remains within the siting areas, particularly relating to historic agricultural and industrial activity. Standard mitigation measures will apply across all three Landfall Compound Siting Areas, including early consultation with Cadw, preparation of a WSI, and archaeological survey, excavation or watching briefs where required.

5.3.4.4 Access

All three siting areas are located to the west of the A499, which provides a high-quality access route. No bridges are present, and the only relevant PRoW is Clynnog No. 54, to the north of the Landfall Compound Siting Areas. Access would require either the upgrade of an existing farm access or creation of a new private junction with the A499.

Construction will increase HGV movements, with potential for temporary congestion and disruption to local residents and tourists. However, impacts are considered manageable through standard measures, including a CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures, and early engagement with Cyngor Gwynedd, MNWTRA and affected landowners. Access issues are therefore not expected to differentiate between AC6-PEN-LFC-LF3A, AC6-PEN-LFC-3B and AC6-PEN-LFC-LF3C.

5.3.4.5 Socio-Economic Environment

Local Planning Receptors

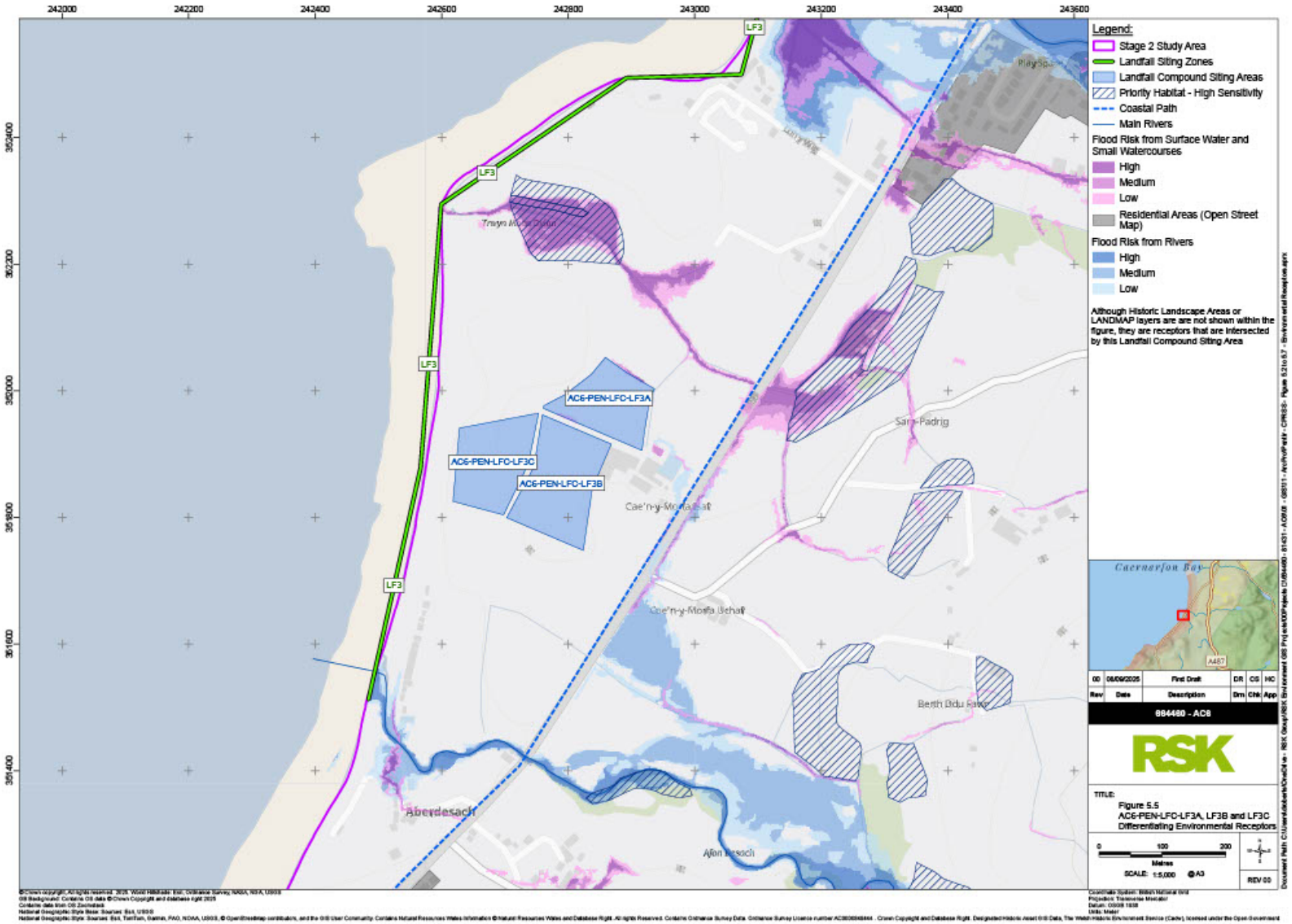
The three siting areas are not located within urban settlements and do not intersect any Local Plan allocations. However, each lies within 250 m of caravan/motorhome parks and individual residential properties, including one residential property at the boundary of AC6-PEN-LFC-LF3A and AC6-PEN-LFC-LF3B. The compounds also lie close to two PRoWs, which may experience temporary disruption, noise and visual impacts during construction.

Socio-economic impacts are therefore largely temporary, relating to amenity, recreation, and tourism. Holidaymakers and local residents may experience reduced amenity from dust, noise, and traffic, potentially deterring visitor use of nearby caravan sites and the Wales Coast Path.

Mitigation will include construction outside peak tourist seasons, effective noise and dust control, and clear communication with residents and businesses. Temporary signage and safe diversions for PRoW users will also be necessary.

The Differentiating Environmental Receptors for AC6-PEN-LFC-LF3A, LF3B and LF3C as described above were mapped using GIS and are presented in **Figure 5.3.3:** AC6-PEN-LFC-LF3A, LF3B and LF3C Differentiating Environmental Receptors

Figure 5.3.3: AC6-PEN-LFC-LF3A, LF3B and LF3C Differentiating Environmental Receptors



5.3.5 AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B

In order to streamline the appraisal and avoid unnecessary repetition, the two Landfall Compound Siting Areas AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B have been assessed together within this sub-section. These options are located in close proximity to one another and share similar environmental, physical, and socio-economic receptors, meaning that potential effects and mitigation measures are largely comparable. Grouping them in this way allows for a more concise and coherent assessment, while still highlighting the relative differences between the individual sites where relevant.

5.3.5.1 Biological Environment

Special Areas of Conservation / Sites of Special Scientific Interest

AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B are located inland of the A499, on gently rolling farmland separated from the immediate coastline. The nearest statutory designation is the Caeau Tan y Bwlch SSSI, situated approximately 1.7 km south-east of LF4A and approximately 1.6 km south-east of LF4B. The Caeau Tan y Bwlch SSSI is designated for its species-rich grassland habitat.

The closest European designation is the Glynllifon SAC (UK0012661), located approximately 2.1 km north-east of AC6-PEN-LFC-LF4A and approximately 2.4 km north-east of AC6-PEN-LFC-LF4B. The SAC is designated for lesser horseshoe bats (*Rhinolophus hipposideros*), supporting both maternity and hibernation roosts, including those at Melin y Cim and Pen y Bont, and hibernation sites at the Simdde-dylluan Copper Mine. While neither Landfall Compound Siting Area intersects the SAC, both are close to the outer edge of the typical 1-2 km foraging range of the species, and habitats within the Landfall Compound Siting Areas (pasture fields and hedgerows) could function as foraging habitats.

No permanent infrastructure is required post-construction; therefore, potential effects are limited to the construction phase. Key risks include temporary disturbance from noise, dust, and lighting, and possible hedgerow removal leading to reduced foraging opportunities.

Mitigation measures for both areas would focus on avoiding the removal of hedgerows and trees, implementing bat-sensitive lighting schemes, and restricting noisy night-time works. Targeted bat surveys are recommended to determine the extent to which the areas function as foraging habitat. It is expected that adequate mitigation can be identified through the EIA and planning process.

5.3.5.2 Physical Environment

AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B are located within the LANDMAP Visual and Sensory Area GWNDDVS006 (Bethel Clynnog and Bangor). Both AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B intersect and are located within the Heritage Coast designation and the Llŷn AONB, which elevates their landscape and visual sensitivity and the level of scrutiny during consultation and consenting compared with other Landfall Compound Siting Areas outside these designations. The landscape comprises rolling farmland between the upland backdrop and the coastal plain, with the A499 and Wales Coast Path forming a key linear corridor through the landscape.

Both options have the potential to introduce energy infrastructure into a landscape of local sensitivity, but their relative prominence differs:

- AC6-PEN-LFC-LF4A lies directly adjacent to the A499 and Wales Coast Path, making it more visible to road users and path users. The panoramic views available from the coast at this location mean AC6-PEN-LFC-LF4A would be more prominent in the landscape.
- AC6-PEN-LFC-LF4B is set slightly further back from the road, with opportunities to integrate the compound into the existing pattern of farm buildings. This reduces its prominence and provides greater scope for mitigation planting.

Mitigation measures at both locations could include hedgerow and thicket planting, micrositing to avoid prominent ridgelines, and the use of localised screening to soften visual effects. However, AC6-PEN-LFC-LF4B is considered the more visually preferable option, with greater assimilation potential and reduced exposure from the Wales Coast Path.

5.3.5.3 Historic Environment

Neither AC6-PEN-LFC-LF4A or AC6-PEN-LFC-LF4B intersect with any designated heritage assets. Both however, have the potential to contain undiscovered archaeological remains, given the history of agricultural use in the area. Potential mitigation measures common to both AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B could include early engagement with Cadw and Gwynedd Archaeological Planning Service, completion of pre-determination archaeological assessment, and implementation of a WSI during construction.

5.3.5.4 Access

Both AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B are located to the east of the A499, with direct access possible via existing or upgraded farm tracks. Both are adjacent to PRoW Clynnog No. 16, which runs to the north of the sites, and a pedestrian footpath along the eastern edge of the A499.

Construction traffic will temporarily increase HGV movements, leading to potential disruption and pedestrian amenity impacts. These effects are considered similar for both AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B. Potential mitigation measures will include preparation of a CTMP, early engagement with Cyngor Gwynedd Highways, MNWTRA, and clear communication with local communities.

5.3.5.5 Socio-Economic Environment

Local Planning Receptors

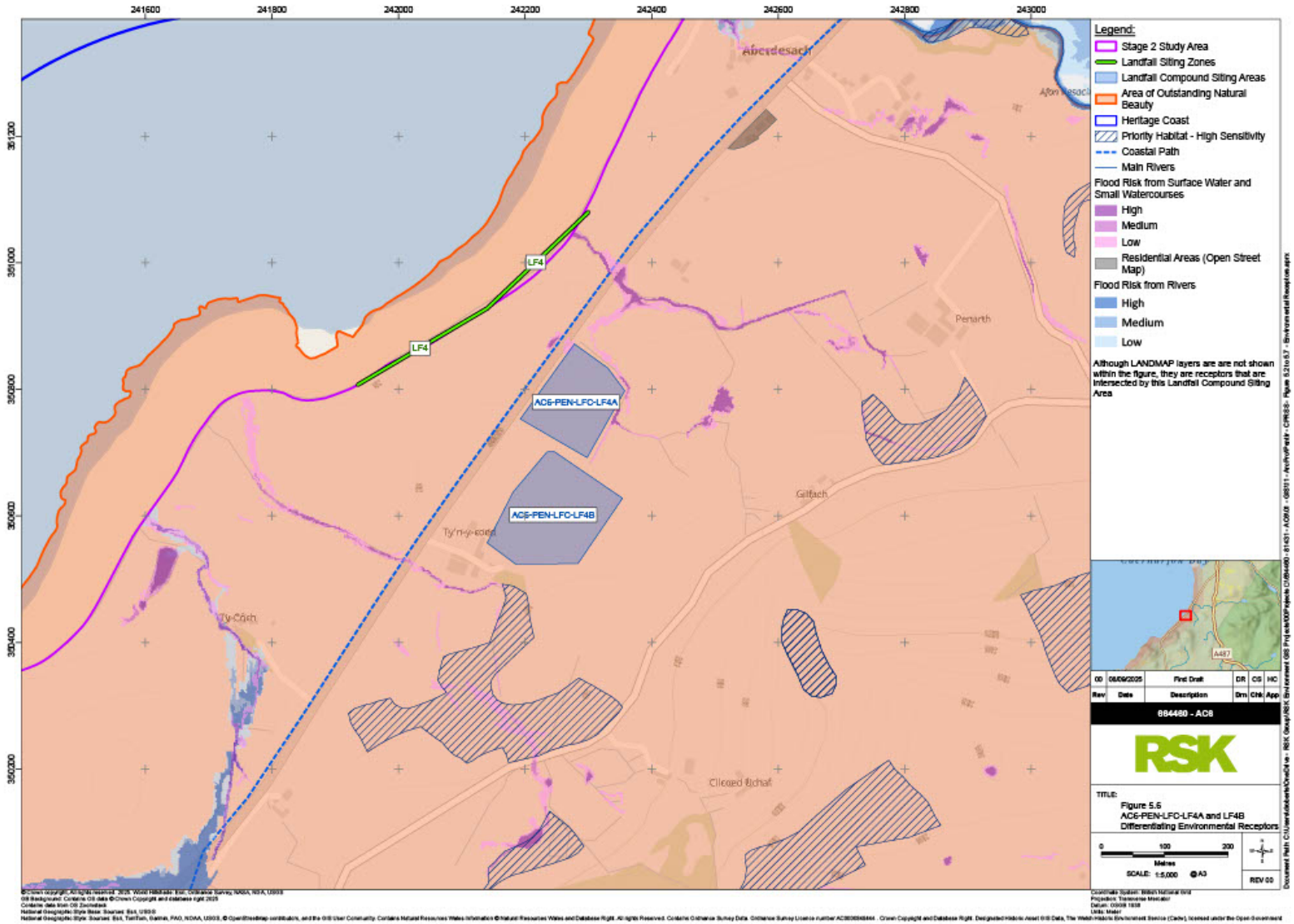
Neither AC6-PEN-LFC-LF4A or AC6-PEN-LFC-LF4B intersect with settlements or Local Plan designations, and no major development allocations are located nearby. Both are however, within 250 m of caravan/motorhome parks and scattered residential properties. One residential property lies directly on the boundary of AC6-PEN-LFC-LF4B, giving this option a slightly higher sensitivity to construction disturbance.

Socio-economic impacts are expected to be short-term, arising from dust, noise, and traffic, with the potential to affect visitor experience at the nearby caravan park and PRoW amenity. The Wales Coast Path, running immediately adjacent to AC6-PEN-LFC-LF4A, may be particularly affected by visual intrusion and noise disturbance, deterring recreational use during construction. AC6-PEN-LFC-LF4B is located further back from the A499, reduces this direct interaction with the Wales Coast Path.

Potential mitigation could include seasonal programming to avoid peak tourist use, targeted noise controls and dust suppression, and clear communication with visitors and residents. Temporary information boards and PRoW diversions may also be required.

The Differentiating Environmental Receptors for AC6-PEN-LFC-LF4A and LF4B as described above were mapped using GIS and are presented in **Figure 5.3.4**: AC6-PEN-LFC-LF4A and LF4B Differentiating Environmental Receptors.

Figure 5.3.4: AC6-PEN-LFC-LF4A and LF4B Differentiating Environmental Receptors



5.4 Engineering Factors

When considering a preferred Landfall Compound Siting Area, the key engineering receptors include a site which is relatively free from technical and infrastructure constraints (including those arising from environmental and socio-economic receptors).

5.4.1 AC6-PEN-LFC-LF1A

The AC6-PEN-LFC-LF1A is located south of the Dinas Dinlle SSSI and north of a low-lying tidal plain. Compound locations are positioned on the shoreward edge of a glaciotectonised platform, behind actively retreating soft sea cliffs as evidenced in available geomorphological data. The site includes isolated moraine features that contribute to local topographic variation, with morainic deposits comprising a heterogeneous mix of clay, silt, sand, and gravel.

Compound areas offer sufficient land availability; however, access is limited to narrow, unsealed farm tracks, which may require temporary upgrades to support construction logistics. The site is bounded by peat deposits that must be crossed to connect with the onshore cable corridor.

Open-cut installation may be possible; however, the proximity to retreating cliff lines presents a risk of accelerated erosion, meaning further assessment would be required and making this method less favourable. Trenchless solutions, such as HDD installation, are considered technically feasible over a moderate alignment length. The site also contains shallow depressions infilled with surface water and reed swamps, indicating a low water table. Construction will require active drainage management, and tidal influence combined with fluctuating groundwater levels due to freshwater runoff may constrain operational windows for cable jointing.

Achieving the required trenchless installation length—potentially exceeding 2,000 m—would be technically challenging and may necessitate dual drilling operations from both onshore and offshore locations. Observations at the AC6-PEN-LFC-LF1A indicate boggy ground surrounding a raised mound, with standing water and reeds suggesting near-surface till. Depressions in the terrain may reflect a glacial legacy of dead ice melt-out.

Subsurface conditions include over 8 m of folded and faulted sand, gravel, and cobbles, with frequent gravel and cobble lenses. Fine gravels are typically grey and purple in colour. Bedrock comprises Ordovician slate with thinly laminated sand beds, displaced by micro-scale normal faulting. The area also exhibits multiple overlapping rotational landslides, some of which have affected the ramparts of the Iron Age hill fort located on the mound.

5.4.2 AC6-PEN-LFC-LF2AB

The AC6-PEN-LFC-LF2AB lies within a low-lying coastal plain intersected by tidal flood defences and open drainage channels. These features constrain construction and would require trenchless crossing solutions to maintain the integrity of the defences. A trenchless installation method (e.g. HDD) is considered technically feasible over a moderate length.

The compound area itself offers sufficient land availability, although access is constrained by narrow local roads which may require temporary widening to accommodate construction traffic.

An open-cut method across the flood defence is technically feasible but would not be preferable due to the disruption and regulatory implications of disturbing tidal defences.

The preferred method would therefore be a trenchless crossing, of approximately 1, 250 –1, 400 m, under the tidal defences and drainage channels. This is considered technically feasible, although detailed geotechnical investigation would be required to confirm subsurface conditions and geophysical surveys to confirm the water depth along the shoreface.

5.4.3 AC6-PEN-LFC-LF3A, AC6-PEN-LFC-LF3B and AC6-PEN-LFC-LF3C

AC6-PEN-LFC-LF3A, AC6-PEN-LFC-LF3B and AC6-PEN-LFC-LF3C is situated south of a low-lying floodplain with extensive drainage features and existing flood defence bunds. The three landfall options are located in close proximity but vary in terms of distance inland and the availability of compound

space. The compounds are sited in morainic deposits comprising a heterogeneous mix of clay, silt, sand, and gravel. In exposed sections in cliffs to the north of the compound sections boulders and glacial erratics are frequent, with boulders and cobbles overlain on till that extend beyond low water.

LF3A lies closest to the shoreline and would require a shorter trenchless installation but is constrained by soft alluvial soils and floodplain ground conditions, which increase the risk of settlement or frac-out during the installation (e.g. via HDD). LF3B is located further inland and provides more extensive land availability and improved access, but would require a significantly longer trenchless installation, thereby increasing engineering complexity and the risk of drill deviation. LF3C sits between the two but is constrained by narrower land parcels and local infrastructure, reducing construction flexibility.

Open-cut installation across flood defences and drainage channels is technically feasible but not likely to be consented given the disruption to flood infrastructure.

The preferred approach across AC6-PEN-LFC-LF3A, AC6-PEN-LFC-LF3B and AC6-PEN-LFC-LF3C would be a longer trenchless installation method (e.g. HDD), potentially in excess of 800–1,000 m depending on the desired punch-out water depth. This would allow the cables to pass beneath flood defences and intertidal zones, but feasibility would depend on further geotechnical survey to confirm soil strength and bore stability.

5.4.4 AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B

AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B lie adjacent to sea cliffs formed from moraine deposits, and on the onshore side of the A499 trunk road. The principal engineering constraint here relates to the stability of the soft glaciogenic sea cliffs during installation. Both LF4A and LF4B provide sufficient compound land availability and good construction access, although LF4B is closer to existing infrastructure corridors, increasing the risk of utility interaction.

The geology of this area is anticipated to comprise sandy superficial deposits, in exposed cliff sections this is observed as up to 6m of sand, gravel and cobbles. In places it is overlain by laminated silt which appears to fill depressions in the top surface of the sand and gravel layer. Where silt is present, landslides occur spreading debris on to the beach. This geology may present challenges during trenchless drilling due to the risk of fluid loss or bore collapse.

An open-cut installation through the cliffs may not be technically feasible and carries consenting risk due to potential impacts on rate of cliff retreat and the proximity of the shoreline to the A499.

The preferred engineering solution is a trenchless crossing of approximately 900–1,300 m, which would allow the DC cables to be installed beneath the intertidal zone, dunes and flood defences, avoiding disturbance at the beach frontage. Further geophysical and geotechnical investigations would be required to assess the feasibility of trenchless installation (e.g. HDD) in sandy ground.

5.5 Comparative Appraisal and Summary for Landfall Compound Siting Areas

AC6-PEN-LFC-LF2AB has been identified as the most preferred Landfall Compound Siting Area. This preference reflects both engineering feasibility and a comparatively reduced environmental risk profile. The OAST appraisal highlights that AC6-PEN-LFC-LF2AB benefits from fewer designated ecological sites in direct conflict with the landfall works. Where statutory designations or priority habitats are present, they can be largely avoided through a trenchless installation approach, with a comparatively shorter length required than at the alternative sites. This reduces both technical risk and environmental disturbance. In addition, AC6-PEN-LFC-LF2AB avoids the densest clusters of sensitive recreational or tourism receptors. Overall, this option demonstrates a more balanced risk profile across all key disciplines.

The AC6-PEN-LFC-LF3A, AC6-PEN-LFC-LF3B, and AC6-PEN-LFC-LF3C are considered the second most favoured. These locations demonstrate feasible engineering solutions and offer opportunities to avoid direct impacts on sensitive environmental features through trenchless installation. However, when compared with AC6-PEN-LFC-LF2AB, these are associated with greater relative constraints. The assessments note a higher number of ecological sensitivities, a greater requirement for trenchless cable installation to avoid statutory designations, and in some cases closer proximity to receptors such as

PRoWs, holiday parks, or beach access points. These issues do not preclude development; they collectively make the LF3 options less favourable than AC6-PEN-LFC-LF2AB.

The AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B options are considered the third most favoured, due to the need to cross the A499 and the unstable cliff conditions at the trenchless installation punch-out. Importantly, both AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B are located within the Heritage Coast designation and the Llŷn AONB, which substantially elevates their landscape and visual sensitivity when compared with AC6-PEN-LFC-LF2AB and AC6-PEN-LFC-LF3A, AC6-PEN-LFC-LF3B, and AC6-PEN-LFC-LF3C. While mitigation measures such as micrositing, screening, and sensitive compound design could help reduce impacts, these designations could result in even temporary works being subject to higher levels of scrutiny. From an environmental perspective, the sites are located outside the 2 km buffer of most SSSIs (with the exception of one site designated for habitats), which compares favourably to LF3 compound siting areas. Of the two, AC6-PEN-LFC-LF4B is the stronger candidate as it enables a shorter trenchless installation bore length without compromising offshore exit levels and performs best of all landfall sites in landscape and visual terms. Nevertheless, their potential visibility from the Wales Coast Path and elevated viewpoints, coupled with their location within protected landscape designations, is a risk. In terms of access and socio-economics, impacts are expected to be localised, short-term, and manageable through measures such as a CTMP and early engagement with local stakeholders. Taken together, while AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B do not perform as strongly as AC6-PEN-LFC-LF2AB or AC6-PEN-LFC-LF3A, AC6-PEN-LFC-LF3B, and AC6-PEN-LFC-LF3C, they remain credible alternatives and represent a balanced third-tier option.

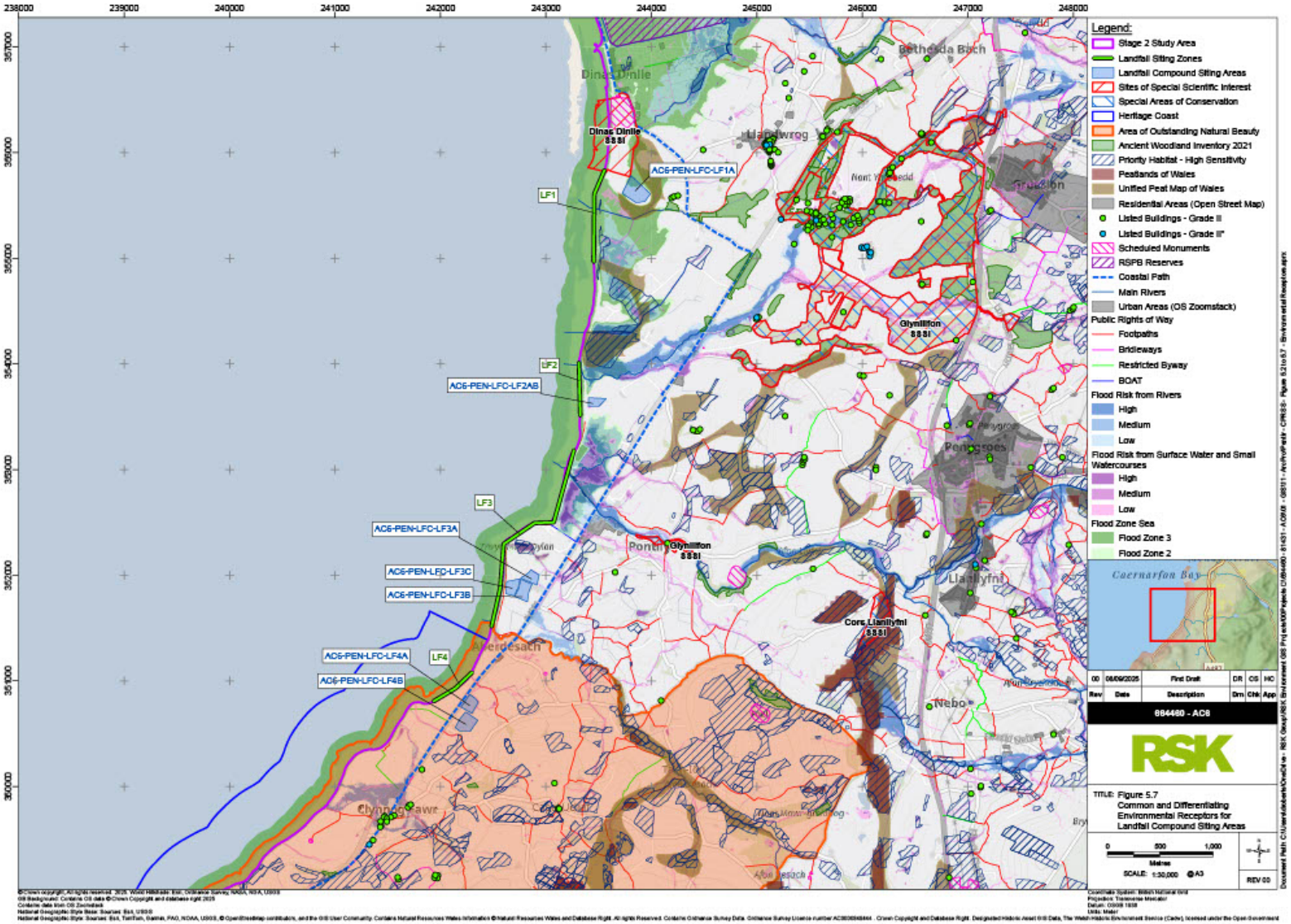
From both an engineering and environmental perspective, the AC6-PEN-LFC-LF1A option is the least preferred. This location presents a number of environmental constraints, including proximity to a national designation (Dinas Dinlle SSSI) and priority habitats. Any installation method in this location would likely result in disturbance to sensitive receptors, particularly intertidal habitats. The technical feasibility of avoiding such impacts through trenchless installation is reduced due to the extended length that would be required, which raises concerns around constructability and cable integrity. In addition, the terrestrial appraisal work has highlighted that AC6-PEN-LFC-LF1A lies within Flood Zone 3, immediately adjacent to the Dinas Dinlle SSSI and within close proximity to sensitive peatland areas. These constraints create consenting risk and reduce engineering deliverability. Again, the risks outlined must be carefully considered in the decision-making process for selecting landfall options to be taken forward to Stage 3: Defined Proposal and Statutory Consultation.

Overall, AC6-PEN-LFC-LF2AB is identified as the preferred Landfall Compound Siting Area as it presents the most balanced and deliverable option from an environmental, engineering, and socio-economic perspective. AC6-PEN-LFC-LF3A, AC6-PEN-LFC-LF3B, and AC6-PEN-LFC-LF3C are considered the next most favourable options, offering feasible solutions but with comparatively greater environmental sensitivities and engineering challenges that reduce their relative preference. AC6-PEN-LFC-LF4A and AC6-PEN-LFC-LF4B are considered credible third-tier options, viable in technical terms but constrained by their location within a Heritage Coast and AONB. AC6-PEN-LFC-LF1A is the least preferred option and has not been taken forward for further appraisal.

To support the summaries in this section, **Figure 5.5.1**: Common and Differentiating Environmental Receptors for Landfall Compound Siting Areasillustrates the common and differentiating receptors for all Landfall Compound Siting Areas, bringing all constraints together for ease of comparison.

Further details and confirmation of the emerging preference to progress to Stage 3: Defined Proposal and Statutory Consultation for the Landfall Siting Zones and Landfall Compound are provided in **EMERGING PREFERENCES**.

Figure 5.5.1: Common and Differentiating Environmental Receptors for Landfall Compound Siting Areas



6. OPTIONS APPRAISAL – CABLE CORRIDOR SECTIONS AND COMBINATIONS

6.1 Introduction

6.1.1 Overview

This chapter presents the outcomes of the options appraisal outcomes for the onshore HVDC and HVAC cable connections (see **Section 2.3.3.1** and **2.3.3.2**). The appraisal covers:

- 11 discrete Cable Corridor Sections (AC6-PEN-CC-RA01 to AC6-PEN-CC-RA11); and
- Cable Corridor Combinations that form complete end-to-end alignments between the shortlisted Landfall Siting Zones, Converter Station Siting Zones and the existing Pentir substation.

The Cable Corridor Section identification process and Cable Corridor Combination configuration process is described in **OPTIONS APPRAISAL** APPROACH**.**

The chapter appraises the following:

- Cable Corridor Sections (RA01–RA11): Defined in **Preliminary Cable** Corridor Sections, these are the building blocks of the onshore cable connection. Each section is a coded corridor segment with a defined width, used for constraint mapping, risk/opportunity recording, and construction planning.
- Cable Corridor Combinations: Defined in **Section 4.94.9**, these are groupings of corridor sections that form complete alignments from each Landfall Siting Zone to the Converter station siting zones via either western (W) or eastern (E) routing options (see
- **Table** 6.1.1).

Consistent with **OPTIONS APPRAISAL** APPROACH, each Cable Corridor Section was assessed against environmental, socio-economic, land use, planning and technical/constructability parameters using desk study, targeted site visits and GIS constraint mapping.

The appraisal distinguishes between:

- Common receptors (as defined in **Common Environmental** Receptors): Present across all sections. These inform design and mitigation but do not differentiate between options (see **6.2** for details); and
- Differentiating receptors (defined in **Differentiating Environmental** Receptors): (Vary between sections, as defined in **Differentiating Environmental** Receptors); and enable comparison of risk, opportunity and feasibility (see **Differentiating Environmental** Receptors for Cable Corridor Sections for details).

A brief description of each Cable Corridor Section is provided below:

- AC6-PEN-CC-RA01: This section begins at the Dinas Dinlle/Morfa Dinlle frontage and routes inland across low-lying agricultural land, connecting toward the A499 corridor. The underground cable route within this section would be approximately 4.4 km in length.
- AC6-PEN-CC-RA02: This section starts at the Pontllyfni/Clynnog Fawr frontage and routes inland across enclosed pasture, turning toward the A499. Underground cable routes within this section would be approximately 1.15 km in length.
- AC6-PEN-CC-RA03: This section begins at the Aberdesach frontage, crossing coastal hinterland near areas of AONB/Heritage Coast, before trending inland. Underground cable routes within this section would be approximately 2.16 km in length.
- AC6-PEN-CC-RA04: This section runs inland from the coastal feeders, which are the existing utility routes along the coast, providing early corridor consolidation and accommodating the first tranche of watercourse and minor road crossings. Underground cable routes within this section would be approximately 10.0 km in length.

- AC6-PEN-CC-RA05: This section forms part of the western inland route, extending through medium-length agricultural land parcels while balancing settlement avoidance and floodplain extents. Underground cable routes within this section would be approximately 11.74 km in length.
- AC6-PEN-CC-RA06: This section provides a shorter inland link, offering optionality for western and eastern routing alternatives. Underground cable routes within this section would be approximately 3.11 km in length.
- AC6-PEN-CC-RA07: This section forms part of the eastern inland route, connecting agricultural land and field patterns with the wider corridor network. Underground cable routes within this section would be approximately 8.18 km in length.
- AC6-PEN-CC-RA08: This section provides a western convergence link, rationalising crossings before the central approach. Underground cable routes within this section would be approximately 4.5 km in length.
- AC6-PEN-CC-RA09: This section provides an eastern convergence link, tying the inland routes into the shared central corridor. Underground cable routes within this section would be approximately 5.23 km in length.
- AC6-PEN-CC-RA10: This section provides the final approach to the Converter Station Siting Zones, offering a versatile tie-in and direct access to the highway network. Underground cable routes within this section would be approximately 2.5 km in length.
- AC6-PEN-CC-RA11: This section is retained as a contingency or variant approach, safeguarding design resilience and optionality during later consenting. Underground cable routes within this section would be approximately 2.8 km in length.

Table 6.1.1 outlines which Cable Corridor Sections are included in each Cable Corridor Combination.

6.1.2 Cable Route Corridor Configuration Options

Table 6.1.1: Further information on Cable Corridor Combinations

Route Corridor Combination Reference	Corridor Route Sections	Corridor Route Section lengths (km)	Total length (km)
AC6 – PEN – CC – LF2_W	AC6-PEN-CC-RA01	4.4	21.3
	AC6-PEN-CC-RA05	11.74	
	AC6-PEN-CC-RA08	4.5	
	AC6-PEN-CC-RA10	~2.5	
AC6 – PEN – CC – LF2_E	AC6-PEN-CC-RA01	4.4	21.4
	AC6-PEN-CC-RA06	3.11	
	AC6-PEN-CC-RA07	8.18	
	AC6-PEN-CC-RA09	5.23	
	AC6-PEN-CC-RA10	~2.5	
AC6 – PEN – CC – LF3_W	AC6-PEN-CC-RA02	1.15	31.3
	AC6-PEN-CC-RA04	10	
	AC6-PEN-CC-RA06	3.11	
	AC6-PEN-CC-RA05	11.74	
	AC6-PEN-CC-RA08	4.5	
	AC6-PEN-CC-RA10	~2.5	
AC6 – PEN – CC – LF3_E	AC6-PEN-CC-RA02	1.15	25.12
	AC6-PEN-CC-RA04	10	

Route Corridor Combination Reference	Corridor Route Sections	Corridor Route Section lengths (km)	Total length (km)
	AC6-PEN-CC-RA07	8.18	
	AC6-PEN-CC-RA09	5.23	
	AC6-PEN-CC-RA10	~2.5	
AC6 – PEN – CC – LF4_W	AC6-PEN-CC-RA03	2.16	31.4
	AC6-PEN-CC-RA04	10	
	AC6-PEN-CC-RA06	3.11	
	AC6-PEN-CC-RA05	11.74	
	AC6-PEN-CC-RA08	4.5	
	AC6-PEN-CC-RA10	~2.5	
AC6 – PEN – CC – LF4_E	AC6-PEN-CC-RA03	2.16	26.13
	AC6-PEN-CC-RA04	10	
	AC6-PEN-CC-RA07	8.18	
	AC6-PEN-CC-RA09	5.23	
	AC6-PEN-CC-RA10	~2.5	

6.2 Common Environmental Receptors for Cable Corridor Sections

This section presents the environmental designations and receptors that are consistently present within all eleven Cable Corridor Sections (see **Table 4.7.1**). These designations and receptors are considered common because they either directly intersect the corridor section or they are located within 250 m of the corridor section boundary.

While these designations and receptors form an important part of the baseline environment and may influence design or mitigation measures, they do not provide a basis for distinguishing between corridor sections, as they are unavoidable across all sections.

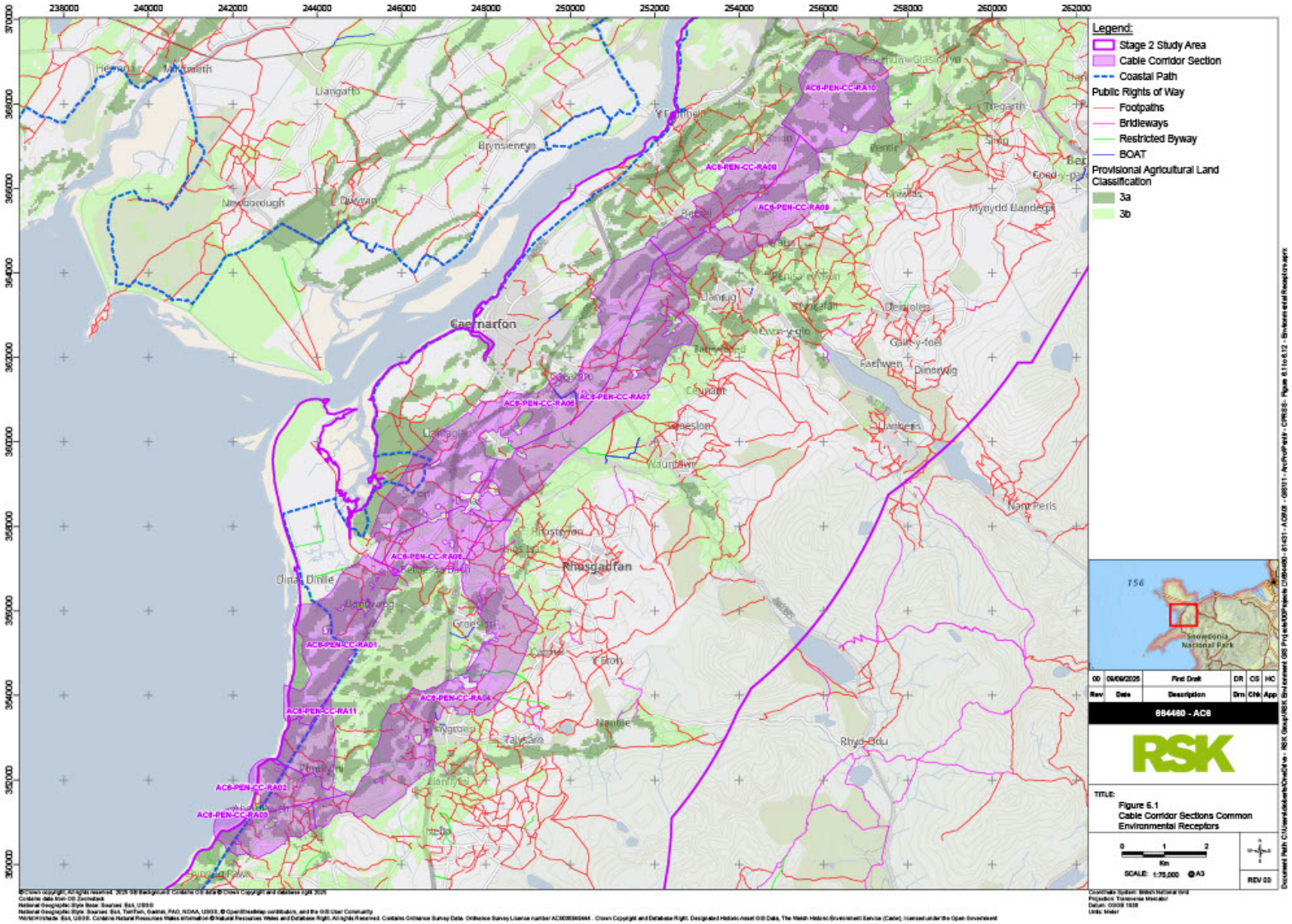
Common Environmental Receptors are defined in **Common Environmental** Receptors of this TCPRSS.

The following Common Environmental Receptors have been identified:

- Grade 3a and 3b Agricultural Land;
- Public Rights of Way (PRoW);
- Wales Coast Path; and
- A499 Road Corridor.

The Common Environmental Receptors within all 11 Cable Corridor Sections as described above were mapped using GIS and are presented in **Figure 6.2.1**: Cable Corridor Sections Common Environmental Receptors.

Figure 6.2.1: Cable Corridor Sections Common Environmental Receptors



6.3 Differentiating Environmental Receptors for Cable Corridor Sections

This section presents the environmental designations and receptors that vary between the Cable Corridor Sections. These differentiating receptors represent the key features that enable a comparison of options.

The appraisal of Differentiating Environmental Receptors forms the core of the comparative assessment, providing insight into how each section interacts with distinct environmental, socio-economic, or planning constraints. These receptors therefore underpin the evaluation of relative risk, opportunity, and feasibility of each option.

Any environmental constraints that do not intersect or fall within the 250 m buffer of the Cable Corridor Section boundaries have not been described in this section. A detailed summary of the Cable Corridor Section options is provided in the subsections below.

Differentiating Environmental Receptors are defined in **Differentiating Environmental** Receptors of this TCPRSS.

6.3.1 Options Appraisal Approach

The Options Appraisal evaluates each Cable Corridor Section option across a range of environmental, socio-economic, and technical considerations. This assessment has been informed by data sources outlined in **Table 4.4.1**, which include both desk-based research and targeted site visits conducted at key locations near sensitive receptors.

As described in **OPTIONS APPRAISAL** APPROACH, the appraisal systematically examines the potential impacts of each option on relevant receptors. It considers whether these impacts can be avoided or reduced through strategic routeing. Where avoidance or minimisation is not feasible, alternative mitigation measures have been explored to address residual effects.

It is important to note that the residual impacts identified at this stage do not yet reflect the full suite of detailed, project-specific mitigation strategies. These will be developed and refined during the EIA process, which will take place at Stage 3: Defined Proposal and Statutory Consultation. This future project stage will provide a more comprehensive understanding of the potential effects and mitigation opportunities, ensuring that the final proposal is both environmentally responsible and technically robust.

6.3.2 AC6-PEN-CC-RA01

6.3.2.1 Biological Environment

Special Areas of Conservation (SACs) / Sites of Special Scientific Interest (SSSIs)

AC6-PEN-CC-RA01 is located in close proximity to a number of designated sites. Most notably, the Glynllifon SAC and overlapping Glynllifon SSSI lie approximately 250 m from this Cable Corridor Section boundary. The SAC/SSSI is designated for its large population of lesser horseshoe bats (*Rhinolophus hipposideros*), supporting both maternity and hibernation roosts, and representing around 6% of the UK population. While much of AC6-PEN-CC-RA01 is separated from the SAC/SSSI by the A499, there are strips of woodland, hedgerows, and watercourses which connects suitable foraging habitats within the Cable Corridor Section. Small, enclosed pasture fields, hedgerows, and tree lines may therefore comprise functionally linked habitat for bats. Given this, potential effects include habitat loss, fragmentation, and disturbance through lighting, noise, and dust during construction.

Further designated sites within proximity include the Dinas Dinlle SSSI (approximately 370 m from the Cable Corridor Section), designated for its coastal geomorphological features and glacial landforms. While no direct impacts are anticipated, appropriate mitigation is assumed to avoid any indirect effects from construction activities such as ground disturbance, dust, or vibration. Y Foryd SAC, SSSI, and Local Nature Reserve (approximately 700 m from the Cable Corridor Section) is designated for its intertidal habitats, including seagrass beds and important overwintering waterbird populations (notably Wigeon). While the Cable Corridor Section does not directly intersect these designations, temporary disturbance to qualifying bird species may arise during the construction phase from lighting, traffic, and

noise. Wintering and passage bird surveys will be required to determine the extent of potential effects and inform the need for seasonal restrictions.

Additional designated sites within 2 km include Corsydd Eifionydd / Eifionydd Fens SAC (approximately 2.6 km south) and Afon Gwyrfai a Llŷn Cwellyn SAC (approximately 1.7 km north-east). Both designated sites could experience indirect air quality effects from construction traffic and dust deposition, although neither site currently identifies air quality as a key management issue.

Priority Habitats & Ancient Woodland

AC6-PEN-CC-RA01 crosses several priority habitats, including coastal floodplain and grazing marsh and purple moor grass and rush pastures. These habitats are sensitive to both direct habitat loss and indirect disturbance, such as hydrological alteration and compaction. While the Cable Corridor Section does not directly intersect mapped Ancient Woodland, there is a risk that these areas represent extensions or contain equivalent biodiversity value. Long-term loss of biodiversity value could result if woodland removal cannot be avoided.

Mitigation will require a combination of avoidance, micro-routeing, and sensitive construction techniques. Trenchless installation methods (e.g. HDD) beneath priority habitats, alongside temporary turf removal, storage, and reinstatement, could reduce permanent loss to temporary disturbance. Sensitive timing of works, informed by wintering bird surveys, would minimise effects on overwintering populations. Maintaining continuous dark corridors by retaining hedgerows and applying bat-sensitive lighting would reduce potential impacts on lesser horseshoe bats. Pollution prevention measures (silt fencing, spill response plans, dust suppression, and low-emission plant/vehicles) would further safeguard designated sites, particularly Corsydd Eifionydd and Afon Gwyrfai SACs.

Without mitigation, biodiversity net loss may occur due to permanent habitat loss within the corridor section, particularly for grazing marsh and rush pasture.

6.3.2.2 Physical Environment

Landscape & Visual

The Cable Corridor Section is routed through a largely open, low-lying agricultural landscape between the coast and the rising farmland inland (LANDMAP GWYNDDVS034 Morfa Dinlle). Construction will likely result in the temporary loss of field vegetation and introduction of construction compound(s), plant, and haul roads, with visibility from scattered farmsteads, occasional residential properties, and local PRoW including the Wales Coast Path near the coast. Greatest visual effects are anticipated near the Landfall Siting Zone, where cumulative visibility with other construction works may occur. During operation, all infrastructure is buried; landscape restoration will likely be achievable, although easement restrictions will limit replacement planting, particularly of hedgerows and woodland.

Peatland

The Cable Corridor Section intersects three clusters of mapped peatland and passes within 250 m of a further area. Although direct encroachment into deep or active peat is avoided where possible, proximity to peatland introduces risk of hydrological alteration, compaction, and carbon release. Construction works may destabilise surface layers or increase erosion risk if not carefully managed. Avoidance is preferred; where proximity is unavoidable, works should employ low-ground-pressure plant, floating track systems, and construction during drier periods. Detailed peat depth and condition surveys will likely be required pre-construction.

Hydrology & Flood Risk

The Cable Corridor Section intersects multiple rivers and watercourses, including the Llifon, Caerloda, Bodfan, Foryd and Carrog. Associated surface water bodies and floodplain areas (Flood Zone 2/3) extend into the corridor section. Temporary watercourse crossings may be required, with potential for sediment mobilisation, pollution, or localised flood risk if poorly managed. NRW Flood Risk Activity Permits will be required for main river crossings and works within 8 m of watercourses. Given the presence of numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required. Standard pollution prevention (silt fencing, settlement tanks, cut-off drains, spill response plans) and sensitive method statements (e.g. timing works in low-flow periods, use of trenchless techniques) will likely mitigate risks.

6.3.2.3 Historic Environment

Scheduled Monuments
No scheduled monuments lie within the Cable Corridor Section, but two lie within 250 m: the Dinas Dinlle Camp (Iron Age hillfort) and Maen Llwyd Standing Stone (Bronze Age). The primary risk is indirect setting change from visible plant, lighting, and construction activity. Temporary visual screening, sensitive siting of compounds, and consultation with Cadw will reduce these risks.

Listed Buildings
Approximately 43 Grade II and three Grade II* listed buildings are located within 250 m of the Cable Corridor Section. Construction-phase risks include setting change, vibration, dust, and noise. No direct land-take is required, and effects can be avoided through careful micro-routeing away from sensitive receptors.

Historic Landscape & Archaeology
The Cable Corridor Section passes through the Nantlle Valley Historic Landscape Area, recognised for its quarrying heritage. While no above-ground infrastructure is proposed, ground disturbance may affect non-designated archaeological remains (e.g. standing stones, bridges, or buried features). A pre-construction desk-based assessment, targeted evaluation, and a WSI with archaeological watching brief during intrusive works would safeguard the resource.

Conservation Areas & Registered Parks
The Cable Corridor Section intersects the Llandwrog Conservation Area and passes within 250 m of Glynllifon Registered Park and Garden. Temporary disturbance during construction (visual and noise) may affect setting, but effects will be mitigated through sensitive routing, buffers, and temporary screening.

6.3.2.4 Access

Highway Access
The Cable Corridor Section runs broadly parallel to the A499, intersecting with a network of minor roads and private tracks serving Llandwrog, Dinas Dinlle, and surrounding farmland. Temporary access from the A499 may be required, with upgrades to existing junctions to accommodate construction traffic. Construction activities may necessitate temporary road closures or lane restrictions, increasing HGV traffic and potentially causing local congestion. The Wales Coast Path and at least seven PRoWs intersect the route and will require temporary diversion, signage, and protection.

A CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures, and early engagement with Cyngor Gwynedd, MNWTRA and private landowners, will secure safety and minimise disruption. Advance communication with residents, signage, and managed diversions will ensure safe pedestrian and vehicle movement.

6.3.2.5 Socio-Economic Environment

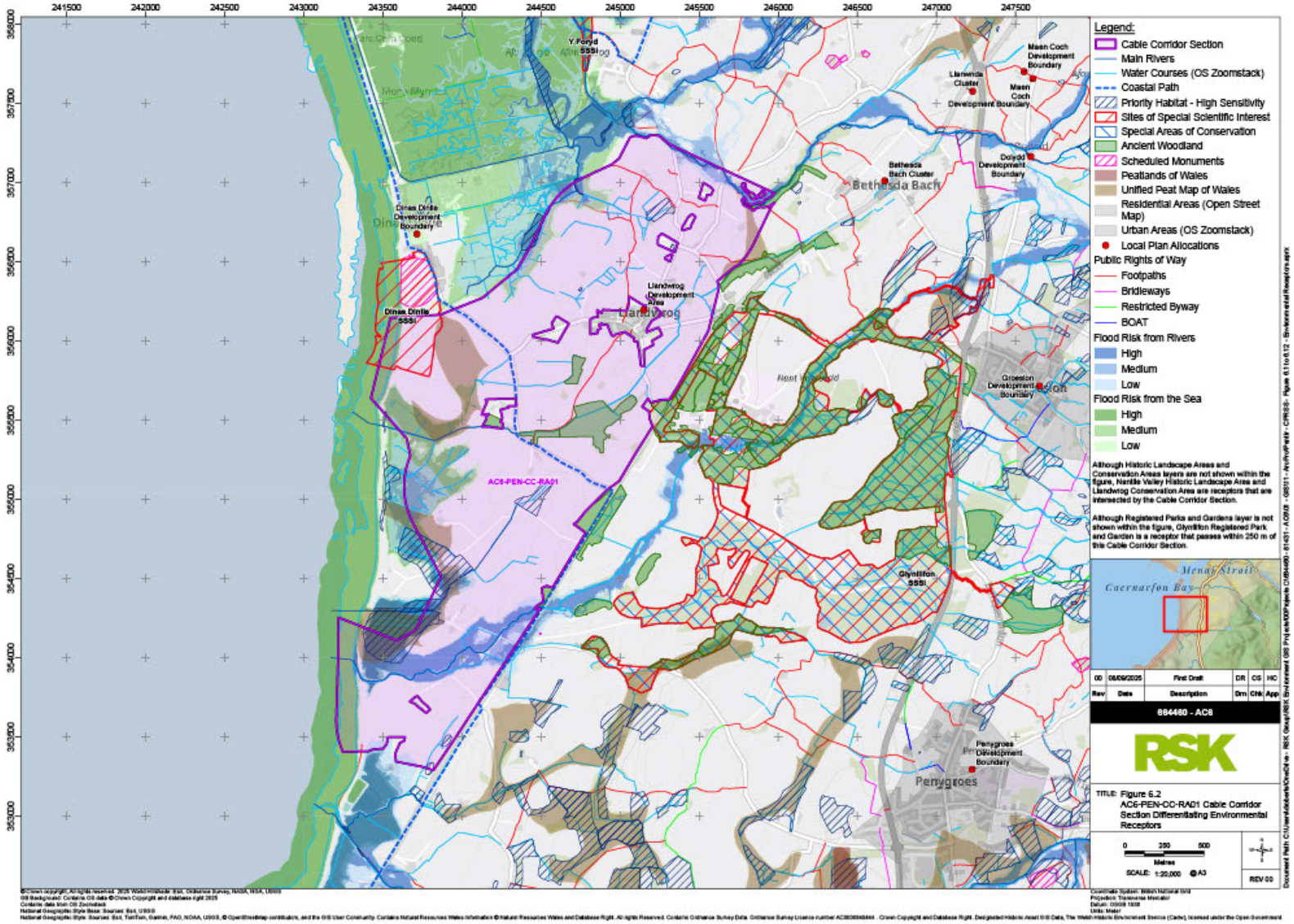
Local Planning Receptors
The Cable Corridor Section intersects the Dinas Dinlle Development Boundary and Llandwrog Development Area, meaning early engagement with Cyngor Gwynedd will be required to ensure compatibility with future land use aspirations. The Cable Corridor Section passes within 250 m of multiple settlements, including Llandwrog and Dinas Dinlle, with at least seven individual residential properties within the buffer. A number of recreational receptors are affected, including one tourist facility (Cae Clyd Campsite and Touring Park), the Wales Coast Path, and seven PRoWs.

Tourism & Recreation
Construction will introduce temporary disturbance (noise, dust, traffic, visual intrusion), with potential implications for visitor experience at Dinas Dinlle beach and Llandwrog, as well as footfall to local businesses and tourist facilities. Temporary disruption to the Wales Coast Path and PRoWs may also affect recreational access.

Mitigation measures will include advance engagement with Cyngor Gwynedd and stakeholders, as well as potentially include temporary diversions for PRoWs and the Wales Coast Path, clear public communication and signage, and timing of works to avoid peak tourist seasons. Best practice construction methods (restricted hours, noise and dust suppression, traffic management, and maintenance of clean access routes) will minimise impacts on residents and visitors. It will be the role of the EIA and planning process to identify relevant mitigation measures.

The Differentiating Environmental Receptors for AC6-PEN-CC-RA01 as described above were mapped using GIS and are presented in **Figure 6.3.1**: AC6-PEN-CC-RA01 Cable Corridor Section Differentiating Environmental Receptors.

Figure 6.3.1: AC6-PEN-CC-RA01 Cable Corridor Section Differentiating Environmental Receptors



6.3.3 AC6-PEN-CC-RA02

6.3.3.1 Biological Environment

Special Areas of Conservation (SACs) / Sites of Special Scientific Interest (SSSIs)

AC6-PEN-CC-RA02 is located in proximity to but does not intersect any designated habitats sites. Glynllifon SAC lies to the north of AC6-PEN-CC-RA02 and is designated for lesser horseshoe bat (*Rhinolophus hipposideros*) maternity and hibernation roosts. The overlapping Glynllifon SSSI is located approximately 460 m from the Cable Corridor Section boundary. Although separated by farmland, minor roads and farmsteads, functionally linked offsite habitat within the typical 1-2 km foraging range (hedgerows, treelines and woodland blocks) may be present within the corridor section and could be affected during construction by lighting, noise, dust and limited vegetation removal.

Cors Llanllyfni SSSI is located approximately 1.1 km from the 250 m buffer and is designated for biological interest, notably the internationally important slender green feather-moss (*Hamatocaulis vernicosus*). Given the separation and absence of a hydrological linkage, effects are expected to be minimal.

A beneficial aspect of AC6-PEN-CC-RA02 is that all SPA sites are located more than 10 km, reducing the potential for functionally linked land for SPA bird species.

Priority Habitats & Ancient Woodland

AC6-PEN-CC-RA02 crosses mapped priority habitat, purple moor grass and rush pastures, at two locations (approximately at SH 43343 51758 and SH 43792 51532). These habitats are sensitive to direct land-take, compaction and hydrological change. No Ancient Woodland is located within AC6-PEN-CC-RA02 but there is one area recorded within the 250 m buffer. Indirect “edge effects” (lighting, dust, invasive species risk) remain possible where construction is close to woodland.

Mitigation measures should focus on avoidance and timing, with timing referring to scheduling works to avoid sensitive periods, such as key breeding or growth seasons. Micro-routeing should be used to avoid the two areas of purple moor grass and rush pasture where practicable. Where avoidance is not feasible, trenchless methods (e.g., HDD) together with careful soil/turf handling and aftercare to meet post-construction condition targets, can reduce permanent loss to short-term, reversible disturbance.

For bats, it is recommended to retain continuous dark corridors along hedgerows/treelines, apply bat-sensitive lighting, and minimise the removal of woody vegetation. Best practice pollution prevention and IAQM dust/haul-route measures should also be implemented.

6.3.3.2 Physical Environment

Landscape & Visual Amenity

AC6-PEN-CC-RA02 extends from the coast around Cae’n-y-Morfa into low-lying farmland. West of the A499, the Cable Corridor Section lies within LANDMAP GWYNDDVS035 Clynnog Fawr and also intersects the Llŷn AONB, where sensitivity to temporary construction activity would be higher, particularly for users of beach footpaths and the Wales Coast Path. East of the A499 AC6-PEN-CC-RA02 lies within farmland of local importance (LANDMAP GWYNDDVS006 Bethel). Construction will introduce plant, temporary compounds and localised vegetation loss. Operationally, the cable is buried, and the landscape can be largely restored, noting that an easement will constrain replacement tree planting. Selection of a low-lying alignment, minimising hedgerow removal, temporary screening of compounds and a phased, rolling reinstatement programme will reduce potential effects.

Peatland

There is no mapped peatland is located in AC6-PEN-CC-RA02 or within the 250 m buffer. No peat-specific mitigation is anticipated beyond standard soil management.

Hydrology & Flood Risk

AC6-PEN-CC-RA02 intersects the Afon Desach (main river) and lies within 250 m of the Afon Llyfni, with associated networks of watercourses and surface-water features. Main river crossings will be required and without mitigation measures could increase pollution and flood risk. NRW Flood Risk

Activity Permits will be required for works within 8 m of any main rivers and for activities within functional floodplains. Given the presence of numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required. Standard measures such as trenchless techniques for sensitive crossings, timing during low-flow periods, silt control, cut-off drains, settlement tanks and spill response planning, will minimise risk.

Areas of Outstanding Natural Beauty
AC6-PEN-CC-RA02 intersects the Llŷn AONB near the coast. While trenchless solutions cannot feasibly be applied across the entire AONB extent, micro-routeing to reduce visual exposure, careful compound siting, temporary screening and restricted construction windows will minimise potential effects.

6.3.3.3 Historic Environment

Scheduled Monuments
AC6-PEN-CC-RA02 does not intersect any scheduled monuments; however, Pont y Cim (a narrow stone bridge with early 17th-century origins) is located within the 250 m buffer. Visual setting effects during construction (i.e., plant/vehicle activity) are likely but will be temporary. Mitigation measures such as a precautionary buffer, sensitive siting of compounds and proportionate method statements can minimise potential effects.

Listed Buildings
There are no Grade I or II* assets located in the AC6-PEN-CC-RA02 corridor or within the 250 m buffer. There are two Grade II listed buildings located within the 250 m buffer. No direct land-take is required, but short-term construction disturbance (such as noise, dust, traffic) could affect setting. A CEMP with noise/dust/vibration controls, and traffic management, plus micro-routeing to maintain intervening vegetation/landform, will minimise potential effects.

Historic Landscape & Archaeology
AC6-PEN-CC-RA02 intersects the Nantlle Valley Historic Landscape Area, recognised for quarrying heritage and archaeological potential. There is potential for groundworks to affect non-designated buried remains. To minimise potential effects, the following mitigation measures are recommended: pre-construction desk-based assessment, targeted evaluation, a WSI and an archaeological watching brief during intrusive works.

6.3.3.4 Access

Highway Access
AC6-PEN-CC-RA02 crosses the A499 and interfaces with minor lanes, including the road from Capel Brynaerau westwards (serving Plas Brynaerau and Cae Morfa Uchaf) and PRoW Clynnog No. 1. It is likely that construction access will rely on the A499 with spurs along minor roads/private tracks. Potential effects could include temporary road closures or lane restrictions, increased HGV movements and intermittent congestion; in additional there could be short-term impacts to PRoW users during trenching or trenchless compound operations.

Potential mitigation measures include engaging early with the MNWTRA and landowners to agree access strategy. Minor road crossings may employ open-cut methods under suitable traffic management, temporary access points may be required off the A499, preferably at existing junctions and localised upgrades may be necessary to accommodate construction vehicles. A CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures (detailing timing of deliveries, banksmen, signage, wheel-wash and road cleanliness) to minimise disruption.

6.3.3.5 Socio-Economic Environment

Local Planning Receptors
A local development plan designation, Pontllyfni Cluster, intersects AC6-PEN-CC-RA02, therefore necessitating early engagement with Cyngor Gwynedd to confirm compatibility and any preferred micro-

routeing. AC6-PEN-CC-RA02 is located within 250 m of multiple individual properties and the settlements of Pontllyfni and Aberdesach. Recreational receptors include the Wales Coast Path and approximately seven PRoWs; Llŷn Y Gele Caravan Park lies on the route, with West Point Beach Resort and the Trwyn Maen Dylan historic landmark close by. No major planning applications have been identified in the immediate area.

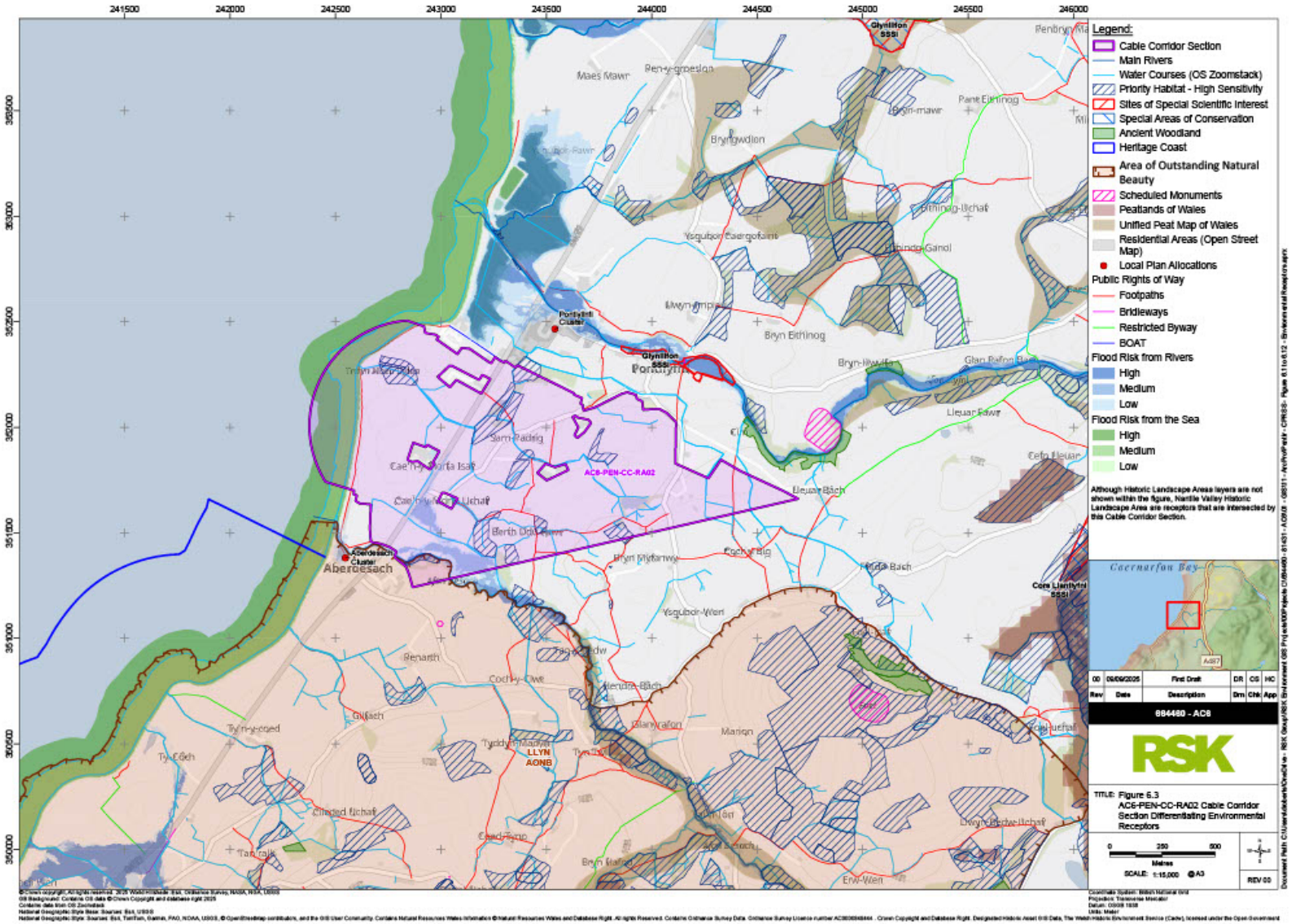
Tourism & Recreation

Construction will result in short-term disturbance (i.e. noise, traffic, visual activity) and potential temporary diversions of the Wales Coast Path/PRoWs, with potential to affect visitor experience and local businesses.

It is recommended that programme works avoid peak tourism periods where practicable and that access is maintained via signed temporary diversions and clear public communications is provided. In addition, best-practice construction controls such as restricted hours, noise and dust suppression, clean access routes are implemented and careful traffic routing via the potential CTMP.

The Differentiating Environmental Receptors for AC6-PEN-CC-RA02 as described above were mapped using GIS and are presented in **Figure 6.3.2**: AC6-PEN-CC-RA02 Cable Corridor Section Differentiating Environmental Receptors.

Figure 6.3.2: AC6-PEN-CC-RA02 Cable Corridor Section Differentiating Environmental Receptors



6.3.4 AC6-PEN-CC-RA03

6.3.4.1 Biological Environment

Special Areas of Conservation (SACs) / Sites of Special Scientific Interest (SSSIs)
AC6-PEN-CC-RA03 Cable Corridor Section does not intersect any designated sites. The Glynllifon SAC and overlapping Glynllifon SSSI lie to the north, with the SSSI located approximately 800 m from the 250 m buffer. These designations support lesser horseshoe bat roosts. Although there will be no direct land-take within these sites, functionally linked foraging habitat within the typical 1–2 km range (i.e. hedgerows, treelines and small woodland blocks within the corridor) could be affected during construction by lighting, noise, dust and limited vegetation removal.

Caeau Tan y Bwlch SSSI, located about 1.3 km to the south, and Cors Llanllyfni SSSI, 1.9 km to the east, are unlikely to be affected due to separation distances and intervening land uses.

Priority Habitats and Woodland
AC6-PEN-CC-RA03 crosses three areas of registered priority habitat, purple moor grass and rush pastures, at SH 42780 50807, SH 43384 51103 and SH 43870 51469. These habitats are sensitive to direct vegetation loss, compaction and hydrological change. One area of Ancient Woodland lies within the 250 m buffer of AC6-PEN-CC-RA03 but is not intersected. Edge effects (such as lighting, dust, invasive species risk) remain possible where works occur close to these woodland areas.

AC6-PEN-CC-RA03 crosses the main river Afon Desach at approximately SH 43454 51151. Without controls, trenching could mobilise sediments, increase turbidity and introduce pollution risks to aquatic habitats. The EIA and planning process will focus on identifying relevant migration measures.

6.3.4.2 Physical Environment

Landscape and Visual Amenity
AC6-PEN-CC-RA03 extends inland from near Ty'n-y-Coed. West of the A499 it passes through LANDMAP GWYNDDVS035 Clynnog Fawr and within the Llŷn AONB; east of the A499 it traverses farmland within LANDMAP GWYNDDVS006 Bethel. Key receptors include scattered farmsteads, the Wales Coast Path, local PRoWs with beach views and elevated PRoWs east of the A499. Construction will introduce temporary compounds, vegetation loss and plant movement. During operation the cable will be buried and the landscape largely reinstated, although the operational easement will limit replacement of woody vegetation. Selecting a low-lying alignment, minimising hedgerow removal, temporary screening and phased reinstatement will minimise effects.

Peatland
One cluster of peatland is present within AC6-PEN-CC-RA03. Peat is sensitive to drainage alteration, erosion and carbon loss. Potential mitigation measures could include peat depth and condition surveys, micro-routeing to avoid deep areas of peat, the use of low ground-pressure plant and temporary matting and working during drier periods.

Hydrology and Flood Risk
AC6-PEN-CC-RA03 crosses the Afon Desach and would interact with surface-water features. Works within 8 m of a main river or within a functional floodplain will require a Flood Risk Activity Permit from NRW. Potential mitigation measures such as pollution prevention (silt fencing, settlement tanks, cut-off drains and spill response), timing of works to low-flow periods and trenchless crossing methods where appropriate will minimise risk. Given the presence of numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required.

AONB and Heritage Coast
AC6-PEN-CC-RA03 intersects the Llŷn AONB and a section of the Wales Heritage Coast. Trenchless techniques cannot feasibly be applied across the full length of these designations, but micro-routeing, phased construction and temporary screening of compounds are expected to provide mitigation.

6.3.4.3 Historic Environment

Scheduled Monuments
Penarth Burial Chamber, a scheduled monument, lies within the 250 m buffer of AC6-PEN-CC-RA03 boundary. Construction may affect its setting, but with precautionary buffers, sensitive siting of compounds and proportionate methods, effects are expected to be mitigated against.

Listed Buildings
One Grade II listed building is located within the 250 m buffer. No direct land-take is required. Temporary effects on setting and amenity (i.e. noise, dust and traffic) will be managed through a CEMP, micro-routeing and traffic controls.

Historic Landscape and Non-Designated Archaeology
AC6-PEN-CC-RA03 is located within the Nantlle Valley HLA and there is potential for pre-historic and medieval settlement remains and post-medieval land-management features. Potential mitigation measures include a desk-based assessment, targeted evaluation, a WSI and archaeological watching briefs.

6.3.4.4 Access

Highway and PRoW
AC6-PEN-CC-RA03 crosses the A499 and interfaces with minor roads (including the road from the A499 at Fron Aber towards Pennarth) and several PRoWs (Clynnog Nos. 19, 1, 3 and 1B). It is likely that construction access will rely on the A499 with spurs along minor roads/private tracks. Potential effects could include temporary road closures or lane restrictions, increased HGV movements and intermittent congestion; in additional there could be short-term impacts to PRoW users during trenching or trenchless compound operations.

Potential mitigation measures include engaging early with the MNWTRA and landowners to agree access strategy, crossings of the A499 should be completed using trenchless techniques (i.e. HDD). Minor road crossings may employ open-cut methods under suitable traffic management, temporary access points may be required off the A499, preferably at existing junctions and localised upgrades may be necessary to accommodate construction vehicles. A CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures (detailing timing of deliveries, banksmen, signage, wheel-wash and road cleanliness) to minimise disruption.

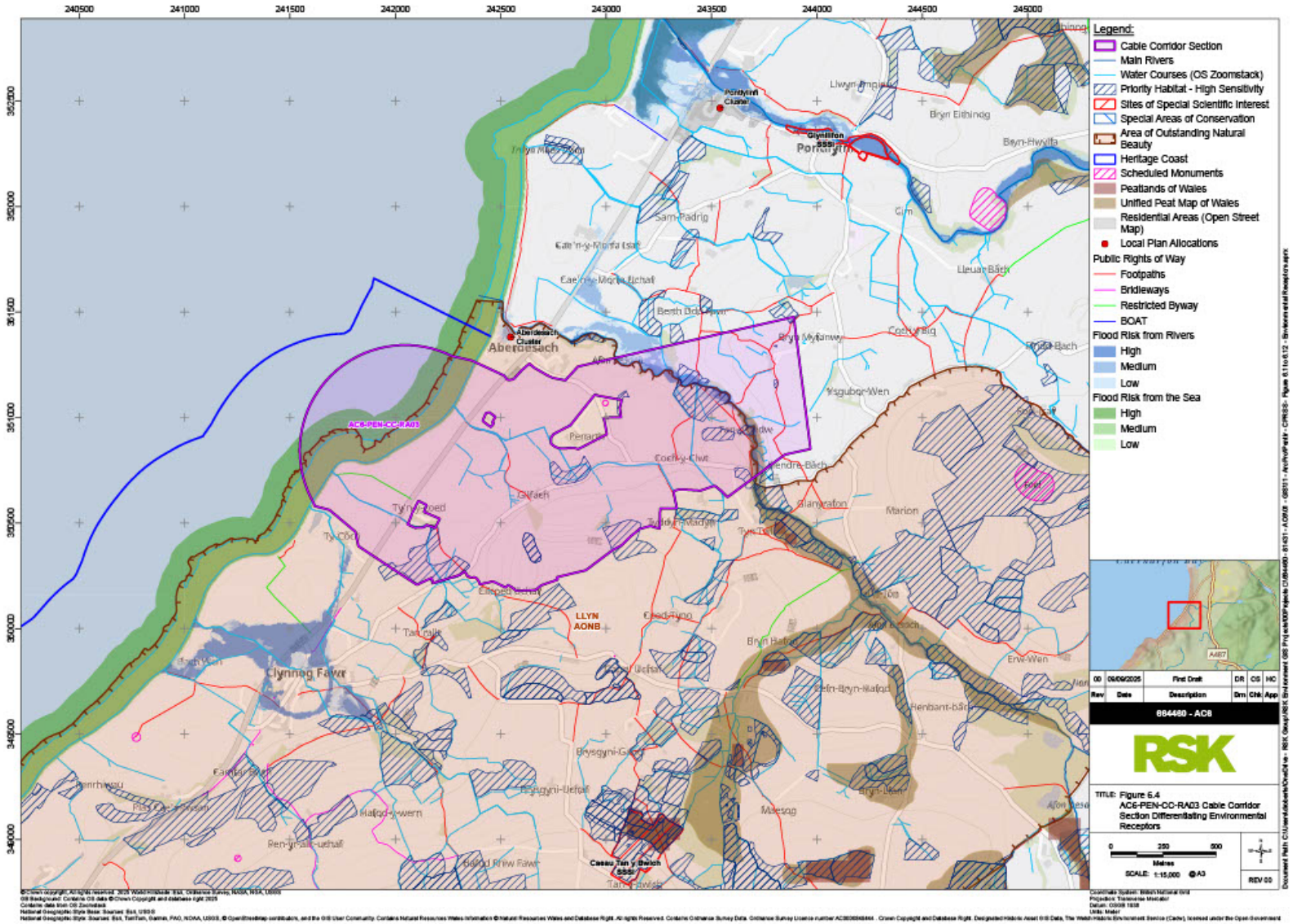
6.3.4.5 Socio-Economic Environment

Local Planning Receptors
AC6-PEN-CC-RA03 intersects the Aberdesach Cluster local development plan allocation, which identifies land designated for future development within the Aberdesach area (as set out in the adopted local planning framework), therefore necessitating early engagement with Cyngor Gwynedd to confirm compatibility and any preferred micro-routeing. AC6-PEN-CC-RA03 passes close to multiple individual properties and the settlement of Aberdesach, exposing residents to short-term construction disturbance. Socio-economic receptors include the Wales Coast Path, approximately eight PRoWs and local tourism in Aberdesach.

Tourism and Recreation
Construction may require temporary diversion or closure of the Wales Coast Path and PRoWs, with potential to reduce visitor experience and recreational access. Potential mitigation measures include construction programming outside peak tourism seasons, temporary diversions with clear signage, and early communication with residents and visitors. In addition, best-practice dust, noise and traffic management to be applied.

The Differentiating Environmental Receptors for AC6-PEN-CC-RA03 as described above were mapped using GIS and are presented in **Figure 6.3.3:** AC6-PEN-CC-RA03 Cable Corridor Section Differentiating Environmental Receptors

Figure 6.3.3: AC6-PEN-CC-RA03 Cable Corridor Section Differentiating Environmental Receptors



6.3.5 AC6-PEN-CC-RA04

6.3.5.1 Biological Environment

Special Areas of Conservation (SACs) / Sites of Special Scientific Interest (SSSIs)
AC6-PEN-CC-RA04 does not intersect any Habitats sites but lies in close proximity to several receptors. Glynllifon SAC/SSSI is located within approximately 100–160 m of the Cable Corridor Section boundary and is functionally connected to the route by hedgerows, treelines and Ancient Woodland. Corsydd Eifionydd SAC lies within approximately 200 m of the buffer to the east, with Cors Llanllyfni SSSI (component of the SAC) located approximately 160 m from the buffer and hydrologically linked via the Afon Llyfni. Afon Gwyrfai a Llŷn Cwellyn SAC is approximately 1.4 km to the north and is not expected to be affected. There is potential for disturbance of functionally linked bat foraging habitat associated with Glynllifon SAC.

Priority Habitats & Woodland
Extensive areas of priority habitat are located within and adjacent to AC6-PEN-CC-RA04, including purple moor grass and rush pastures (numerous polygons at SH 45892 52206; 47940 54230; 48113 54428; 48210 54611; 48328 54855; 48501 55254; 48558 55853; 48142 56504; 47904 57237) and lowland dry acid grassland (SH 46274 53116; 48292 54799). Ancient Woodland linked to Glynllifon occurs within 250 m.

Main rivers within or adjoining AC6-PEN-CC-RA04 include the Afon Llyfni, Afon Carrog and Afon Dolydd/Cwm Dulyn. Afon Llyfni is potentially hydrologically connected to the Glynllifon SAC/SSSI; Afon Carrog drains towards Y Foryd SSSI and the Menai Strait and Conwy Bay SAC, with adjacent RSPB interests. There is a potential that crossings could mobilise sediment and alter local hydrology.

Route refinement should prioritise avoidance of mapped priority habitats and Ancient Woodland edges. Where avoidance is not practicable, it is recommended that it is trenchless installation methods (e.g. HDD) beneath sensitive areas, turf lifting/rapid reinstatement and aftercare to limit permanent loss to short-term disturbance. For bats, retain dark corridors, minimise woody vegetation removal and impose sensitive lighting. Hydrological protection should include maintaining groundwater regimes, avoiding preferential flow paths, pollution prevention and timing works in low-flow windows. Engagement with NRW and completion of targeted hydrological assessment for Cors Llanllyfni will likely be required.

6.3.5.2 Physical Environment

Landscape & Visual Amenity
AC6-PEN-CC-RA04 traverses a mosaic of lowland farmland and valley landscapes (LANDMAP GWYNDDVS006; GWNDD011; GWNDD029). Construction will introduce temporary loss of ground cover, compounds and plant movements which will reduce visual amenity for scattered farms, roadside receptors and numerous PRoWs, including sections near Minffordd, between Gwynfa and Tyddyn Bach, at Cefn Hendre and east of the A487/A4871 roundabout. The North Wales Pilgrims Way is a particularly sensitive receptor, where short-term diversions and activity will be perceptible. Post-construction, reinstatement will restore the baseline character; but easement constraints may limit replacement tree planting. Potential mitigation measures include selecting low-lying alignments, minimising hedgerow removal, careful construction compound siting, temporary screening and a rolling reinstatement programme.

Peatland
Six peatland clusters intersect AC6-PEN-CC-RA04 (with a further three clusters located within the 250 m buffer). Peat is sensitive to drainage alteration, erosion and carbon loss. Potential mitigation measures could include peat depth/condition surveys, micro-routeing to avoid deep/active peat, use of low ground-pressure plant and temporary matting and working during drier periods.

Hydrology & Flood Risk
Crossings of Afon Llyfni, Afon Carrog and Afon Dolydd/Cwm Dulyn will be required within AC6-PEN-CC-RA04, alongside multiple ordinary watercourses and surface-water features. Works within 8 m of main rivers or within floodplain will require NRW Flood Risk Activity Permits. Given the presence of

numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required. Potential mitigation measures include trenchless methods at sensitive crossings, timing for low flows, robust silt/pollution controls and flood-resilient construction planning will control risk.

Areas of Outstanding Natural Beauty
AC6-PEN-CC-RA04 intersects the Llŷn AONB at its southern margin. While corridor-scale trenchless installation is not feasible, it is recommended that micro-routeing is undertaken to reduce visibility and restrictive construction windows, and temporary screening are introduced to minimise effects.

Agricultural Land Classification
AC6-PEN-CC-RA04 route intersects ALC Grade 2 and extensive Grade 3 land, with localised areas of Grades 4–5 in the wider context. It is recommended that Grade 2 land is avoided where practicable; and if this is not possible then measures such as the protection of topsoil/subsoil, strip/store/reinstate appropriately and manage wet-weather working to preserve soil structure measures are implemented. Residual effects are not expected to be significant.

Historic Landfill
AC6-PEN-CC-RA04 The cable corridor section intersects the Cefn-Nen historic landfill (south of Y Groeslon) and passes close to two further sites. Where avoidance is not feasible, undertake contamination and ground-gas risk assessment, define construction controls (encasement/ducting, venting/leachate management), adopt enhanced H&S measures and secure any necessary permits/consents. With these provisions, significant residual effects are unlikely.

6.3.5.3 Historic Environment

Scheduled Monuments
Two scheduled monuments are located within AC6-PEN-CC-RA04: the Early Habitation Site west of Pen-yr-Allt and the Hut Group near Pen Llwyn, Carmel. The route should be micro-aligned to avoid ground disturbance within designated extents, with precautionary buffers and bespoke method statements for nearby works prepared.

Listed Buildings
Numerous Grade II Listed Buildings occur within the 250 m buffer, particularly in and around Pen-y-groes. No direct land-take is required. Short-term effects on setting (i.e noise, dust, traffic) will be managed via CEMP controls, screened compounds and traffic management.

Historic Landscape & Archaeology
AC6-PEN-CC-RA04 intersects the Nantlle Valley HLA and contains high potential for non-designated archaeological remains (prehistoric/medieval settlement, burnt mounds, post-medieval industrial and land-management features). Recommended mitigation measures included via a desk-based assessment, a targeted evaluation, a WSI and archaeological watching briefs during intrusive works.

Registered Parks and Gardens (RPGs)
Glynllifon RPG lies within the 250 m buffer; it is recommended that a specific buffer surround the RPG must be agreed to avoid any intrusive works within its setting. Any required mitigation works will be identified during the EIA and planning process.

6.3.5.4 Access

Highway and PRoW Interface
AC6-PEN-CC-RA04 interfaces with the A487(T), multiple minor roads and extensive PRoWs (35+), including footpaths, bridleways and restricted byways. NCN Route 8 crosses the section near Llanllyfni. There is potential that construction will require temporary accesses and compounds, which could create short-term increases in HGV movements, localised lane closures and intermittent PRoW/cycle route diversions.

Potential mitigation measures include (but not limited to):

- Use of trenchless installation methods (e.g. HDD) for the A487(T) crossing;
- Use of open-cut with traffic management at minor roads, where appropriate;
- Utilise existing junctions for temporary accesses:
- Upgrade local roads to accommodate construction vehicles;
- A CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures (detailing timing of deliveries, banksmen, signage, wheel-wash and road cleanliness) to minimise disruption.
- Early engagement with the MNWTRA, Sustrans and landowners; and
- If PRoW and NCN diversions are required, it is recommended that these are undertaken outside of the peak tourism seasons, and early communication with residents and visitors is undertaken.

6.3.5.5 Socio-Economic Environment

Local Planning Receptors

AC6-PEN-CC-RA04 intersects three urban areas, Pen-y-groes/Llanllyfni, Y Groeslon and Carmel, and passes close to further residential clusters. It also intersects NCN Route 8 and a dense PRoW network (35+). One major approved planning application (Cae Efa Lwyd sand and gravel pit extension; C23/0302/22/LL) introduces potential for cumulative construction-phase effects. Early engagement with Cyngor Gwynedd would be required to coordinate programmes and access.

Tourism, Recreation and Community Amenity

Short-term disturbance (i.e., noise, traffic, visual activity) and temporary diversions could affect residents and users of PRoWs and NCN 8. Nearby attractions include Pant Du Vineyard and Café (Pen-y-groes), Dorothea Quarry (Llanllyfni) and the Welsh Highland Railway (Y Groeslon).

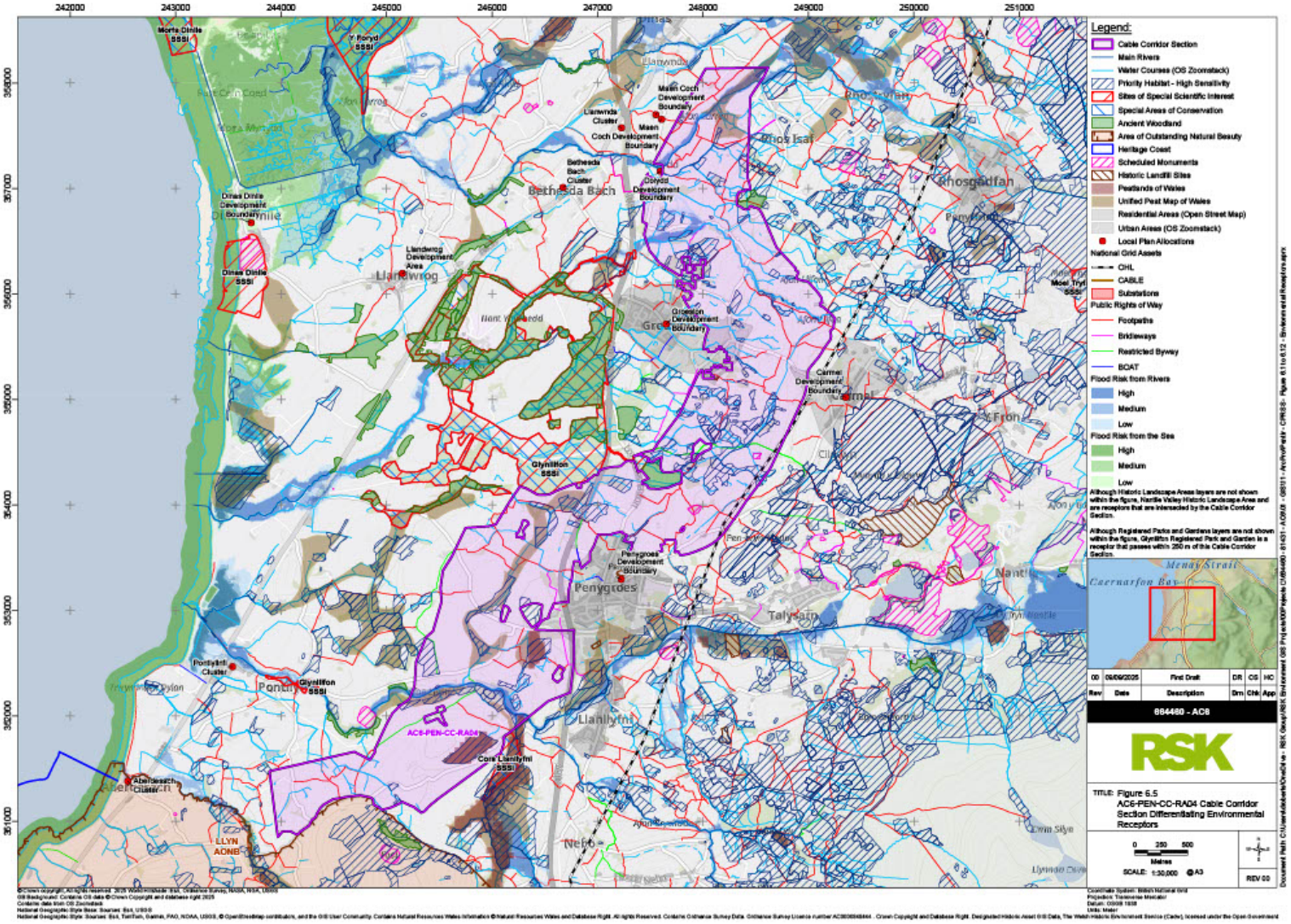
Potential mitigation measures include (but are not limited to):

- Stage construction to limit concurrent works in populated areas;
- Schedule works outside peak visitor periods where practicable;
- Provide clear advance communications;
- Maintain access via signed diversions; and
- Apply best-practice controls (i.e., working hours, dust/noise suppression, clean haul routes) under the potential CTMP and CEMP.

It is recommended that works are coordinated with the quarry extension project to avoid overlapping peak activities on shared roads.

The Differentiating Environmental Receptors for AC6-PEN-CC-RA04 as described above were mapped using GIS and are presented in **Figure 6.3.4**: AC6-PEN-CC-RA04 Cable Corridor Section Differentiating Environmental Receptors

Figure 6.3.4: AC6-PEN-CC-RA04 Cable Corridor Section Differentiating Environmental Receptors



6.3.6 AC6-PEN-CC-RA05

6.3.6.1 Biological Environment

Special Areas of Conservation (SACs) / Sites of Special Scientific Interest (SSSIs)

AC6-PEN-CC-RA05 intersects the Afon Gwyrfai a Llŷn Cwellyn SAC (also Afon Gwyrfai SSSI), designated for Annex I habitats (watercourses of plain to montane levels) and Annex II species including Atlantic salmon (*Salmo salar*), floating water-plantain (*Luronium natans*) and otter (*Lutra lutra*). It is assumed that any crossing will be constructed via trenchless methods (e.g. HDD); however, launch/reception pits, vibration and construction emissions could cause temporary habitat deterioration and species disturbance.

The Glynllifon SAC/SSSI lies within approximately 900 m of the 250 m buffer. While no direct land-take is proposed, functionally linked foraging habitat for lesser horseshoe bat (*Rhinolophus hipposideros*), including hedgerows, treelines and small woodland blocks within the corridor section, could be lost or degraded during construction through lighting, noise and vegetation removal.

Y Foryd SSSI/LNR is approximately 480 m from the buffer and is potentially hydrologically connected via watercourses (Afon Gwyrfai, Afon Rhyd). Afon Seiont SSSI lies approximately 800 m north of the buffer, and the registered main river Afon Seiont is within the Cable Corridor Section. Given separation and the underground nature of works, Pant Cae Haidd SSSI (approximately 950 m east) and Dinas Dinlle SSSI (approximately 1.6 km south) are unlikely to be affected.

The Cable Corridor Section also runs parallel to the Menai Strait and Conwy Bay SAC (within approximately 500 m at its closest extent) and within 2 km of Abermenai to Aberffraw Dunes SAC; and the Traeth Lafan / Lavan Sands SPA to the north has potential functionally linked habitat throughout the Menai Strait. Given temporary transient construction works and separation distance, any temporary effects will insignificant and can be adequately mitigated.

Priority Habitats and Woodland

Sections of the route pass through priority habitats sensitive to direct loss, compaction and hydrological change, including purple moor grass and rush pasture, wood pasture and lowland meadow. The Cable Corridor Section intersects five Ancient Woodland areas, with a further nine within 250 m; disturbance effects (lighting, dust, invasive species risk) and permanent planting constraints within the easement are relevant.

Six main rivers are crossed including Rhyd (Dinas), Tyddyn Bychan, Plas, Gwyrfai, Rhosdican and Seiont, together with numerous ordinary watercourses and surface-water features. Without controls, trenching and compound drainage could mobilise sediment, increase turbidity and elevate pollution risk to aquatic habitats and downstream designations (including the SAC/SSSIs).

Phosphorus Sensitive Catchment

The route lies within the Afon Gwyrfai Phosphorus Sensitive SAC Freshwater Catchment. Construction poses a risk of nutrient and fine-sediment inputs with potential pathway connectivity to designated features.

The following list is suggested standard mitigation that could be proposed to mitigate any potential impact:

- Micro-route to avoid priority habitats and Ancient Woodland;
- Employ trenchless methods at the Afon Gwyrfai/SAC crossing and other sensitive watercourses;
- Site compounds/set-downs away from watercourses and bat-sensitive corridors;
- Retain dark, continuous linear features;
- Apply pollution prevention (cut-off drains, silt fencing, settlement facilities, spill response); and
- Adopt IAQM-aligned dust/haul-route controls with low-emission plant.

Where avoidance of priority grassland is not feasible, use turf lifting, short-term storage and reinstatement to reduce permanent loss to short-term disturbance.

6.3.6.2 Physical Environment

Landscape and Visual Amenity
The Cable Corridor Section traverses LANDMAP Visual and Sensory Areas: GWYNDDVS006 Bethel (rolling farmland), GWYNDDVS034 Morfa Dinlle (a flat coastal strip) and two river valley crossings (GWYNDDVS031 Pont Faen; GWYNDDVS015 Afon Seiont). Key receptors include scattered farmsteads, users of local PRoWs and road users; a short section of the Wales Coast Path at Saron will experience temporary effects. Construction will introduce compounds, plant movement and short-term vegetation loss; during operation, the cable is buried, with reinstatement constrained only by easement restrictions on woody planting.

Mitigation will focus on selecting low-lying alignments, minimising hedgerow removal, temporary screening, and phased reinstatement. Mitigation measures will be identified and developed through the EIA and planning process.

Peatland
Five clusters of peatland occur within the Cable Corridor Section. Peatland is sensitive to drainage alteration, erosion and carbon loss. Peat depth/condition surveys, micro-routeing to avoid deep peat, low ground-pressure plant, temporary matting and dry-weather working will be applied. Works within 8 m of main rivers or within functional floodplain will require a Flood Risk Activity Permit from NRW. Given the presence of numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required.

6.3.6.3 Historic Environment

Scheduled Monuments
The route intersects one Scheduled Monument (Hut Circle south of Rhyd y Galen) with others nearby. Construction could affect the setting and, if not avoided, fabric. Precautionary buffers, micro-routeing and proportionate methods will be adopted; where unavoidable, consents and targeted investigation would be required.

Listed Buildings and Conservation Areas
Six Grade II assets lie on the route; a further eight Grade II, one Grade II* and the Bontnewydd Conservation Area fall within proximity. No direct land-take is anticipated; temporary effects on setting, dust, noise and traffic are possible during construction. A CEMP, micro-routeing, screening and traffic controls will manage effects.

Historic Landscape and Non-Designated Archaeology
The Cable Corridor Section intersects the Nantlle Valley HLA and has potential for medieval/post-medieval remains and currently unknown archaeology. Mitigation will be refined via a desk-based assessment and evaluation and likely to include a WSI and a watching brief.

6.3.6.4 Access

Highway Network
Access will utilise minor roads and private tracks, with crossings of the A487(T), A4871 and A4085 via trenchless installation methods (e.g. HDD); minor road crossings may use open cut with traffic management. Temporary lane closures and short-duration road closures are anticipated, with localised increases in HGV movements.

Public Rights of Way
The route intersects 24+ PRoWs (footpaths, bridleways and restricted byways) and a short section of the Wales Coast Path at Saron. Temporary diversions/closures will be required during trenching and compound establishment.

Cycle Network and Railway

NCN Route 8 and NCN Route 61 lie within the Cable Corridor Section and will require managed crossings and short, signed diversions. One railway south from Caernarfon is intersected; works will be coordinated with the operator and use trenchless or night/possessions working as required.

Early engagement with Cyngor Gwynedd, local highways and landowners; a CTMP; use of existing junctions with localised upgrades; clear wayfinding for PRoW/cycle diversions; and careful programming will minimise disruption.

6.3.6.5 Socio-economic Environment

Local Planning Receptors

The Cable Corridor Section intersects local development plan designations at Bontnewydd Development Boundary, Caeathro Development Boundary, and the Penrhos (Caeathro) and Saron clusters. Urban areas at Caernarfon and Y Bontnewydd (and the settlement of Caeathro) lie on/near the route, with multiple individual properties within 250 m. Two major planning applications occur locally (C24/0323/14/LL: petrol filling station and C23/0574/26/AC: 12-unit residential scheme extension). Rhyd Y Galen Caravan & Camping Park lies within 250 m and may experience temporary amenity effects.

Tourism and Recreation

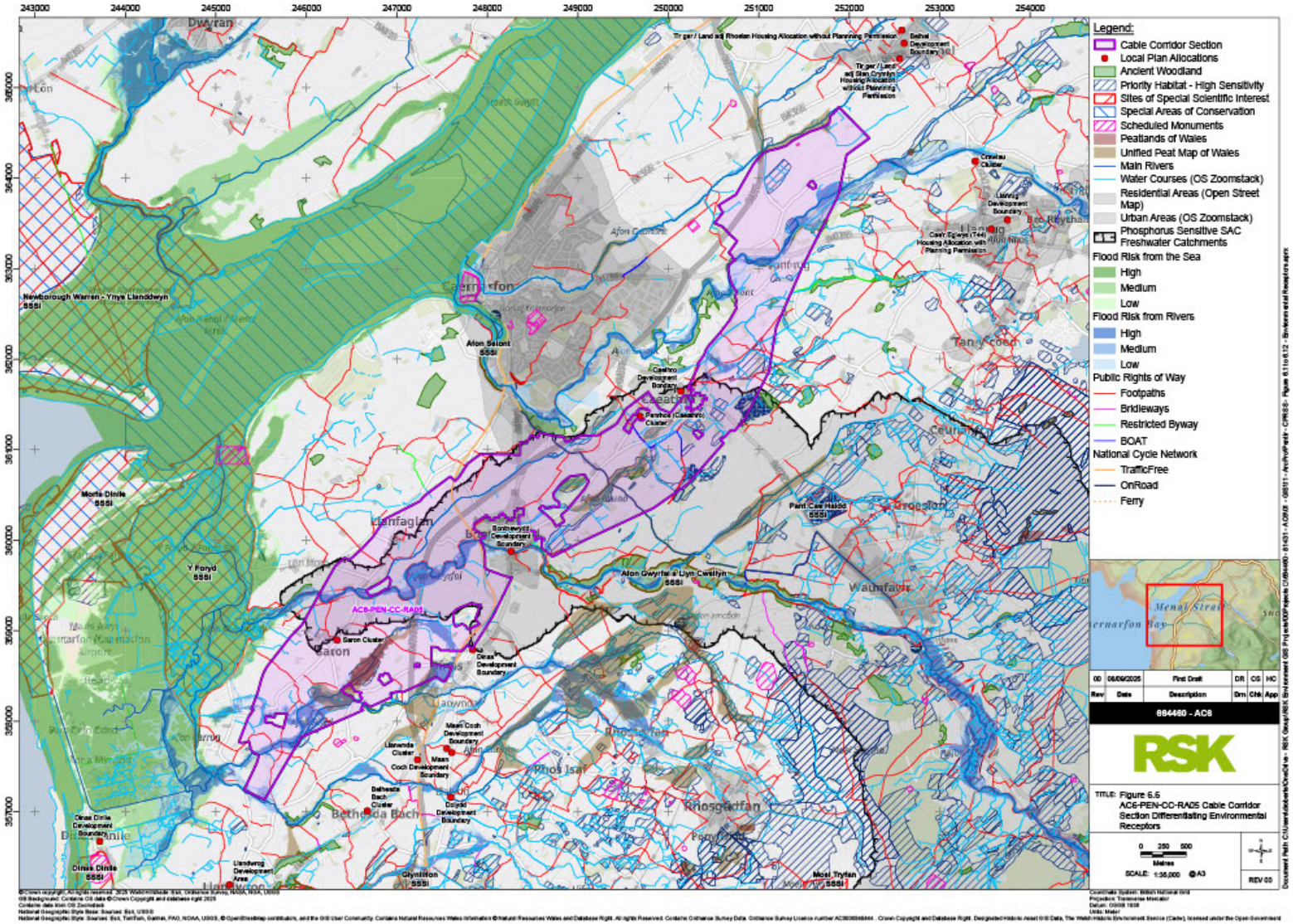
Underground installation will cause temporary disruption to PRoWs and NCN 8/61, with short-term reductions in accessibility and amenity. Mitigation will include:

- Seasonal programming to avoid peak visitor periods;
- Temporary diversions with clear signage;
- Staged construction through populated areas, and
- Proactive community/stakeholder engagement.

Best-practice dust, noise and traffic management will be implemented. The required mitigation measures will be further identified and developed through the EIA and planning process.

The Differentiating Environmental Receptors for AC6-PEN-CC-RA05 as described above were mapped using GIS and are presented in **Figure 6.3.5**: AC6-PEN-CC-RA05 Cable Corridor Section Differentiating Environmental Receptors

Figure 6.3.5: AC6-PEN-CC-RA05 Cable Corridor Section Differentiating Environmental Receptors



6.3.7 AC6-PEN-CC-RA06

6.3.7.1 Biological Environment

Special Areas of Conservation (SACs) / Sites of Special Scientific Interest (SSSIs)
AC6-PEN-CC-RA06 Cable Corridor Section does not intersect any Habitats sites. Glynllifon SAC/SSSI lies to the south, with the SAC approximately 700 m from the 250 m buffer. These designations support lesser horseshoe bat (*Rhinolophus hipposideros*) roosts and are connected to the corridor by suitable commuting and foraging habitat (hedgerows, treelines and patches of Ancient Woodland). Although no direct land-take is proposed, functionally linked habitat within the typical 1-2 km bat range could be affected during construction by lighting, noise, dust and limited vegetation removal.

Afon Gwyrfai a Llŷn Cwellyn SAC/SSSI lies approximately 1.5 km north of the buffer and is unlikely to be hydrologically connected to the Cable Corridor Section. Y Foryd SAC/SSSI/LNR is within approximately 1 km; given separation and lack of direct hydrological pathways, effects are unlikely, but targeted wintering and passage bird surveys are required due to the site's importance for intertidal habitats (including seagrass) and overwintering waterbirds (notably wigeon). Dinas Dinlle SSSI lies approximately 1.8 km away and is not expected to be affected.

Priority Habitats and Woodland
No priority habitats or Ancient Woodland are intersected by the Cable Corridor Section, though several areas of purple moor grass and rush pasture and Ancient Woodland occur within 250 m. Edge effects (lighting, dust, accidental encroachment, invasive species risk) are possible where works run close to these features.

Within the wider Cable Corridor Section there are no main rivers to be crossed by this section; however, local ordinary watercourses and ditches may still be encountered.

Mitigation will prioritise avoidance and timing: micro-route to retain continuous dark corridors along hedgerows/treelines; minimise vegetation removal; apply sensitive, directional, low-spill lighting; and locate compounds away from bat corridors. For nearby priority habitats/Ancient Woodland outside the boundary, establish protective buffers, fencing and biosecurity measures. Apply IAQM-aligned dust and haul-route controls, low-emission plant and robust spill prevention.

6.3.7.2 Physical Environment

Landscape and Visual Amenity
This is a comparatively short route through rolling farmland (LANDMAP Visual and Sensory Area GWYNDDVS006 Bethel). Receptors comprise scattered dwellings, minor local roads including the A499, and local PRoWs. Construction will introduce temporary compounds, plant movements and short-term vegetation loss; the operational phase will have negligible presence as the cable is buried, with reinstatement constrained only by easement restrictions on woody planting.

Mitigation will include selection of low-lying alignments, minimising hedgerow removal, temporary screening of compounds and phased reinstatement. Temporary PRoW effects (short-term visibility and access management) are anticipated during construction only.

Peatland
One mapped area of peatland is located in the corridor section (approximately 140 m SW of Llanwnda). Peat is sensitive to drainage alteration and erosion. Peat depth/condition surveys, micro-routeing to avoid deeper peat, low ground-pressure plant, temporary matting, and dry-weather working will be employed.

Hydrology and Flood Risk
Although this section does not cross main rivers, it is hydrologically connected to catchments featuring the Llifon, Caerloda, Bodfan, Foryd and Carrog downstream. Works near ordinary watercourses will follow Guidance for Pollution Prevention, with silt control (silt fencing, settlement facilities, cut-off drains) and refuelling controls. Where works occur within functional floodplain, permits and method statements will be agreed with NRW.

6.3.7.3 Historic Environment

Scheduled Monuments
Two Scheduled Monuments fall on the Cable Corridor Section: Dinas y Prif Camp (hillfort) and the Enclosed Hut Circle Settlement north of Rhedynog Felen Bach. Construction could affect setting and, if not avoided, fabric. Precautionary buffers, micro-routeing and proportionate methods will be adopted; where unavoidable, consents and targeted investigation would be required.

Listed Buildings and Conservation Areas
Five Grade II Listed Buildings occur in proximity (including assets at Ty-hen and Maengwyn). Llanwnda Conservation Area also lies within the buffer. No permanent land-take is anticipated; temporary setting effects (dust, noise, traffic, views) are possible during construction. A CEMP, screening, micro-routeing and traffic controls will be required.

Historic Landscape and Non-Designated Archaeology
The Cable Corridor Section intersects the Nantlle Valley Historic Landscape Area and contains potential for Roman road, medieval settlement, post-medieval land-management and railway features, as well as currently unknown archaeology. Mitigation will include desk-based assessment, targeted evaluation, a Written Scheme of Investigation and watching briefs.

6.3.7.4 Access

Highway Network
Access will utilise minor roads and private tracks, with strategic crossings of the A487(T) and A499 via trenchless installation methods (e.g. HDD); minor road crossings may use open cut with traffic management. Short-duration lane closures and localised HGV increases are anticipated.

Public Rights of Way and Cycle Network
The route interfaces with multiple PRoWs, including Llandwrog No. 6; Llanwnda Nos. 134, 4, 3, 8, 17, 16, 14 and links to Lon Eifion and the old A487. NCN Route 8 crosses the Cable Corridor Section and will require a managed crossing and short, signed diversions. Temporary closures/diversions of PRoWs will be required during trenching and compound establishment.

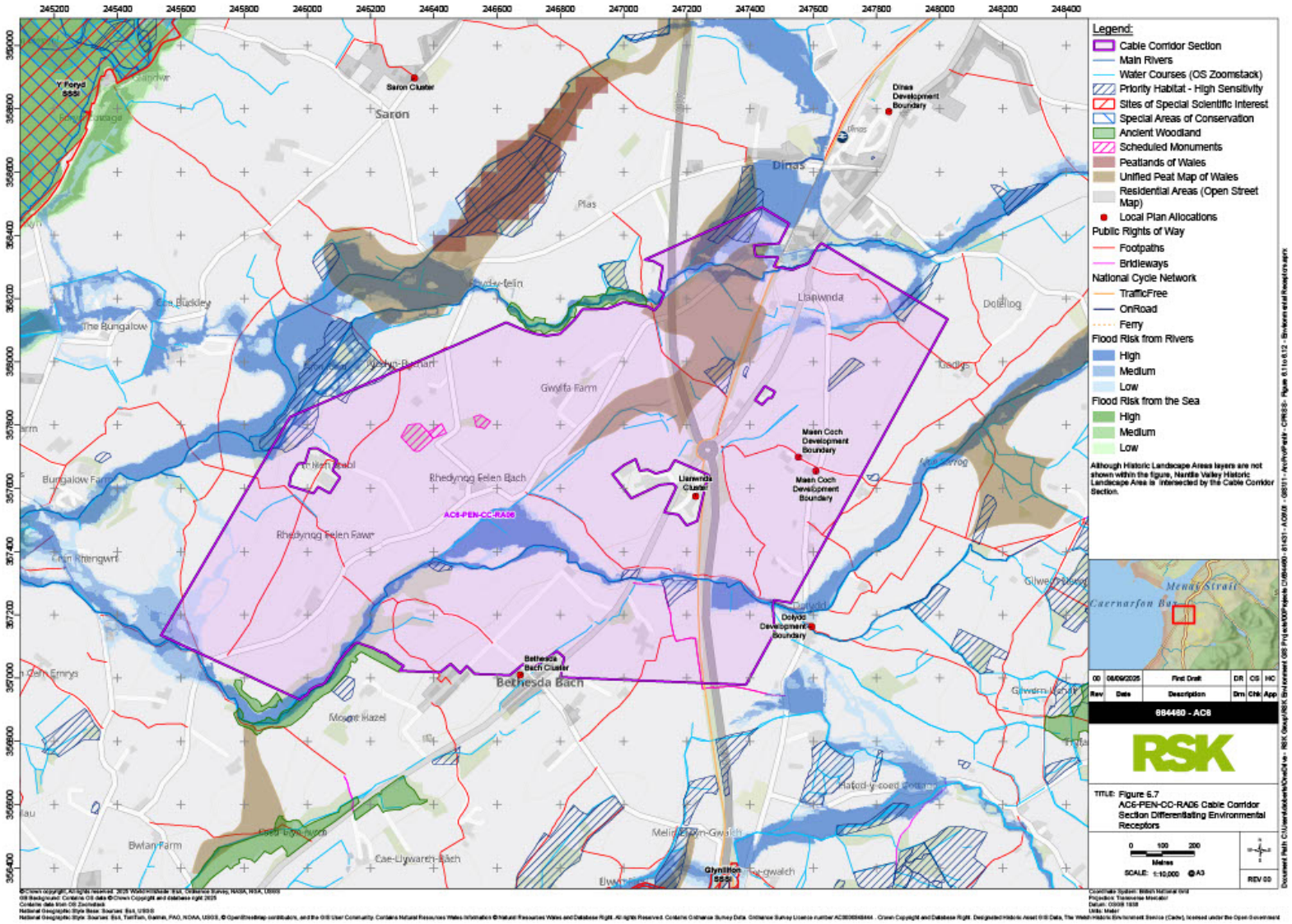
Early engagement with Cyngor Gwynedd and the Local Highway Authority; a CTMP; use of existing junctions with localised upgrades; clear wayfinding for PRoW/NCN diversions; and careful programming will minimise disruption.

6.3.7.5 Socio-economic Environment

Local Planning Receptors
The Cable Corridor Section intersects local plan clusters at Llanllyfni/Llandwrog (Llanwnda) Cluster, Bethesda-bach Cluster and Maen Coch. No urban areas are crossed, but properties and the settlements of Bethesda-bach and Llanwnda lie within 250 m. NCN Route 8 is present; no major planning applications are recorded within the immediate study area.

Tourism and Recreation
Construction will cause temporary disruption to approximately 14 PRoWs (footpaths, bridleways, restricted byways) and NCN 8, reducing accessibility and amenity during works. Mitigation will include temporary diversions with clear signage, seasonal programming to avoid peak visitor periods, and proactive community engagement. Best-practice dust, noise and traffic management will be implemented. With these measures, socio-economic effects are localised, temporary and minor, with low planning conflict risk. The Differentiating Environmental Receptors for AC6-PEN-CC-RA06 as described above were mapped using GIS and are presented in **Figure 6.3.6**: AC6-PEN-CC-RA06 Cable Corridor Section Differentiating Environmental Receptors

Figure 6.3.6: AC6-PEN-CC-RA06 Cable Corridor Section Differentiating Environmental Receptors



6.3.8 AC6-PEN-CC-RA07

6.3.8.1 Biological Environment

Special Areas of Conservation (SACs) / Sites of Special Scientific Interest (SSSIs)

AC6-PEN-CC-RA07 Cable Corridor Section directly intersects the Afon Gwyrfai a Llŷn Cwellyn SAC and SSSI, a riverine and lacustrine system recognised for its oligotrophic to mesotrophic waters, *the Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation community, and populations of Atlantic salmon (*Salmo salar*), floating water-plantain (*Luronium natans*) and otter (*Lutra lutra*). The Cable Corridor Section crosses the river and surrounding habitat corridor, inevitably leading to some disturbance and potential temporary habitat loss. This carries risks for connectivity, particularly for migratory fish and otters, and may also place pressure on adjacent woodland habitats. It is assumed trenchless crossing methods such as HDD would be required, though even these bring risks of localised vegetation clearance at entry and exit pits, vibration, dust and emissions.

The Cable Corridor Section also lies within 1.7 km of the Glynllifon SAC and SSSI, designated for its lesser horseshoe bat (*Rhinolophus hipposideros*) roosts. While there is no direct overlap, the bats' foraging range (typically 1–2 km) extends into functionally linked habitats within the Cable Corridor Section, including hedgerows and woodland blocks. Construction could lead to disturbance from lighting, noise and vegetation clearance. Careful micro-routing to retain hedgerows, together with sensitive lighting and timing, would minimise impacts. Elsewhere, the Cable Corridor Section passes close to other designated sites within 10 km, including the Menai Strait and Conwy Bay SAC, Abermenai to Aberffraw Dunes SAC, Anglesey Coast: Saltmarsh SAC, and Eryri SAC. Given their separation and the underground nature of works, these are not anticipated to be affected.

Priority Habitats and Ancient Woodland

The Cable Corridor Section crosses small areas of purple moor grass & rush pasture and lowland dry acid grassland. Within the 250 m buffer, further priority habitats occur including lowland meadow, traditional orchards, lowland fens and reedbeds. Ten areas of Ancient Woodland lie within the buffer; while direct intersection is avoidable, edge effects (light, dust, invasive risk) and bat connectivity sensitivities must be managed.

The Afon Gwyrfai SAC/SSSI crossing will use trenchless methods (e.g. HDD), selecting previously disturbed / lower-value banks for pits, with exclusion zones, pollution prevention, and seasonally constrained windows (e.g. avoiding salmonid spawning). For bats, retain continuous dark corridors, minimise hedgerow removal, and use low-spill, directional lighting. Priority habitats will be micro-routed to avoid; where unavoidable, deploy trenchless methods under sensitive swards or turf-lifting, short-term storage and reinstatement.

6.3.8.2 Physical Environment

Landscape and Visual Amenity

This Cable Corridor Section lies predominantly in farmland and a mosaic river-valley landscape, falling within LANDMAP Visual and Sensory areas GWYNDDVS006 Bethel and GWYNDDVS020 Afon Gwyrfai. The existing baseline already contains detracting elements such as road corridors, pylons and overhead lines, meaning the corridor is not free from infrastructure influence. Construction would nonetheless introduce short-term, reversible effects through vegetation removal, compounds and plant movement, with impacts most notable on scattered dwellings, roadside properties, farmsteads, local roads and A-roads, as well as the dense network of PRoWs. A short section of the Welsh Highland Railway near Llanwnda would also experience temporary visual intrusion. The most sensitive location is at the Afon Gwyrfai crossing near Plas-y-Bryn Farm and Cae Mawr, where the wooded river valley would be difficult to reinstate fully due to easement restrictions. Selecting a low-lying alignment, limiting hedgerow loss, using temporary screening where appropriate and phasing reinstatement would help ensure effects are localised and minor once construction is complete.

Hydrology and Flood Risk

The route intersects the main rivers Rhyd (Dinas), Gwyrfai and Seiont, together with numerous smaller watercourses and surface-water features. Works within 8 m of any main river will require a Flood Risk

Activity Permit from NRW, and several parts of the Cable Corridor Section are mapped as river flood zones. Given the presence of numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required. No sea flood-risk areas are present, though surface-water flood risk occurs intermittently along the network. Sensitive construction techniques such as trenchless methods (e.g. HDD) at the principal river crossings, or if not feasible, timing works for low-flow periods, will be needed to avoid sediment release or habitat disturbance. Best-practice pollution prevention measures (for example silt fencing, settlement lagoons, cut-off drains and spill response protocols) would further reduce the likelihood of water quality deterioration.

Soils and Agricultural Land

The Cable Corridor Section passes through a mix of agricultural land, including areas of Grade 2, extensive tracts of Grade 3, and smaller pockets of Grades 4 and 5. Higher value Grade 2 land is best avoided where routing flexibility allows; where this is not possible, soils can be protected through standard measures such as stripping and storing topsoil and subsoil separately, reinstating after construction, and restricting trafficking during wet periods. Management practices will comply with the guidelines outlined in NGET's Soil and Drainage Leaflet developed for The Great Grid Upgrade projects (National Grid Electricity Transmission, 2025). With such soil management practices, adverse long-term effects on agricultural productivity are unlikely.

Peatland

One area of Peatland lies approximately 900 m north of Llanwda. Although the corridor section avoids direct intrusion, peatlands are particularly sensitive to drainage changes, erosion and carbon release. Depth and condition surveys would inform micro-routing to avoid deeper peat deposits, while construction in drier periods, use of low-ground-pressure machinery and temporary matting would minimise disturbance. Adoption of appropriate handling and reinstatement protocols would ensure that peatland impacts remain minor and manageable.

Contaminated Land and Historic Landfill

Two historic landfill sites, Prysgol and Plas Gwyn, are intersected by this Cable Corridor Section. These present potential risks such as contaminated soils, ground gas, leachate and stability issues, as well as hazards to workers and the possibility of cable corrosion. Where practicable, routing would avoid these sites. Should avoidance not be feasible, more detailed intrusive investigations and reviews of historic records would be required to establish risks. Protective barriers or cable encasement would mitigate potential effects. Construction methods would need to follow strict permit conditions and be embedded within the CEMP and site-specific RAMS.

6.3.8.3 Historic Environment

Designated Assets

Two designated assets, Tyddyn Berth Grade II Listed Building and a Grade II milestone, lie within the Cable Corridor Section, alongside at least ten further Grade II listed buildings and one Grade II* within 50 m of the corridor boundary. Temporary impacts to setting may arise during construction from noise, dust, and traffic, though no direct land-take is required.

Archaeology and Historic Landscape

Non-designated remains recorded/potential include prehistoric standing stones, burnt mounds, a Roman road, medieval settlement, post-medieval land-management and railway features, and sites of post-medieval/modern buildings (including a hospital). The route also intersects the Nantlle Valley Historic Landscape Area, though setting effects are limited for a buried cable.

6.3.8.4 Access

Highways

The Cable Corridor Section intersects several major and minor roads, including the A4871, A4085 and A4086, along with a network of local lanes and private tracks. Major A-road crossings will require trenchless techniques, while smaller roads may be crossed using trench/open-cut methods with

appropriate traffic management. Construction is expected to cause temporary lane closures, diversions, and increased HGV traffic, leading to short-term congestion and disruption for road users.

PRoWs and Cycle Routes

The corridor section also crosses a large number of PRoWs, including footpaths, bridleways and restricted byways, as well as the NCN Route 8, which cannot be avoided. Temporary diversions and signage will maintain connectivity, though recreational users may experience short-term disruption. Early engagement with Cyngor Gwynedd, landowners and route managers, alongside a CTMP, will help to coordinate works and minimise inconvenience.

6.3.8.5 Socio-Economic Environment

Planning Policy and Land Allocations

The Cable Corridor Section intersects several local development plan designations, including the Dinas Development Boundary, Llanrug Development Boundary and the Cae'r Eglwys (T44) Housing Allocation with Planning Permission. Early consultation with Cyngor Gwynedd will be required to understand potential conflicts and routing preferences.

Residential Receptors and Settlements

The Cable Corridor Section passes through the urban areas of Y Bontnewydd and Llanrug and in proximity to Llanwnda, with multiple residential properties located within 250 m of the route. Construction works may temporarily affect residents through noise, dust, visual disturbance, vibration and increased traffic movements.

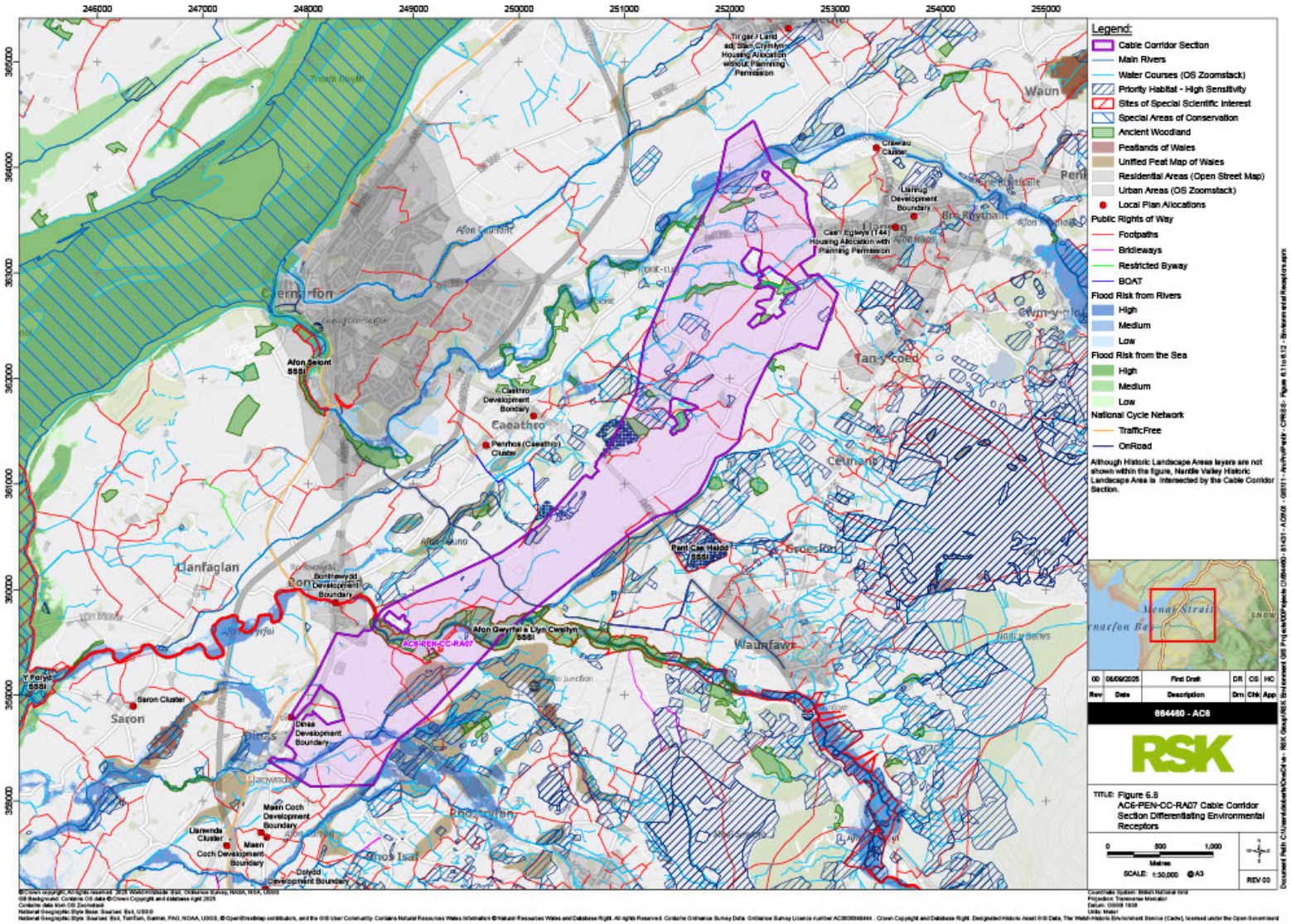
Recreation and Tourism

At least 21 PRoWs and the NCN Route 8 intersect this corridor section, representing a recreational constraint. Construction will likely result in temporary closures and diversions, reducing amenity for walkers, cyclists and other users. Tourism and visitor activity could be affected during peak seasons if access and amenity are disrupted.

Mitigation measures will include maintaining PRoW and cycle connectivity via temporary diversions, provision of clear signage and advance public communication, and implementation of best practice construction methods to control dust, noise and traffic impacts. Seasonal programming will be considered to avoid disruption during peak tourism periods.

The Differentiating Environmental Receptors for AC6-PEN-CC-RA07 as described above were mapped using GIS and are presented in **Figure 6.3.7**: AC6-PEN-CC-RA07 Cable Corridor Section Differentiating Environmental Receptors

Figure 6.3.7: AC6-PEN-CC-RA07 Cable Corridor Section Differentiating Environmental Receptors



6.3.9 AC6-PEN-CC-RA08

6.3.9.1 Biological Environment

Special Areas of Conservation (SACs) / Sites of Special Scientific Interest (SSSIs) / Special Protection Areas (SPAs)

AC6-PEN-CC-RA08 Cable Corridor Section is situated between European designated sites; Menai Strait and Conwy Bay SAC lies a little over 2 km to the west and Eryri SAC around 3 km to the east. Neither SAC is designated for mobile qualifying species, and with standard pollution prevention in place there is no realistic pathway for habitat loss or deterioration. To the north (approximately 2.6 km), Lavan Sands, Conway Bay SPA supports oystercatcher, Eurasian curlew, red-breasted merganser, great crested grebe and common redshank. Although SPA birds chiefly depend on intertidal habitat, curlew can range widely over farmland; confirming any functionally linked use of fields in the corridor through survey would therefore be prudent. Given the short-lived, linear nature of construction and the SPA's management emphasis on shoreline disturbance, any effects are expected to be minor and temporary.

With current desk-top data available, the Cable Corridor Section is unlikely to be a critical offsite habitat for curlew, but targeted breeding/foraging surveys will clarify usage. If curlew are found to use fields locally, simple measures including limited vegetation removal outside sensitive periods, screened compounds and dusk-to-dawn low-spill lighting, would keep displacement risk low and effects transient.

Priority Habitats and Woodland (including Ancient Woodland)

The corridor section intersects two areas of purple moor grass and rush pastures (approx. SH 54259 66738; SH 54478 66113) and one area of lowland dry acid grassland (approx. SH 55211 66760). Two areas of Ancient Woodland also fall within 250 m of the Cable Corridor Section. These receptors are sensitive to ground disturbance, compaction and hydrological change; the route should therefore be micro-aligned to skirt priority patches wherever practicable.

Although no main rivers are crossed, local watercourses drain towards the Menai Strait. Where the corridor section approaches channels or drains, timing works in low-flow conditions, keeping compounds outside riparian zones, and applying robust silt and spill controls will keep turbidity and pollution risks low and avoid knock-on effects to downstream designated waters.

6.3.9.2 Physical Environment

Landscape and Visual Amenity

The route threads through rolling farmland and open valley landform east of Bethel, within LANDMAP Visual and Sensory Area GWYNDDVS006 (Bethel). Existing pylons and OHL already punctuate views and will remain the dominant vertical elements. Construction will introduce plant, soil storage and hedgerow gaps affecting scattered dwellings, roadside properties, minor roads and local PRoWs; sensitivity rises where the Cable Corridor Section edges higher ground near Ty-Mawr and where receptors enjoy wider panoramas. Selecting low-lying alignments, trimming rather than removing woody boundaries, and phasing reinstatement will keep effects localised and reversible; once reinstated, the buried asset will appear as farmland again, with only the easement subtly limiting woody regrowth.

Agricultural Land Classification

The Cable Corridor Section intersects Grade 2 land at its southern end, extensive Grade 3, and smaller pockets of Grades 4–5. Where Grade 2 is unavoidable, a soils management plan that separates, protects and reinstates horizons, restricts trafficking in wet conditions and returns fields to pre-construction profiles will safeguard long-term agricultural function.

Geoheritage (UNESCO Geopark)

The northern part runs within 250 m of the GeoMôn UNESCO Global Geopark. Although direct interaction can be avoided, works nearby should respect key geological exposures and research sites; early liaison with the Geopark body and low-impact access strategies will ensure its scientific and educational value is preserved.

Contaminated Land / Historic Landfill

The route intersects the Coed Bolyn Mawr Farm historic landfill. Ground gas, leachate and contaminated soils present design and health and safety risks, as well as potential for cable corrosion. Avoidance is preferable; where not feasible, intrusive site investigation and gas/leachate risk assessment, protective ducting or liners, and permit-compliant construction (CEMP/RAMS) will reduce risks to acceptable levels.

Hydrology and Flood Risk

Two main rivers, Cadnant (Caernarfon) and Cefn Llan, and numerous smaller surface-water features lie along the Cable Corridor Section. Works within 8 m of a main river would require a Flood Risk Activity Permit from NRW. Given the presence of numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required. Preference should be given to trenchless crossings (e.g., HDD) where practicable; otherwise, scheduling during low flows, silt management (fencing, settlement), cut-off drains and spill response will protect water quality and maintain floodplain function. No tidal flood zones are intersected; riverine and surface-water risks are manageable with these controls.

6.3.9.3 Historic Environment

Registered Landscapes of Outstanding and of Special Interest

The Cable Corridor Section passes through the Dinorwig Registered Landscape of Outstanding Interest, designated for its rich historic record of quarrying and settlement. The buried nature of the cable means landscape effects are confined to the construction phase; with careful siting of compounds and prompt reinstatement, long-term change to the registered landscape's character is not anticipated.

Scheduled Monuments

The corridor section intersects the Cefn Mawr Hut Group, comprising Bronze/Iron Age hut circles. Given this pinch-point constraint, the most realistic solution is to micro-route or, if necessary, pass beneath using trenchless installation methods (e.g. HDD) to avoid direct effects on the monument and any associated subsurface remains. Vibration, drainage change, and ground settlement should also be considered in detailed design.

Listed Buildings

One Grade II asset lies within the Cable Corridor Section, with six further Grade II assets within 250 m. Temporary effects on setting, principally construction traffic, noise, dust and short-term views of plant, can be kept low with screened compounds, good housekeeping and localised route tweaks that maintain buffers to curtilages and key viewpoints.

Historic Landscape Area (non-designated) and Other Archaeology

Beyond designated interests, the wider historic landscape includes non-designated features (e.g. standing stones, burnt mounds, Roman road lines, medieval and post-medieval land-use traces). A proportionate investigation strategy and/or desk-based assessment will be used to guide a need for micro-routing and to adequately inform the planning application and EIA process.

6.3.9.4 Access

Highways and PRoW

The corridor section interfaces with a network of B-roads (including the B4366 and B4547) and numerous local PRoWs around Bethel and Llanddeiniolen. Temporary access points and compounds will be needed; A- and B-road crossings are best delivered by trenchless methods where feasible, with minor road crossings managed by trenching and traffic control. Some short-duration PRoW closures or diversions will be unavoidable during trenching and reinstatement. Early engagement with the MNWTRA, Local Highways Authority and landowners, a CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures (detailing timing of deliveries, banksmen, signage, wheel-wash and road cleanliness) to minimise disruption.

6.3.9.5 Socio-economic Environment

Local Plan Designations and Consents

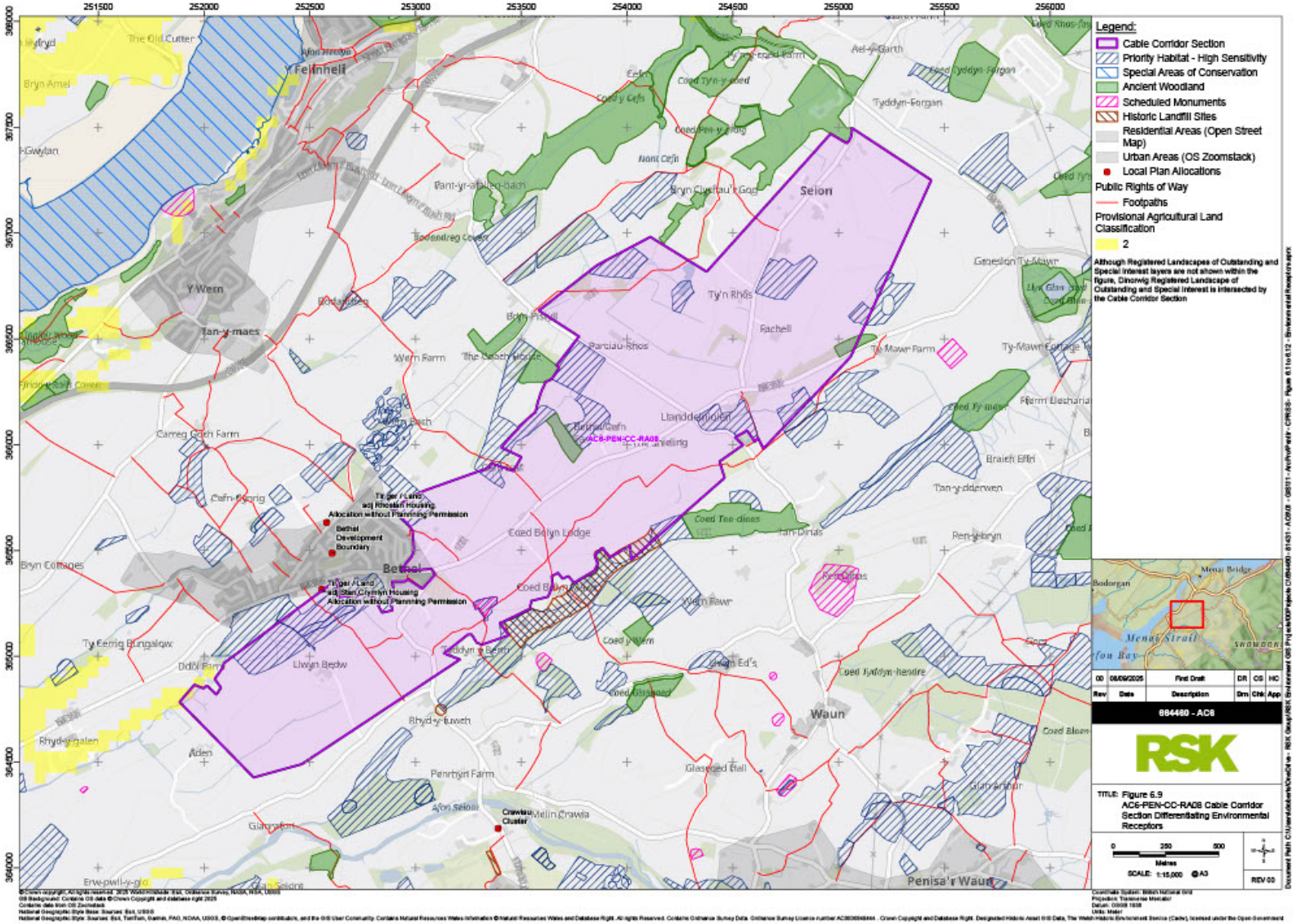
The Cable Corridor Section intersects the urban area of Bethel and the settlement of Llanddeiniolen and interacts with local development plan designations including the Bethel Development Boundary and housing allocations at Tir ger / Land adj. Stad Cremlyn and Tir ger / Land adj. Rhoslan (both without permission). A consented scheme for 30 affordable dwellings (C23/0657/18/LL, Dec 2023) also lies nearby, introducing some potential for cumulative construction-phase disruption. While earlier screening noted an absence of constraints, the presence of these allocations means early Cyngor Gwynedd dialogue is advisable to coordinate routing and programming around planned growth.

Communities, Recreation and Amenity

Multiple individual properties fall within or near the Cable Corridor Section, and at least ten PRoWs would be crossed. Construction will bring short-term amenity effects including traffic, noise, dust, and intermittent access interruptions, to residents and path users, particularly around Bethel. By scheduling the most disruptive works outside peak visitor periods, maintaining PRoW continuity via clear, signed diversions, communicating in advance with local communities and applying best-practice dust/noise controls, disruption can be kept brief and manageable. On that basis, socio-economic effects are expected to be temporary and localised once the route is reinstated.

The Differentiating Environmental Receptors for AC6-PEN-CC-RA08 as described above were mapped using GIS and are presented in **Figure 6.3.8**: AC6-PEN-CC-RA08 Cable Corridor Section Differentiating Environmental Receptors

Figure 6.3.8: AC6-PEN-CC-RA08 Cable Corridor Section Differentiating Environmental Receptors



6.3.10 AC6-PEN-CC-RA09

6.3.10.1 Biological Environment

Special Areas of Conservation (SACs) / Sites of Special Scientific Interest (SSSIs) / Special Protection Areas (SPAs)

AC6-PEN-CC-RA09 Cable Corridor Section is situated between European designated sites however, it avoids direct intersection. Menai Strait and Conwy Bay SAC is located around 2.4 km west, and Eryri SAC about 2.1 km east. The sites are designated for habitats rather than mobile species, and given the separation, no direct habitat loss or deterioration is anticipated. Noise, dust or other disturbance pathways are unlikely with standard construction management in place. To the north, Lavan Sands, Conway Bay SPA lies 6.9 km away and supports oystercatcher, Eurasian curlew, red-breasted merganser, great crested grebe and common redshank. While most of these species are tied to intertidal habitats, curlew may occasionally forage on farmland, and its potential use of fields within the corridor should be confirmed by survey.

Priority Habitats and Woodland (including Ancient Woodland)

The corridor section directly intersects polygons of lowland dry acid grassland (approx. SH 55238 66765, SH 54868 66081, SH 55348 65919) and purple moor grass and rush pastures (approx. SH 55151 66198, SH 54381 64994). Within 250 m of the Cable Corridor Section sit six areas of Ancient Woodland, all of which are sensitive to direct and indirect disturbance. Routing should avoid priority habitat wherever possible; where avoidance is constrained, options include trenchless installation methods (e.g. HDD) beneath sensitive swards, or short-term turf lifting and reinstatement to retain soil and seedbank integrity. Ancient Woodlands should be skirted, with tree-root mapping and buffers to prevent edge damage. Without such measures, biodiversity net loss could occur; with them, long-term recovery to baseline condition is achievable, though some risk remains.

The route crosses several local watercourses hydrologically connected to the Afon Rhythallt / Afon Seiont, which in turn links to Llŷn Padarn SSSI around 3 km upstream. Although direct impacts to the SSSI are not expected, sediment and pollution pathways during construction present a credible risk. Adoption of best-practice pollution controls, timing works for low-flow conditions, and exclusion of compounds from riparian zones will prevent deterioration of water quality and protect downstream habitats.

6.3.10.2 Physical Environment

Landscape and Visual Amenity

The Cable Corridor Section occupies rolling farmland within LANDMAP Visual and Sensory Areas: GWYNDDVS006 Bethel and the Afon Seiont valley (GWYNDDVS015). Views already feature pylons and OHLs, which remain dominant in the landscape. Construction would temporarily alter character through soil stripping, hedgerow gaps, access tracks and plant movement, particularly near scattered farmsteads, minor roads and PRoWs. Sensitivity is heightened where works coincide with the setting of Scheduled Monuments such as Dinas Dinorwic, where visual and experiential qualities could be affected. Careful route selection to low-lying ground, retention of boundary vegetation wherever possible, and sensitive reinstatement will limit effects, leaving only localised and reversible changes once the Cable Corridor Section is restored.

Agricultural Land Classification

The Cable Corridor Section is dominated by Grade 3 land, with smaller areas of Grades 4–5. High-value Grades 1–2 are absent. Routing will inevitably require passage through Grade 3 land; effects can be minimised by stripping, storing and reinstating topsoil/subsoil horizons and limiting trafficking during wet periods. Grade 4–5 land is less sensitive and can generally be accommodated with similar soil management measures. Management practices will comply with the guidelines outlined in NGET's Soil and Drainage Leaflet developed for The Great Grid Upgrade projects (National Grid Electricity Transmission, 2025).

Peatland
Two peatland areas lie within the Cable Corridor Section boundary, with another within 250 m. Peat is highly sensitive to drainage alteration, carbon loss and erosion. While routing avoids direct incursion into nationally designated peat, proximity effects such as drawdown or compaction remain possible. To manage these risks, peat condition surveys, micro-routing to avoid deep deposits, use of low ground-pressure equipment and seasonal timing of works will be essential. Required mitigation measures will be identified and developed through the EIA process.

Contaminated Land / Historic Landfill
The Cable Corridor Section intersects two historic landfill sites: Coed Bolyn Mawr Farm and Maes Arwerthiant Charles Medforth. These present risks of ground gas, leachate, unstable ground and contaminated soils, with associated health and safety concerns. Avoidance through careful routing is preferable; if crossing is unavoidable, intrusive investigations, protective ducting and strict adherence to CEMP and RAMS protocols are all likely to form part of the mitigation options considered at the planning and EIA stage.

Hydrology and Flood Risk
The corridor section crosses the Glan Yr Afon and Afon Seiont, together with numerous smaller watercourses and surface water features. Works within 8 m of a main river will require a Flood Risk Activity Permit from NRW. Flood risk zones associated with these rivers and surface water channels occur along the Cable Corridor Section, though no tidal flood zones are intersected. Given the presence of numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required. Sensitive construction at crossings, robust pollution prevention, and design to maintain floodplain conveyance will be considered at the planning and EIA stage.

6.3.10.3 Historic Environment

Registered Landscapes of Outstanding and of Special Interest
The Cable Corridor Section runs through the Dinorwig Registered Landscape of Outstanding Interest, designated for its long record of human settlement and quarrying. Effects are confined to temporary construction disturbance, with reinstatement expected to prevent long-term changes to the landscape's historic character.

Scheduled Monuments
Five Scheduled Monuments fall within the Cable Corridor Section: Cae Metta Hut Group, Glascoed Ancient Village, Glascoed Round Cairn, Dinas Dinorwic Camp, and the Rectangular Earthwork NW of Coed Ty Mawr. These pre-historic and medieval features are highly sensitive to ground disturbance. While micro-routing offers scope for avoidance, in some cases trenchless methods may be required to bypass assets without disturbing subsurface remains. Detailed archaeological survey and early consultation with heritage authorities will be necessary to define workable solutions.

Listed Buildings
Two Grade II Listed Buildings lie within 250 m of the Cable Corridor Section. Construction activities may introduce short-term noise, dust and traffic that could temporarily diminish their setting, but careful routeing, buffers, and screening of compounds should limit effects.

Historic Landscape Areas and Non-designated Archaeology
The Cable Corridor Section intersects the Nantlle Valley Historic Landscape Area, rich in slate-quarrying archaeology, and is also considered to have high potential for unknown remains including standing stones, burnt mounds, Roman roads and medieval/post-medieval land-use features. Standard archaeological mitigation including desk-based assessment, evaluation trenches and a WSI with watching briefs, will ensure preservation by record where avoidance is not possible.

6.3.10.4 Access

The Cable Corridor Section connects to RA08 and crosses a network of minor roads, the B4366, and several local PRoWs, including routes near Glanrafon Farm, Erw Fforch and Tan Dinas. Access to worksites will rely on these lanes and private tracks, increasing HGV movements and creating potential

congestion. Crossings of the B4366 will require trenchless methods such as HDD, while minor road crossings can be managed with open cut and traffic controls.

6.3.10.5 Socio-economic Environment

Communities and Residential Receptors

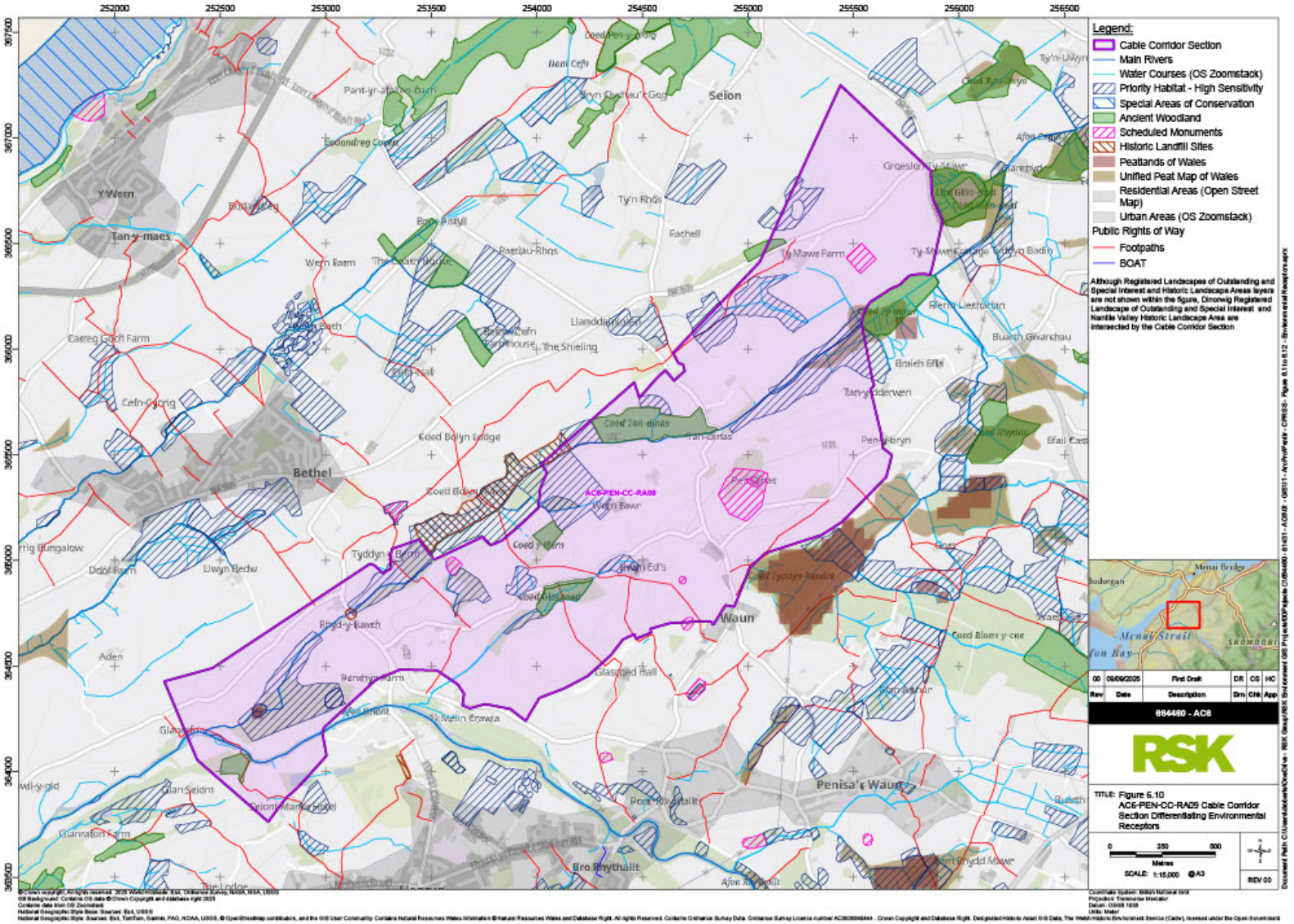
The Cable Corridor Section passes close to Llanddeiniolen and at least eight individual properties. Construction may bring temporary impacts from traffic, noise, vibration, dust and visual disturbance, particularly where works are adjacent to residences.

Recreation and Tourism

The corridor section intersects at least eight PRoWs, all of which will require managed crossings. Temporary closures or diversions could reduce public access and amenity, though these effects are reversible and short-lived. Advance signage and maintained diversions will ensure recreational use is not significantly impaired.

The Differentiating Environmental Receptors for AC6-PEN-CC-RA09 as described above were mapped using GIS and are presented in **Figure 6.3.9**: AC6-PEN-CC-RA09 Cable Corridor Section Differentiating Environmental Receptors

Figure 6.3.9: AC6-PEN-CC-RA09 Cable Corridor Section Differentiating Environmental Receptors



6.3.11 AC6-PEN-CC-RA10

6.3.11.1 Biological Environment

Special Areas of Conservation (SACs) / Sites of Special Scientific Interest (SSSIs)

AC6-PEN-CC-RA10 does not directly intersect or is located within 250 m of any SACs/SSSIs or would be hydrologically linked to any SACs or SSSIs, therefore there are no anticipated direct effects of this Cable Corridor Section on SACs or SSSIs.

The Cable Corridor Section is located approximately 3 km to the west of Eryri SAC (UK0012946) and approximately 3km east of Menai Strait and Conwy Bay SAC (UK0030202). The two SACs are designated for habitats only, and given the distance, no habitat loss within the designated sites will occur. The SACs are also considered to be sufficiently distant such that noise and dust issues are unlikely, assuming good practice construction techniques and standard pollution prevention measures are employed.

Lavan Sands, Conway Bay SPA (UK9013031) is located approximately 6 km to the north and will not be directly impacted by this corridor section. However, the whole of the Menai Strait is considered to be potentially functionally linked habitat. The SPA is designated for the following species; oystercatcher *Haematopus ostralegus*, red-breasted merganser *Mergus serrator*, Eurasian curlew *Numenius arquata*, great crested grebe *Podiceps cristatus* and common redshank *Tringa tetanus*. The majority of these species are waders and/or waterbirds that are unlikely to utilise offsite farmland habitat, with the exception being the Eurasian curlew. Curlew tracking from the Severn shows the species can range for large distances, although predominantly up and down the estuary Survey work is required to confirm the value of the farmland habitat.

Priority Habitats and Ancient Woodland

The route crosses small areas of purpose moor grass, rush pastures and lowland dry acid grasslands.

Six areas of Ancient Woodland like within the Cable Corridor Section, with an additional eight areas located within the 250 m buffer. Temporary disturbances to views, noise, and habitat within or adjacent to the Ancient Woodland may occur during the construction phase, due to vehicles and other construction equipment. Crossing these areas would result in potential habitat loss, loss of vegetation, visual and biodiversity impact and disturbance to species.

6.3.11.2 Physical Environment

Landscape and Visual Amenity

AC6-PEN CC-RA10 Cable Corridor Section does not intersect any National Parks, Coastal Paths, National Trails, AONBs, Biosphere Reserves or Heritage Coasts. It would lie predominately in rolling farmland, within the LANDMAP aspect area of WYNDDVS006 Bethel between Clynnog Fawr and Bangor.

Construction would nonetheless introduce short-term, reversible effects through vegetation removal, compounds and plant movement, with impacts most notable on scattered dwellings, roadside properties, farmsteads, local roads and A-roads, as well as the network of PRoWs.

The corridor section would be passing largely through open farmland, whereby limiting hedgerow loss, using temporary screening where appropriate and phasing reinstatement would help ensure effects are localised and minor once construction is completed.

Hydrology and Flood Risk

The route intersects one main river (Cegin) and numerous smaller watercourses and surface water features. Works within 8 m of any main river will require a Flood Risk Activity Permit from NRW, with flood risk areas associated with the Cegin River. No sea flood-risk areas are present, though surface-water flood risk occurs intermittently along the network. Given the presence of numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required. Sensitive construction techniques such as trenchless installation methods (e.g. HDD) at the principal river crossings, or if not feasible, timing works for low-flow periods, will be needed to avoid sediment release or habitat disturbance. Best-practice pollution

prevention measures (for example silt fencing, settlement lagoons, cut-off drains and spill response protocols) would further reduce the likelihood of water quality deterioration.

Soils and Agricultural Land

The Cable Corridor Section passes through a mix of agricultural land, including large areas of Grade 3 and Grade 5 soils. There are areas of Grade 4 soils within the 250 m of this section. This section of the cable corridor does not intersect any Grade 1 or Grade 2 soils. Where areas of Grade 3 cannot be avoided, soils can be protected through standard measures such as stripping and storing topsoil and subsoil separately, reinstating after construction, and restricting trafficking during wet periods. Management practices will comply with the guidelines outlined in NGET's Soil and Drainage Leaflet developed for The Great Grid Upgrade projects (National Grid Electricity Transmission, 2025). With such soil management practices, adverse long-term effects on agricultural productivity are unlikely.

Peatland

There are five areas of peatland that this section of the Cable Corridor Section intersects, and a further four areas of peatland within 250m of the Cable Corridor Section. Although the corridor section avoids direct intrusion, peatlands are particularly sensitive to drainage changes, erosion and carbon release. Depth and condition surveys would inform micro-routing to avoid deeper peat deposits, while construction in drier periods, use of low-ground-pressure machinery and temporary matting would minimise disturbance.

Contaminated Land and Historic Landfill

There is one historical landfill site, Niwbwrch Farm, which the Cable Corridor Section intersects. This presents potential risks such as contaminated soils, ground gas, leachate and stability issues, as well as hazards to workers and the possibility of cable corrosion. Where practicable, routing would avoid this site. Should avoidance not be feasible, an intrusive investigation and reviews of historic records would be required to establish risks. Protective barriers or cable encasement would mitigate potential effects. Construction methods would need to follow strict permit conditions and be embedded within the CEMP and site-specific RAMS.

6.3.11.3 Historic Environment

Designated Assets

There is one Scheduled Monument, Gors y Brithdir Enclosed Hut Group & Ancient Fields, located within the Cable Corridor Section. It will be avoided through detailed routeing. Potential effects would relate to impacts on setting, which would be mitigated through appropriate buffers.

There are no listed buildings within the Cable Corridor Section or within the 250 m buffer, however there is a cluster of Grade II listed buildings (Ty'n Llwyn Farm) located approximately 250 m of the section, which are also located approximately 500 m east of the existing Pentir substation. There is potential for adverse effects such as noise, vibration and visual impacts on the settings of these buildings, if they are in close proximity to the construction areas.

Archaeology and Historic Landscape

Non-designated remains recorded/potential include prehistoric standing stones, burnt mounds, a Roman road, medieval settlement, post-medieval land-management and railway features, and sites of post-medieval/modern buildings. The route also intersects the Nantlle Valley HLA, though setting effects are limited for a buried cable.

The Cable Corridor Section intersects the Dinorwig Registered Landscape of Outstanding and of Special Interest and is recognised for its outstanding industrial and cultural heritage.

A pre-determination non-intrusive and intrusive archaeological surveys (geophysical survey and targeted trenching) could potentially be required to inform micro-routeing. Consultation with the Gwynedd Archaeological Planning Service will also be required to ensure that appropriate measures are identified and agreed. In addition, a WSI may need to be prepared prior to construction, and works will be conducted under watching briefs and managed through a CEMP (i.e., dust, noise, vibration, screening and access controls).

6.3.11.4 Access

Highways

This section will connect the cable routes AC6-PEN-CC-RA08 and AC6-PEN-CC-RA09 to the Pentir Substation. Access to this area and the existing substation will be from the B4547. Upgrades to the B4547 may be required to accommodate larger vehicles, but this is subject to detailed assessment. The crossing of the B4547 will be constructed via trenchless techniques. Construction is expected to cause temporary lane closures, diversions, and increased HGV traffic, leading to short-term congestion and disruption for road users, which will be managed through a potential CTMP. A CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures (detailing timing of deliveries, banksmen, signage, wheel-wash and road cleanliness) to minimise disruption.

PRoWs

There are four PRoWs in this Cable Corridor Section, but crossing of these can be avoided. However, there may need to be temporary closures/diversions of PRoWs for the construction of temporary access roads. Temporary diversions and signage will maintain connectivity, though recreational users may experience short-term disruption. Early engagement with Cyngor Gwynedd, the Local Highway Authority, landowners and route managers, alongside a CTMP, will help to coordinate works and minimise inconvenience.

6.3.11.5 Socio-Economic Environment

Planning Policy and Land Allocations

There are no local development plan allocations in proximity to the Cable Corridor Section. However, it is recommended that early engagement with Cyngor Gwynedd is undertaken to understand any potential conflicts and routing preferences.

Residential Receptors and Settlements

There are a number of individual residential properties in the vicinity of this Cable Corridor Section. Construction works may temporarily affect residents through noise, dust, visual disturbance, vibration and increased traffic movements.

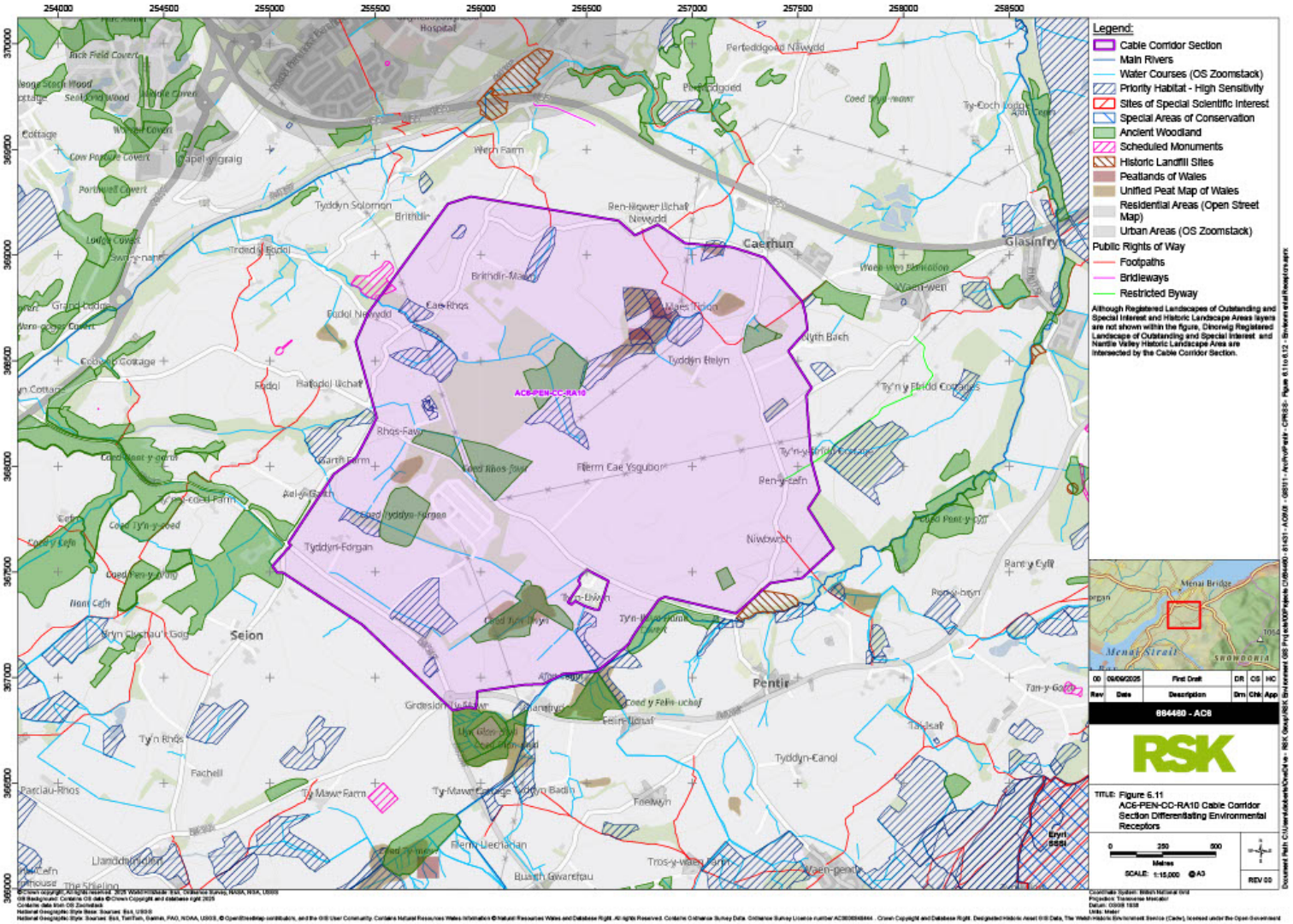
Recreation and Tourism

There are four PRoWs in this Cable Corridor Section but crossing of these can be avoided. However, there may need to be temporary closures/diversions of PRoWs for the construction of temporary access roads, which could reduce amenity for walkers, cyclists and other users. Tourism and visitor activity could be affected during peak seasons if access and amenity are disrupted.

Mitigation measures will include maintaining PRoW via temporary diversions, provision of clear signage and advance public communication, and implementation of best practice construction methods to control dust, noise and traffic impacts. Seasonal programming will be considered to avoid disruption during peak tourism periods.

The Differentiating Environmental Receptors for AC6-PEN-CC-RA10 as described above were mapped using GIS and are presented in **Figure 6.3.10:** AC6-PEN-CC-RA10 Cable Corridor Section Differentiating Environmental Receptors

Figure 6.3.10: AC6-PEN-CC-RA10 Cable Corridor Section Differentiating Environmental Receptors



6.3.12 AC6-PEN-CC-RA11

6.3.12.1 Biological Environment

European and National Nature Conservation Sites (SAC/SSSI/LNR)

The Glynllifon SAC and SSSI, designated for their large population of lesser horseshoe bat (*Rhinolophus hipposideros*), lie within 800 m of the Cable Corridor Section boundary. This site is nationally important, supporting both maternity and hibernation roosts and representing around 6% of the UK population. While the A499 separates the Cable Corridor Section from the SAC/SSSI, woodland strips, hedgerows and watercourses provide functional connectivity to suitable foraging habitat within the corridor. The section also crosses this SAC/SSSI at the Afon Llyfni, near Pontllyfni, introducing the potential for direct effects if not avoided. Even if routed south of the designation, the river crossing is likely to remain functionally linked to bat populations.

To the north, the Y Foryd SAC/SSSI/LNR lies around 4.7 km away, designated for its intertidal habitats and overwintering waterbirds, particularly wigeon. While direct impacts are not expected, the potential for indirect disturbance exists, especially for wintering and passage birds that may forage inland. Survey evidence will be required to confirm the use of habitats within the Cable Corridor Section by these species.

Priority Habitats and Woodland (including Ancient Woodland)

The Cable Corridor Section crosses areas of purple moor grass and rush pasture, a sensitive priority habitat vulnerable to compaction, drainage alteration and permanent loss. Although no Ancient Woodland is intersected directly, one area lies within 250 m of the section, where edge effects such as shading, noise, dust and root disturbance could arise. Route refinement to avoid priority habitats will be critical, but where unavoidable, trenchless techniques such as HDD, or short-term turf lifting and reinstatement, may reduce permanent losses.

The Afon Llyfni crossing presents the greatest ecological risk, as it connects directly to roost units within the SAC, including Melin y Cim and Pen y Bont, both known maternity roosts. Even with trenchless methods, the potential for noise and vibration impacts on roost integrity is uncertain, particularly as some roosts are already in unfavourable condition. Construction activity, lighting and traffic also risk disturbing bat foraging and commuting corridors within 1-2 km of roosts. Operational effects, including vibration and heat, require further assessment to confirm no long-term reduction in roost use.

6.3.12.2 Physical Environment

Landscape and Visual Amenity

The route runs through low-lying farmland between the coast and inland rolling ground, within LANDMAP Visual and Sensory Area GWYNDDVS034 Morfa Dinlle. Views are open towards the coast, with the A499 road infrastructure remaining the key detractor. Construction will be most visible near the landfall (LF2AB) at Maes Mawr, where compounds, plant and bare ground could be seen from local PRoWs and the Wales Coast Path. Further inland, effects will be localised and short-term, limited to farmsteads, scattered dwellings and minor lanes. Once reinstated, the landscape can largely recover, although hedgerow gaps and the inability to replant woodland along the easement will leave some subtle, long-term changes.

Agricultural Land Classification

The Cable Corridor Section crosses Grade 2 land, alongside extensive Grade 3a/3b farmland. Given the quality of the soils, there is potential for scrutiny during planning. Where avoidance is not possible, topsoil and subsoil should be stripped, stored and reinstated, with trafficking avoided in wet conditions. With these practices, long-term agricultural potential can be preserved, though temporary productivity losses are inevitable during construction.

Peatland

A cluster of peatland intersects the section, with further deposits nearby. While the Cable Corridor Section avoids designated peatland sites, works in proximity may disturb hydrology and carbon storage

functions. Detailed peat depth and condition surveys, combined with micro-routing, low ground-pressure equipment and dry-season working, will reduce risks of drainage alteration or erosion.

Hydrology and Flood Risk
The Cable Corridor Section crosses both the Afon Llifon and Afon Llyfni, alongside numerous surface watercourses. Works within 8 m of a main river will require a Flood Risk Activity Permit from NRW. Flood Zone 2/3 areas are also present along the rivers and coastal edge, extending inland. Given the presence of numerous smaller streams, ditches, and minor rivers along the route, Ordinary Watercourse Consent from the Local Planning Authority will also be required. Trenchless installation methods (e.g. HDD) at main rivers, combined with robust pollution controls and retention of floodplain conveyance, will be necessary to prevent downstream water quality impacts or increased flood risk.

6.3.12.3 Historic Environment

Listed Buildings and Scheduled Monuments
The Cable Corridor Section intersects Pont y Cim, a narrow 17th-century stone bridge, which is both a Scheduled Monument and a Grade II Listed Building. Four further Grade II Listed Buildings lie within 250 m. Construction risks affecting setting through noise, dust and traffic disturbance, though direct land-take can be avoided. Buffers, sensitive siting of compounds and proportionate working practices will prevent long-term harm.

Historic Landscape Areas and Non-designated Archaeology
The Cable Corridor Section crosses the Llyfni river valley, Lleuar, and Dinas Dinlle–Aberdesach Historic Landscape Areas, recognised for prehistoric and post-medieval agricultural heritage. There is also high potential for unknown archaeological remains, including settlement and agricultural features. Given the buried nature of the cable, direct impacts will be limited to trenching, with setting effects not relevant. Appropriate mitigation measures will be identified through the planning and EIA process.

6.3.12.4 Access

The Cable Corridor Section runs parallel to the A499, crossing the road, the Wales Coast Path, and several PRoWs near Pontllyfni. Local access tracks and minor roads will also need to be used, though many are unsuitable for HGVs without upgrading. Temporary access points from the A499 could provide safer entry if agreed with the Highway Authority, MNWTRA. Construction will bring short-term increases in HGV traffic, temporary lane closures, and intermittent disruption to PRoW users. Where the Wales Coastal Path and PRoWs are crossed, diversions or trenchless methods will be required to maintain access.

6.3.12.5 Socio-economic Environment

Planning Policy and Development
The Cable Corridor Section passes through the Pontllyfni Cluster local development plan allocation, though no major planning applications are currently identified nearby. Early consultation with Cyngor Gwynedd will be required to confirm acceptability of the corridor section and to minimise planning conflict.

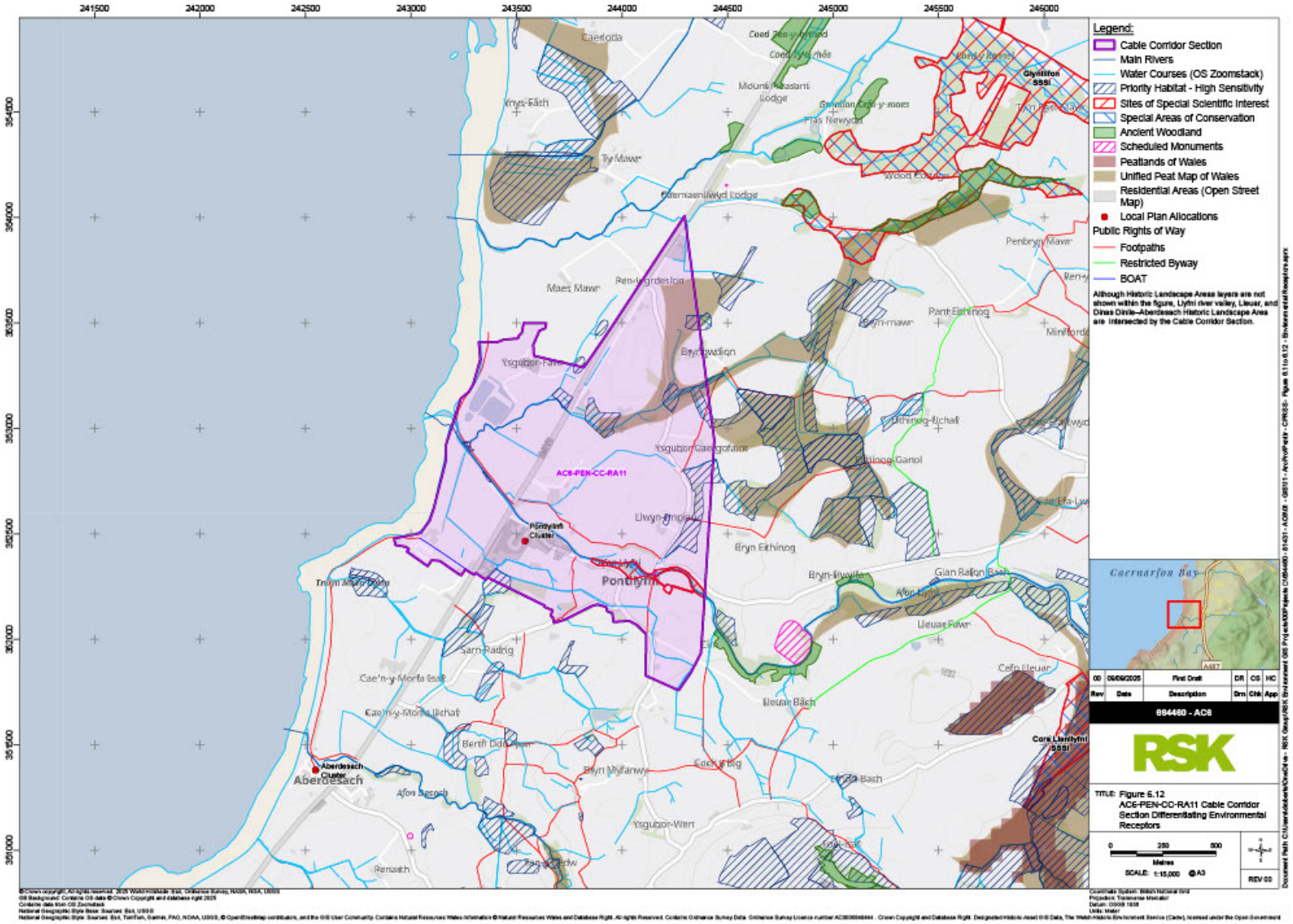
Communities and Residential Receptors
The corridor section passes close to Pontllyfni and at least twelve residential properties within 250 m. Residents are likely to experience temporary noise, vibration, dust and traffic disturbance during construction. Advance communication, screening where practicable, and careful scheduling to avoid prolonged disruption will be important in reducing these impacts.

Recreation and Tourism
The section intersects the Wales Coast Path and around five PRoWs, requiring temporary diversions or closures. Recreational users, particularly tourists in the Pontllyfni area, could face short-term loss of access and amenity. Nearby tourist facilities, including Cae Clyd Campsite & Touring Park, Llŷn Y Gele Caravan Park and West Point Beach Resort, may also be indirectly affected by construction traffic and

reduced visitor activity. Seasonal programming of works, particularly avoiding peak summer months, will help reduce impacts.

The Differentiating Environmental Receptors for AC6-PEN-CC-RA11 as described above were mapped using GIS and are presented in **Figure 6.3.11:** AC6-PEN-CC-RA11 Cable Corridor Section Differentiating Environmental Receptors

Figure 6.3.11: AC6-PEN-CC-RA11 Cable Corridor Section Differentiating Environmental Receptors



6.4 Engineering Factors

6.4.1 Cable Corridor Route Sections

6.4.1.1 AC6-PEN-CC-RA01

AC6-PEN-CC-RA01 intersects three areas of ancient woodland, clusters of Peatland and five main rivers (Llifon, Caerloda, Bodfan, Foryd, and Carrog). This Corridor Route Section encounters a pinch-point between Llandwrog Conservation Area, adjacent greenspace, and Glynllifon SSSI/SAC. The topography of the corridor is generally low-lying with moderate to steep gradients, shallow groundwater and a subsurface comprising of diamicton, glaciofluvial soils, storm deposits, and loose sand, with high gravel and boulder content.

The principal engineering constraints stem from the crossing of multiple rivers and shallow water table areas, which may impose seasonal restrictions on construction and may potentially affect the integrity of the cable route. Moderate slope gradients may pose challenges for cable installation and thermal performance.

Installation may require multiple trenchless crossings of Dedicated Forests, Ancient Woodland and small linear features and river systems. This is considered technically feasible, although detailed topographic surveys, site-specific ground investigations and seasonal groundwater monitoring would be required to better understand topographical and subsurface condition.

6.4.1.2 AC6-PEN-CC-RA02

The AC6-PEN-CC-RA02 intersects one main river (Afon Desach) and one main road (A499). The topography of the corridor is generally low-lying with moderate to steep gradients, shallow groundwater and a subsurface comprising of diamicton, glaciofluvial soils, storm deposits, and loose sand, with high gravel and boulder content.

The principal engineering constraints stem from the intersection of the A499 and shallow water tables, which may impose seasonal restrictions on construction and may potentially affect the integrity of the cable route. Moderate slope gradients may pose challenges for cable installation and thermal performance, potentially requiring more extensive earthworks in the construction of the cable trench.

A trenchless crossing is likely to be required for the A499, while both trenched and trenchless methods will be necessary for minor utilities and waterway crossings. This is considered technically feasible, although detailed topographic surveys, site-specific ground investigations and seasonal groundwater monitoring would be required to better understand topographical and subsurface condition.

6.4.1.3 AC6-PEN-CC-RA03

The AC6-PEN-CC-RA03 Section crosses intersects one main river (Afon Desach), minor roads, minor watercourses, residential overhead lines, and underground utilities. The topography of the corridor is low to high, with steeper gradients influenced by the nearby Gyrn Goch and Bwlch Mawr hill. The subsurface includes a mix of diamicton and glaciofluvial soils, primarily composed of sand and gravel. A high content of gravel and boulders is anticipated, which may impact trenchless construction methods. Peat is expected in topographic depressions and flood-prone areas.

The principal engineering constraints stem from the intersection of the Afon Desach and the proximity to Gyrn Goch and Bwlch Mawr, which may present topographic and geological challenges. Moderate to steep slope gradients near rivers and adjacent mountainous terrain may challenge installation and cable thermal performance, potentially requiring significant earthworks.

A trenchless crossing is likely to be required for the Afon Desach while both trenched and trenchless methods will be necessary for minor utilities and waterway crossings. This is considered technically feasible, although detailed topographic surveys, site-specific ground investigations and seasonal groundwater monitoring would be required to better understand topographical and subsurface condition and support micro-routing.

6.4.1.4 AC6-PEN-CC-RA04

AC6-PEN-CC-RA04 intersects three Main rivers (Afon Llyfni, Afon Carrog and Afon Dolydd), one main road (A487), one National Cycle Network route as well as minor roads, minor watercourses, residential overhead lines, and underground utilities. The topography of the corridor is low to high with steeper gradients influenced by the nearby Eryri hills. The subsurface includes a mix of diamicton and glaciofluvial soils, primarily composed of sand and gravel. Tuff, Sandstone and conglomerate bedrock is expected, with depths varying between <1 - >5m below ground. A high content of gravel and boulders is anticipated, which may impact trenchless construction methods. Peat is also expected in flood prone areas particularly around the Afon Llyfni.

The principal engineering constraints stem from the intersection of the A487 and Main Rivers which may present topographic challenges. The presence of an active quarry west of Penygroes creates a slight pinch-point which will require further investigation, particularly with regards to potential quarry expansion and land rights. Moderate to steep slope gradients near rivers and adjacent mountainous terrain may challenge installation and cable thermal performance, potentially requiring significant earthworks.

A trenchless crossing is likely to be required for the Main Rivers and A487 while both trenched and trenchless methods will be necessary for minor utilities and waterway crossings. This is considered technically feasible but challenging due to the distribution of constraints and the topographic relief, although detailed topographic surveys and site-specific ground investigations would be required to better understand topographical and subsurface condition.

6.4.1.5 AC6-PEN-CC-RA05

AC6-PEN-CC-RA05 intersects six Main rivers (Rhyd, Tyddyn Bychan, Plas, Gwyrfai, Rhosdican and Seiont), one main road (A487), one National Cycle Network route as well as minor roads, minor watercourses, residential overhead lines, and underground utilities. The topography of the corridor is low to high with steeper gradients influenced by fluvial and potentially glacial features. The subsurface includes a mix of diamicton and glaciofluvial soils, primarily composed of sand and gravel. Mudstone, Sandstone and Siltstone bedrock is expected. A high content of gravel and boulders is anticipated, which may impact trenchless construction methods. Peat is expected in flood prone areas, while standing water identified within the cable corridor may pose flooding and seasonal access challenges.

The principal engineering constraints stem from the intersection of the A487 and Main rivers which may present topographic challenges. The geology surrounding identified rivers is expected to be variable and compressible, with a shallow water table, potentially leading to seasonal construction restrictions, instability, and settlement risks. Moderate to steep slope gradients near rivers and adjacent mountainous terrain may challenge installation and cable thermal performance, potentially requiring significant earthworks.

A trenchless crossing is likely to be required for the Main Rivers and A487 while both trenched and trenchless methods will be necessary for minor utilities and waterway crossings. This is considered technically feasible, although detailed topographic surveys and site-specific ground investigations would be required to better understand topographical and subsurface condition and support micro-routing. Opportunities for co-location with existing structures associated with the construction of the Bontnewydd Bypass have been identified and will be investigated to reduce the risk associated with crossing the road asset and the Afon Gwyrfai a Llŷn Cwellyn SSSI. Dewatering measures, temporary works design, and stability analysis will be necessary to mitigate risks associated with excavation instability.

6.4.1.6 AC6-PEN-CC-RA06

AC6-PEN-CC-RA05 intersects five Main Rivers (Llifon, Caerloda, Bodfan, Foryd, and Carrog.), one Main Road (A499) as well as minor roads, minor watercourses, residential overhead lines, and underground utilities. The topography of the corridor is low to high with steeper gradients influenced by fluvial and potentially glacial features. The subsurface includes a mix of diamicton and glaciofluvial soils, primarily composed of sand and gravel. A high content of gravel and boulders is anticipated, which may impact trenchless construction methods.

The principal engineering constraints stem from the intersection of the A499 and Main Rivers which may present topographic challenges. Moderate to steep slope gradients near rivers and adjacent mountainous terrain may challenge installation and cable thermal performance, potentially requiring significant earthworks.

A trenchless crossing is likely to be required for the Main Rivers and A499 while both trenched and trenchless methods will be necessary for minor utilities and waterway crossings. This is considered technically feasible, although detailed topographic surveys and site-specific ground investigations would be required to better understand topographical and subsurface condition and support micro-routing. Dewatering measures at Afon Carrog may be required alongside temporary works design, while stability analysis will be necessary to mitigate risks associated with excavation instability.

6.4.1.7 AC6-PEN-CC-RA07

AC6-PEN-CC-RA07 intersects three Main Rivers (Afon Rhyd, Afon Gwyrfai and Afon Seiont), Afon Gwyrfai a Llŷn Cwellyn SSSI and Ancient Woodland as well as a golf course, mobile residential area, minor roads, minor watercourses, residential overhead lines, and underground utilities. The route crosses near Plas Gwyn Caravan & Camping Park and its associated Historic Landfill site. The topography of the corridor is low to high with steeper gradients influenced by Gwyrfai a Llŷn Cwellyn fluvial system and proximity to local topography. The subsurface includes a mix of diamicton and glaciofluvial soils, primarily composed of sand and gravel. Shallow bedrock of sandstone, mudstone, siltstone and conglomerate is expected. A high content of gravel and boulders is anticipated, which may impact trenchless construction methods.

The principal engineering constraints stem from the intersection of the Afon Gwyrfai and Afon Gwyrfai a Llŷn Cwellyn SSSI. The geology surrounding identified rivers is expected to be variable and compressible, with a shallow water table, potentially leading to seasonal construction restrictions, instability, and settlement risks. Moderate to steep slope gradients near rivers and adjacent mountainous terrain may challenge installation and cable thermal performance, potentially requiring significant earthworks. Several pinch-points exist between residential and camping areas, the most significant being Plas Gwyn Caravan & Camping Park which will require careful routing.

A trenchless crossing is required for the Afon Gwyrfai and is likely to be difficult to deliver technically, with greater set-back distances required due to the greater lateral and vertical extent of the SSSI intersected by the corridor. while both trenched and trenchless methods will be necessary for minor utilities and waterway crossings. crossing of these minor utilities and waterways are expected to be technical feasible, although detailed topographic surveys and site-specific ground investigations would be required to better understand topographical and subsurface condition and support micro-routing.

6.4.1.8 AC6-PEN-CC-RA08

AC6-PEN-CC-RA08 intersects minor watercourses, one B Road (B4366), residential overhead lines, and underground utilities. The topography of the corridor is low to high with steeper gradients influenced by fluvial and potentially glacial features. The subsurface includes a mix of diamicton and glaciofluvial soils, primarily composed of sand and gravel. A high content of gravel and boulders is anticipated, which may impact trenchless construction methods. Shallow bedrock is expected comprising of tuff, sandstone, conglomerate and siltstone.

The principal engineering constraints stem from the intersection of the B4366 and minor utilities. Moderate to steep slope gradients near rivers and adjacent mountainous terrain may challenge installation and cable thermal performance, potentially requiring significant earthworks.

A trenchless crossing is likely to be required for the B4366 while both trenched and trenchless methods will be necessary for minor utilities and waterway crossings. This is considered technically feasible, although detailed topographic surveys and site-specific ground investigations would be required to better understand topographical and subsurface condition and support micro-routing.

6.4.1.9 AC6-PEN-CC-RA09

AC6-PEN-CC-RA09 intersects two Main rivers (Glan Yr Afon and Seiont) one B Road (B4366) as well as minor watercourses, residential overhead lines, and underground utilities. The topography of the corridor is low to high with steeper gradients influenced by the Dinas Dinorwic Camp and Glan yr Afon

fluvial system. The subsurface includes a mix of diamicton and glaciofluvial soils, primarily composed of sand and gravel. A high content of gravel and boulders is anticipated, which may impact trenchless construction methods. Shallow bedrock is expected comprising of tuff, sandstone, conglomerate and siltstone.

The principal engineering constraints stem from the intersection of the Main Rivers which may present topographic challenges. Moderate to steep slope gradients near rivers and adjacent mountainous terrain may challenge installation and cable thermal performance, potentially requiring significant earthworks. Moderate technical risks are anticipated, primarily due to the Dinas Dinorwic Camp Scheduled Monument, which may present topographic and geological challenges.

Both trenched and trenchless methods will be necessary for Glan yr Afon, minor utilities and waterway crossings. This is considered technically feasible, although detailed topographic surveys and site-specific ground investigations would be required to better understand topographical and subsurface condition and support micro-routing.

6.4.1.10 AC6-PEN-CC-RA10

AC6-PEN-CC-RA10 intersects minor watercourses, one B Road (B4547), residential overhead lines, and underground utilities terminating at the existing Pentir substation. The topography of the corridor is low while the subsurface includes a mix of diamicton and glaciofluvial soils, primarily composed of sand and gravel. A high content of gravel and boulders is anticipated, which may impact trenchless construction methods. Peat is expected in topographic depressions and flood-prone areas.

The principal engineering constraints stem from the intersection of the B4547 and minor utilities. Moderate to steep slope gradients near rivers and adjacent mountainous terrain may challenge installation and cable thermal performance, potentially requiring significant earthworks.

Both trenched and trenchless methods will be necessary for crossing the B4547 and minor utilities. This is considered technically feasible, although detailed topographic surveys and site-specific ground investigations would be required to better understand topographical and subsurface condition and support micro-routing.

6.4.1.11 AC6-PEN-CC-RA11

AC6-PEN-CC-RA11 intersects crosses a low-lying floodplain of Afon Llyfni and requires a crossing of the A499, along with other minor watercourses. The site is constrained by river and coastal flood risk areas on the shoreline. Peat is expected in flood prone areas, while standing water identified within the cable corridor may pose flooding and seasonal access challenges. The subsurface includes a mix of diamicton and glaciofluvial soils, primarily composed of sand and gravel. A high content of gravel and boulders is anticipated, which may impact trenchless construction methods.

A trenchless crossing is likely to be required for Afon Llyfni and A499 while both trenched and trenchless methods will be necessary for minor utilities and waterway crossings. This is considered technically feasible, although detailed topographic surveys and site-specific ground investigations would be required to better understand topographical and subsurface condition.

6.5 Cable Corridor Combinations

Building on the appraisal of individual Cable Corridor Sections (AC6-PEN-CC-RA01 to AC6-PEN-CC-RA11) set out in **Common Environmental** Receptors for Cable Corridor Sections and **6.3**, this section considers the environmental receptors at the scale of the Cable Corridor Combinations.

Cable Corridor Combinations, as defined in **Step 7**: Create Cable Corridor Combinations and outlined in

Table 6.1.1, represent integrated sequences of Cable Corridor Sections connecting Landfall Siting Zones to Converter Station Siting Zones. For methodology and naming conventions, refer to Section 4.9.262.

Common Environmental Receptors for Cable Corridor Combinations identifies the receptors that are common to all combinations and therefore unavoidable, while **Differentiating Environmental** Receptors for Cable Corridor Combinations identifies differentiating receptors that vary between

combinations and provide the basis for comparing environmental constraints, sensitivities, and relative implications of each.

6.5.1 Common Environmental Receptors for Cable Corridor Combinations

This section presents the environmental receptors and designations that are consistently present within all six Cable Corridor Combinations, as outlined in

Table 6.1.1. These receptors are common because they occur across every combination, either directly intersecting or located within 250 m of the Cable Corridor Combination boundary.

While these receptors form an important part of the baseline environment and may influence design or mitigation measures, they do not provide a basis for distinguishing between options, as they are unavoidable across all routes.

6.5.1.1 Biological Environment

- Afon Gwyrfai SAC / SSSI – Designated for aquatic and riparian habitats and qualifying species. Potential effects for intersecting or coming into close proximity to this receptor is temporary pollution risk from watercourse crossings, increased suspended sediments, and construction dust/vehicle emissions. Potential mitigation measures for intersecting or coming into close proximity to this receptor is avoid in-channel works where practicable; employ trenchless techniques for main crossings; implement CEMP controls (silt fencing, settlement, cut-off drains, spill response), utilisation of low-emission plant and dust/haul-route measures; programme works for low-flow periods.
- Phosphorus Sensitive SAC Freshwater Catchments – Sensitive to nutrient inputs and fine sediments. Potential effects for intersecting or coming into close proximity to this receptor is nutrient loading from runoff and soil disturbance. Potential mitigation measures for intersecting or coming into close proximity to this receptor is strict pollution prevention, controlled refuelling, buffer zones to drains/watercourses, interception features (bunds, swales) and rapid reinstatement of disturbed soils.
- Priority Habitats (Purple Moor Grass and Rush Pastures, Lowland Dry Acid Grassland) – High ecological value, often hydrologically sensitive. Potential effects for intersecting or coming into close proximity to this receptor is direct habitat loss/fragmentation, compaction and hydrological change. Potential mitigation measures for intersecting or coming into close proximity to this receptor is micro-routeing to avoid/limit encroachment; trenchless methods beneath sensitive areas; turf lifting, storage and rapid reinstatement; soil handling in dry conditions; aftercare to achieve post-construction condition targets and secure Biodiversity Net Benefit.
- Ancient Woodlands – Irreplaceable habitat with high biodiversity, structural complexity, and cultural value. Potential effects for intersecting or coming into close proximity to this receptor is permanent habitat loss, root zone disturbance, fragmentation, edge effects, and introduction of invasive species. Potential mitigation measures for intersecting or coming into close proximity to this receptor is avoidance through careful routeing and buffer zones; no open cut trenching, soil stripping or storage within root protection areas; use of trenchless methods (e.g., HDD) where crossings are unavoidable; implementation of exclusion fencing and biosecurity measures; post-construction monitoring and enhancement planting adjacent to retained woodland.

6.5.1.2 Physical Environment

- Peatland – Carbon-rich, hydrologically sensitive soils. Potential effects for intersecting or coming into close proximity to this receptor is drainage alteration, carbon release, instability/erosion under plant loading. Potential mitigation measures for intersecting or coming into close proximity to this receptor is peat depth/condition and hydrological mapping; avoid deep/active peat; low-ground-pressure plant and temporary mats/floating track; dry-weather working; reinstatement and drainage reinstatement to pre-works condition.
- Wales Coast Path and PRoWs – Strategic recreational assets. Potential effects for intersecting or coming into close proximity to this receptor is temporary closures/diversions, visual disturbance and

access interruption during trenching or trenchless compounds. Potential mitigation measures for intersecting or coming into close proximity to this receptor is temporary diversions with clear signage, short work windows, phased reinstatement and advance public communications within a CTMP.

- Railway (historic Caernarvonshire branch to Afon Wen / Cambrian Coast Line connection) – Linear transport heritage constraint where intersected. Potential effects for intersecting or coming into close proximity to this receptor is crossing complexity, third-party approvals. Potential mitigation measures for intersecting or coming into close proximity to this receptor is trenchless crossing design, asset protection agreements and method statements agreed with the asset owner.

6.5.1.3 Historic Environment

- Dinorwig Registered Landscape of Outstanding Interest – Nationally important historic landscape fabric and setting. Potential effects for intersecting or coming into close proximity to this receptor is temporary construction visibility and ground disturbance affecting archaeological potential. Potential mitigation measures for intersecting or coming into close proximity to this receptor is micro-routeing to retain historic field pattern/boundaries; proportionate setting assessment; WSI, evaluation and archaeological watching brief; temporary screening of compounds; full reinstatement of field boundaries post-installation.

6.5.1.4 Access

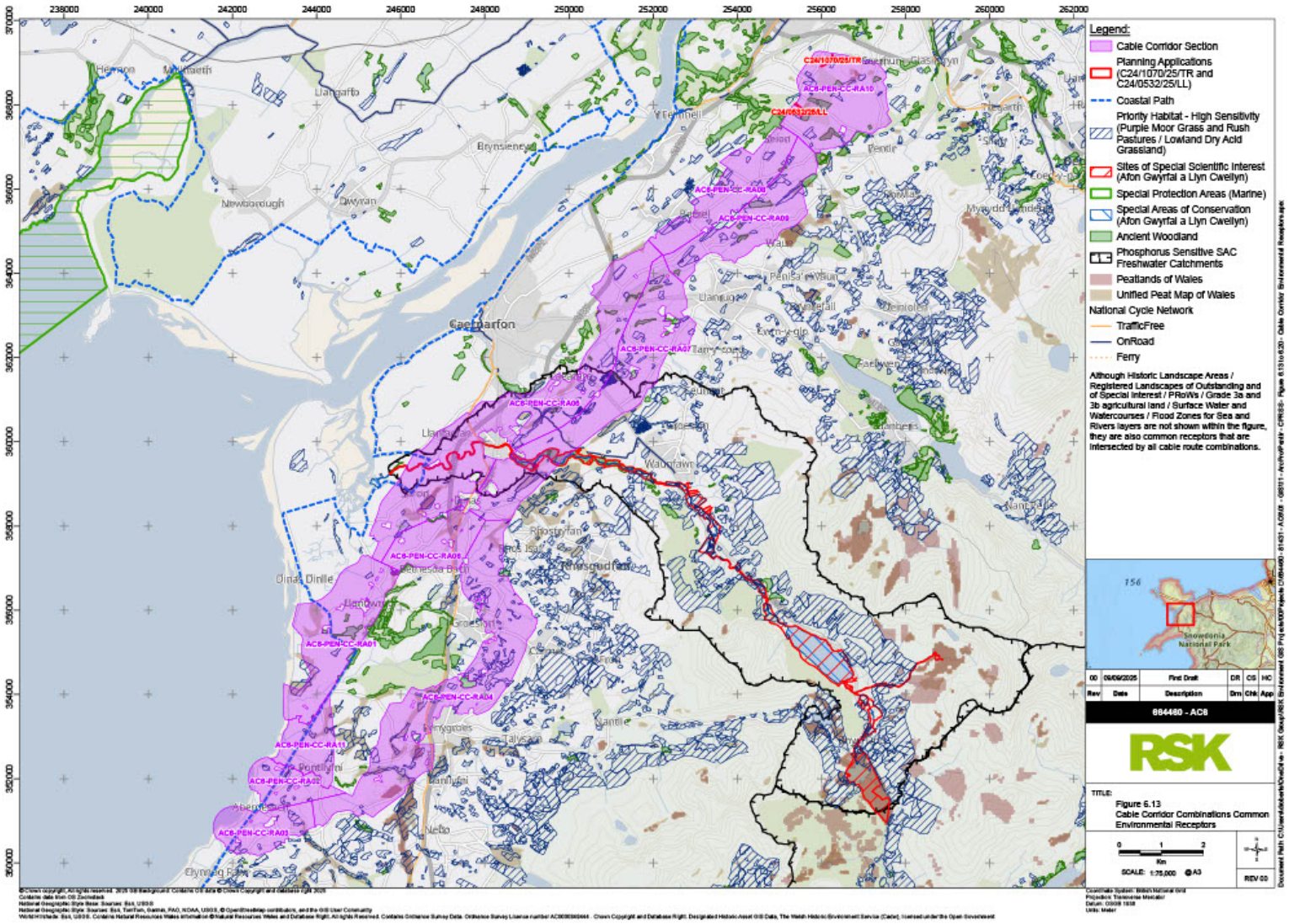
- Strategic and Local Road Network (A499, A487, A4085, A4086, B4547, B4366) – Principal construction access corridors with multiple minor road interfaces. Potential effects for intersecting or coming into close proximity to this receptor is HGV movements, temporary lane closures and local congestion. Potential mitigation measures for intersecting or coming into close proximity to this receptor will mean a CTMP may be required, which would, as necessary, outline mitigations with haul-route selection, junction upgrades where required, timed deliveries, banksmen, and stakeholder coordination with the MNWTRA, Local Highway Authority and landowners; maintain clean access and prompt reinstatement.

6.5.1.5 Socio-Economic Environment

- Two major planning applications in the wider area (C24/1070/25/TR and C24/0532/25/LL) – Potential effects for intersecting or coming into close proximity to this receptor is cumulative construction traffic/amenity effects if programmes overlap. Potential mitigation measures for intersecting or coming into close proximity to this receptor is programme coordination with Cyngor Gwynedd, consolidated traffic management, and communication strategies to minimise combined disturbance.
- National Cycle Network – Potential effects for intersecting or coming into close proximity to this receptor is short-term diversions and user delay at crossings. Potential mitigation measures for intersecting or coming into close proximity to this receptor is safe, signed temporary routes, short crossing durations and reinstatement to pre-works standard.

The Common Environmental Receptors within all six Cable Corridor Combinations as described above were mapped using GIS and are presented in **Figure 6.5.1**: Cable Corridor Combinations Common Environmental Receptors

Figure 6.5.1: Cable Corridor Combinations Common Environmental Receptors



6.5.2 Differentiating Environmental Receptors for Cable Corridor Combinations

This section presents the environmental receptors that distinguish between the different Cable Corridor Combinations under consideration. Unlike the receptors common to all corridor combinations (see **Common Environmental** Receptors for Cable Corridor Combinations), the receptors presented here are specific to individual corridor combinations or are present in varying degrees of sensitivity, scale, or proximity. These differentiating receptors are therefore of particular importance, as they provide the basis for assessing the relative environmental implications of each option.

The information is presented by Cable Corridor Combination and grouped under the key environmental topics: biological, physical, historic, access, and socio-economic, with additional differentiating considerations included where relevant. This structure provides a consistent basis for comparing options and highlights where particular constraints or sensitivities are more significant in one corridor combination than another. Where environmental topics are not listed, this is because no Differentiating Environmental Receptors associated with those topics are located within the combination boundary.

This section does not describe mitigation measures or detailed receptor characteristics, as these are already addressed in **OPTIONS APPRAISAL** – CABLE CORRIDOR SECTIONS AND COMBINATIONS (which set out both common and differentiating receptors in detail). For clarity on how individual corridor sections relate to corridor combinations, refer to

Table 6.1.1.

The purpose of this section is solely recording the presence of Differentiating Environmental Receptors for Cable Corridor Combinations.

6.5.2.1 AC6-PEN-CC-LF2_W

Biological Environment

AC6-PEN-CC-LF2_W passes immediately east of Glynllifon SAC/SSSI, a designated maternity and hibernation site for lesser horseshoe bats. It also lies close to Dinas Dinlle SSSI, approximately 300 m to the east, designated for its coastal geomorphological features and glacial landforms. Further east, within 250 m, lies Y Foryd SAC, SSSI and LNR, which supports overwintering birds and intertidal habitats and is hydrologically connected to the Afon Gwyrfai and Afon Rhyd.

Physical Environment

AC6-PEN-CC-LF2_W is intersected by a landfill site near Maes Mawr, the Nantlle HLA, and areas of Ancient Woodland.

Historic Environment

Key historic receptors that intersect or fall within 250m of AC6-PEN-CC-LF2_W, include the Bontnewydd, Llandwrog and Llanwnda Conservation Area, as well as the Former Railway Bridge at Bontnewydd, a Grade II Listed Building.

Socio-Economic Environment

The Cable Corridor Combination intersects multiple Local Plan Allocations including the Dinas Dinlle Development Boundary, Llandwrog Development Area, Saron Cluster, Llandwa Cluster, Bethesda Bach Cluster and Maen Coch. It also contains tourism and recreational receptors such as Cae Clyd Campsite and Rhyd Y Galen Caravan and Camping Park. National Cycle Network Routes 8 and 61 also pass through the area. AC6-PEN-CC-LF2_W intersects two urban areas of Llanwnda and Bethesda-bach.

Further findings

In addition to the environmental receptors already identified, further appraisal work highlights additional considerations that influence the comparative assessment of this corridor combination.

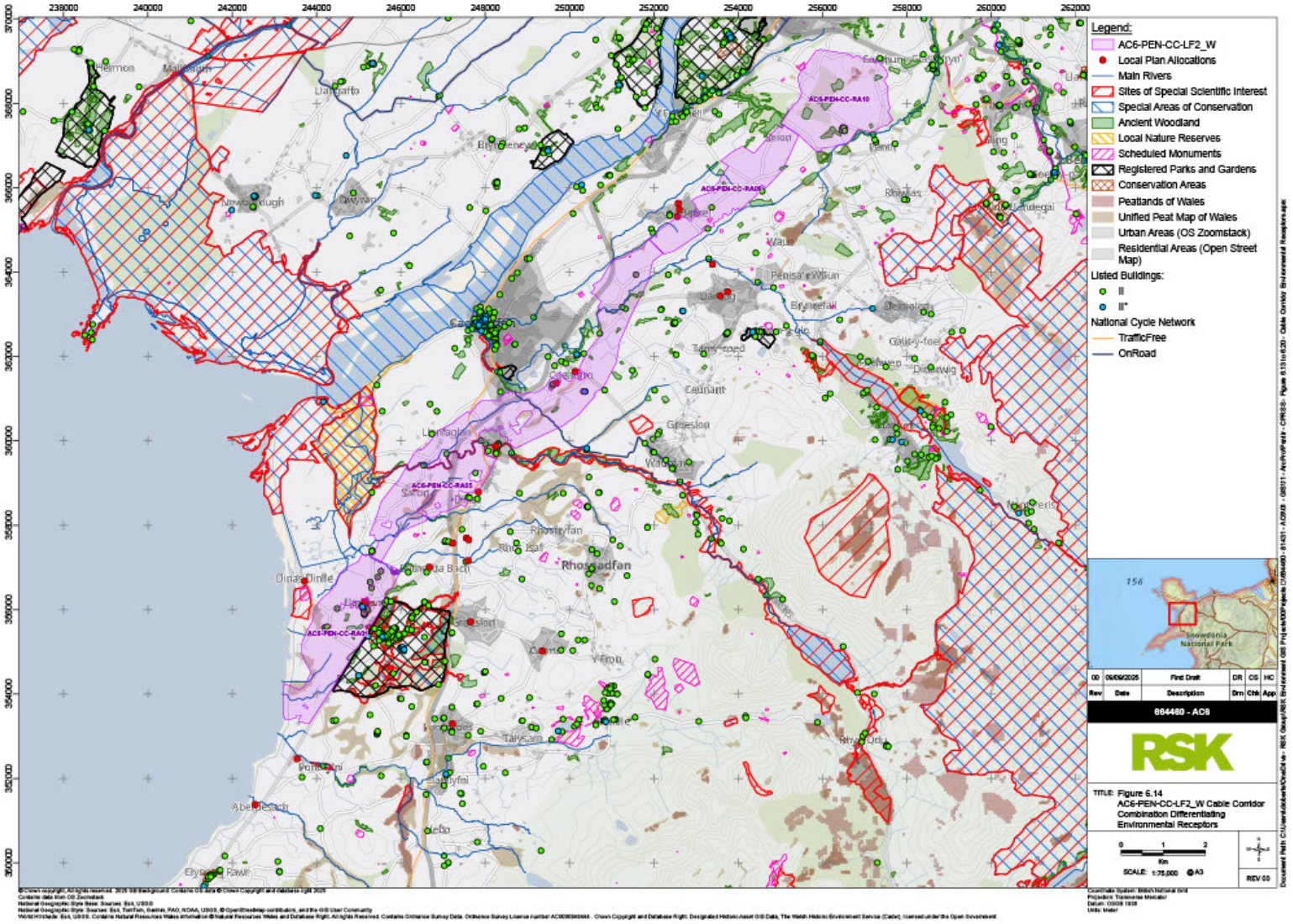
The Cable Corridor Combination intersects a narrower section of the Afon Gwyrfai SSSI (within AC6-PEN-CC-RA05), reducing both the scale of potential environmental disturbance and the engineering complexity associated with the crossing. Compared to alternative combinations, the AC6-PEN-CC-

LF2_W route also overlaps with less extensive areas of peatland and priority habitats, thereby lowering the risk of impacts on carbon-rich soils and sensitive ecological features, as well as reducing the scale of mitigation measure that may be required.

Importantly, AC6-PEN-CC-LF2_W also represents the shortest overall combination, which not only minimises the total construction footprint but also reduces the potential duration of construction and disruption. Taken together, these observations highlight where the combination benefits from a comparatively lower environmental and technical constraint profile, offering a more efficient and less challenging corridor section than other options under consideration.

The Differentiating Environmental Receptors for AC6-PEN-CC-LF2_W as described above were mapped using GIS and are presented in **Figure 6.5.2**: AC6-PEN-CC-LF2_W Cable Corridor Combination Differentiating Environmental Receptors

Figure 6.5.2: AC6-PEN-CC-LF2_W Cable Corridor Combination Differentiating Environmental Receptors



6.5.2.2 AC6-PEN-CC-LF2_E

Biological Environment

AC6-PEN-CC-LF2_E passes the Glynllifon SAC/SSSI immediately to the east, designated for lesser horseshoe bats, and Dinas Dinlle SSSI, located 300 m east. Y Foryd SAC, SSSI and Local Nature Reserve also lies approximately 600 m north, supporting overwintering birds and intertidal habitats. In addition, several main rivers are crossed, including the Rhyd (Dinas), Gwyrfai and Seiont.

Historic Environment

Key historic receptors that intersect or fall within 250m of AC6-PEN-CC-LF2_E, include two Grade II Listed Buildings: Tyddyn Berth and a historic Milestone, both located within the Cable Corridor Combination boundary.

Socio-Economic Environment

The Cable Corridor Combination intersects a number of local development plan Allocations, including the Dinas Development Boundary, Llanrug Development Boundary and the Cae'r Eglwys (T44) housing allocation (with planning permission). It also intersects with NCN Route 8. Settlements directly affected include Bontnewydd and Llanrug.

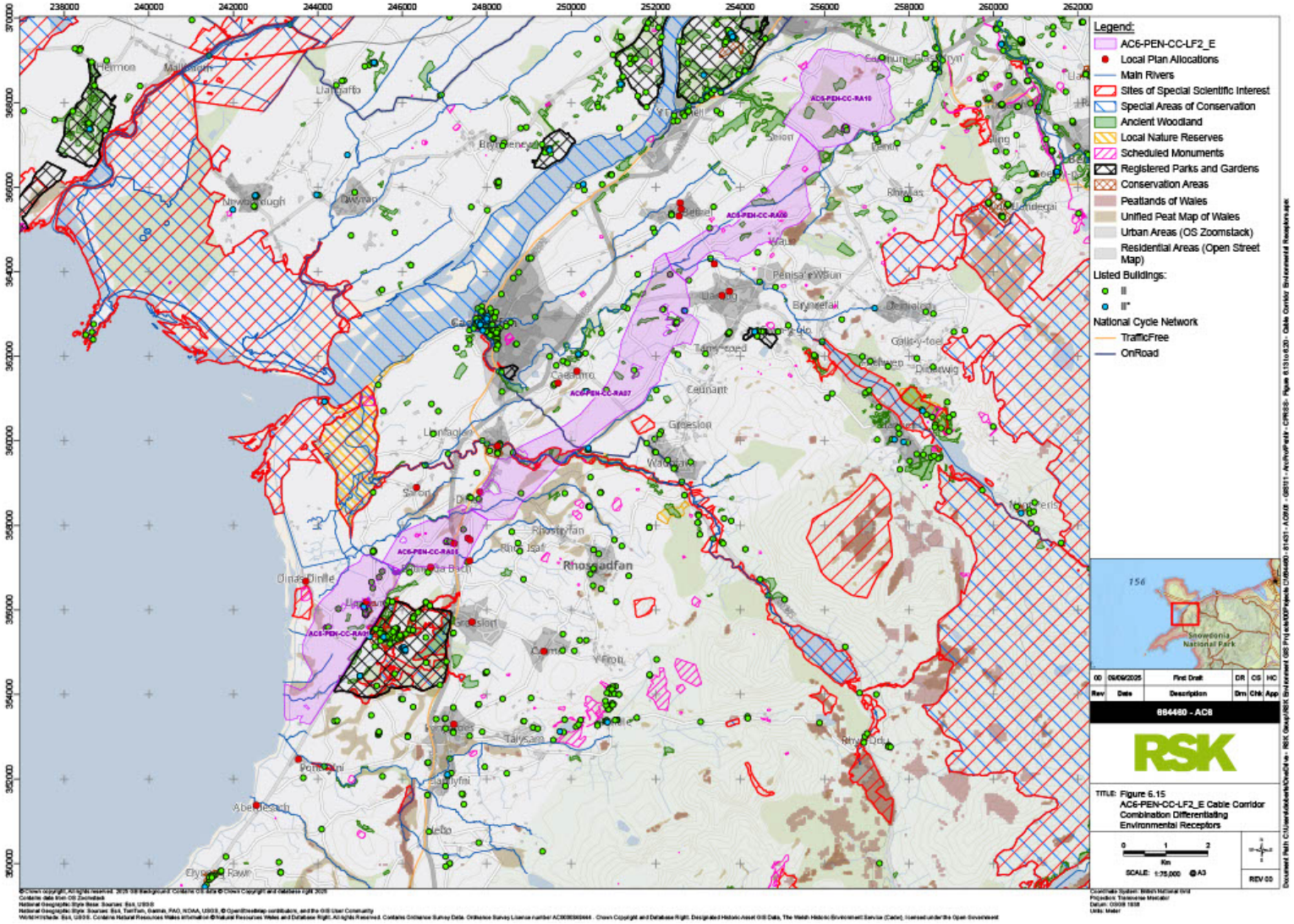
Further findings

In addition to the environmental receptors and designations already identified, further appraisal work highlights additional considerations that influence the comparative assessment of this corridor combination. Notably, this Cable Corridor Combination interacts with larger flood zone areas associated with river systems around Rhostryfan, presenting a higher degree of hydrological constraint and an increased risk of flood-related construction challenges relative to than AC6-PEN-CC-LF2_W combination. The corridor also overlies areas of more extensive peatland deposits, particularly in the vicinity of Llanllyfni and Rhostryfan, where ground conditions are likely to be more sensitive to disturbance, carbon-rich, and technically challenging to manage during construction.

Finally, the route requires crossing a wider section of the Afon Gwyrfai SSSI within AC6-PEN-CC-RA07, increasing both the spatial footprint of potential effects and the complexity of engineering solutions needed to manage those impacts. Together, these observations sit alongside the receptor baseline to differentiate this corridor combination from others, underlining where the relative scale of environmental constraint, construction risk, and potential mitigation effort may be more significant.

The Differentiating Environmental Receptors for AC6-PEN-CC-LF2_E as described above were mapped using GIS and are presented in **Figure 6.5.3**: AC6-PEN-CC-LF2_E Cable Corridor Combination Differentiating Environmental Receptors

Figure 6.5.3: AC6-PEN-CC-LF2_E Cable Corridor Combination Differentiating Environmental Receptors



6.5.2.3 AC6-PEN-CC-LF3_W

Biological Environment

AC6-PEN-CC-LF3_W lies approximately 70 m south of the Glynllifon SSSI/SAC, with connectivity provided through trees, hedgerows and areas of Ancient Woodland. The Cable Corridor Combination is also located around 200 m from the Corsydd Eifionydd SAC and crosses Cors Llanllyfni SSSI, which is hydrologically linked to the route via the Afon Llyfni. In addition, the combination intersects the Afon Carrog which is a 'main river.'

Physical Environment

The North Wales Pilgrims Way National Long Distance Trail crosses this combination.

Historic Environment

Key historic receptors that intersect or fall within 250 m of AC6-PEN-CC-LF3_W include an Early Habitation Site located 180 m west of Pen-Yr-Allt (within the combination boundary), the Llanwnda Conservation Area, and the Dinas y Prif Camp Scheduled Monument, which also lies within the combination boundary.

Socio-Economic Environment

The Cable Corridor Combination intersects several local development plan Allocations, including Pen-y-groes, Carmel, Groeslon, Dolydd and Maen Coch Development Boundaries. It also crosses National Cycle Network Route 8 and multiple urban areas such as Pen-y-groes, Llanllyfni, Y Groeslon and Carmel. In addition, the combination overlaps a major planning application at the Cae Efa Lwyd sand and gravel pit (C23/0302/22/LL).

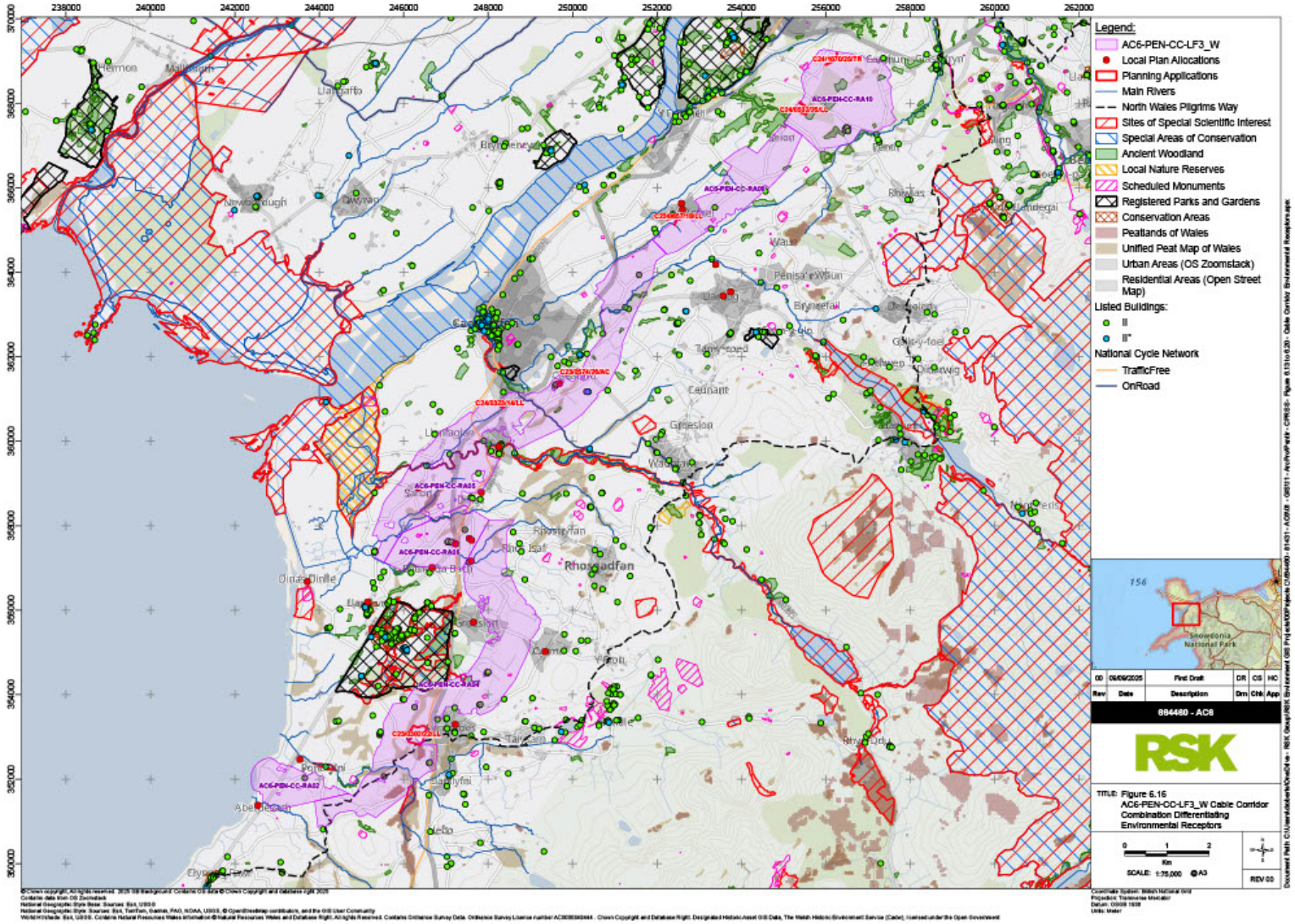
Further findings

In addition to the receptors and designations already identified, further appraisal work highlights additional considerations that influence the comparative assessment of this corridor combination.

AC6-PEN-CC-LF3_W is approximately 10 km longer than the LF2 corridor options, resulting in a larger construction footprint, increased resource requirements, and longer construction duration. The combination also requires routing through more urban areas in AC6-PEN-CC-RA04, including Y Groesion, Carmel and Pen-y-groes, which elevates the potential for community and amenity impacts compared to other corridor combinations. Taken together, these observations demonstrate where this combination may present a higher level of environmental and technical constraint, with more complex challenges to manage than shorter, less constrained alternatives.

The Differentiating Environmental Receptors for AC6-PEN-CC-LF3_W as described above were mapped using GIS and are presented in **Figure 6.5.4**: AC6-PEN-CC-LF3_W Cable Corridor Combination Differentiating Environmental Receptors

Figure 6.5.4: AC6-PEN-CC-LF3_W Cable Corridor Combination Differentiating Environmental Receptors



6.5.2.4 AC6-PEN-CC-LF3_E

Biological Environment

AC6-PEN-CC-LF3_E lies approximately 70 m north of the Glynllifon SSSI/SAC, with additional proximity to the Corsydd Eifionydd SAC (200 m west). The Cable Corridor Combination also intersects the Cors Llanllyfni SSSI, which is hydrologically connected via the Afon Llyfni, and crosses the Main River Afon Carrog.

Physical Environment

The North Wales Pilgrims Way National Trail runs through this corridor combination.

Historic Environment

A key historic receptor is the Early Habitation Site at Pen-Yr-Allt, which lies within the Cable Corridor Combination boundary.

Socio-Economic Environment

The Cable Corridor Combination intersects several local development plan allocations, including Penygroes, Carmel, Groeslon, Dolydd and Maen Coch Development Boundaries. It also crosses National Cycle Network Route 8 and passes through urban areas such as Pen-y-groes, Llanllyfni, Y Groeslon and Carmel. The Cae Efa Lwyd sand and gravel pit (C23/0302/22/LL) is also located within the Cable Corridor Combination boundary.

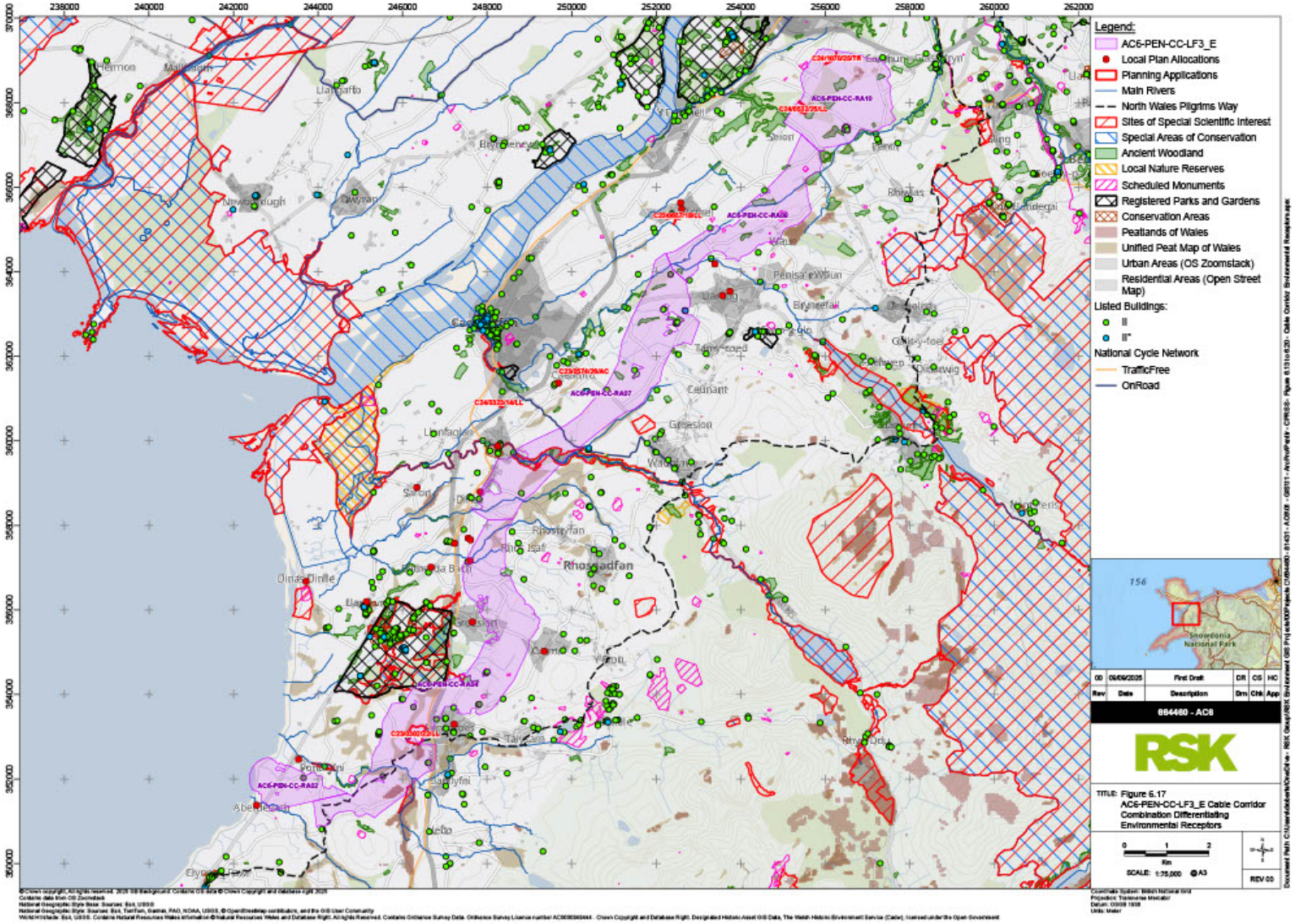
Further findings

Further appraisal work identifies additional considerations that influence the comparative assessment of AC6-PEN-CC-LF3_E. This Cable Corridor Combination interacts with larger flood zone areas around Rhostryfan and more extensive peatland deposits near Llanllyfni and Rhostryfan, increasing the scale of hydrological and ground condition challenges.

The combination also passes through more complex terrain in Landfall Siting Zone (LF4) and Cable Corridor Sections AC6-PEN-CC-RA03 and AC6-PEN-CC-RA04, which may add technical difficulty and construction risk. The crossing of the Afon Gwyrfai SSSI in AC6-PEN-CC-RA07 is wider than for alternative corridors, expanding the potential footprint of impacts and associated mitigation requirements. In addition, this corridor is approximately 4 km longer than the LF2 options, increasing construction extent and duration, and it traverses several urban areas, notably Y Groeslon, Carmel and Pen-y-groes, where community and amenity effects are more likely. Large areas of priority habitat are also present along this combination, adding ecological sensitivity. Collectively, these factors indicate a higher level of environmental and technical constraint compared to shorter and less constrained combinations.

The Differentiating Environmental Receptors for AC6-PEN-CC-LF3_E as described above were mapped using GIS and are presented in **Figure 6.5.5**: AC6-PEN-CC-LF3_E Cable Corridor Combination Differentiating Environmental Receptors

Figure 6.5.5: AC6-PEN-CC-LF3_E Cable Corridor Combination Differentiating Environmental Receptors



6.5.2.5 AC6-PEN-CC-LF4_W

Biological Environment

AC6-PEN-CC-LF4_W lies within the Llŷn Peninsula AONB and the Llŷn Peninsula Heritage Coast. The Cable Corridor Combination is located approximately 1.6 km north of Dinas Dinlle SSSI, designated for its geomorphological and glacial landforms, and 950 m east of Pant Cae Haidd SSSI, noted for its grassland and scrub habitats. The combination also falls within the foraging range of the Glynllifon SAC/SSSI and contains areas of priority habitat, including Purple Moor Grass, Lowland Meadows, and Wood Pasture.

Physical Environment

The Nantlle HLA and a landfill site near Maes Mawr fall within this combination.

Historic Environment

The Cable Corridor Combination is particularly dense in historic assets. Receptors include the Former Railway Bridge at Bontnewydd (Grade II Listed), the Bontnewydd Conservation Area, and the Nantlle HLA. In addition, there are eight further Grade II Listed Buildings and one Grade II* Listed Building within the combination.

Socio-Economic Environment

This Cable Corridor Combination intersects several local development plan Allocations, including Bontnewydd, Caeathro and Penrhos (Caeathro) Development Boundaries, as well as the Saron Cluster. Recreational receptors include 24 Public Rights of Way, National Cycle Network Routes 8 and 61, and the Rhyd Y Galen Caravan and Camping Park. Two major planning applications (C23/0574/26/AC and C24/0323/14/LL) also fall within this Cable Corridor Combination.

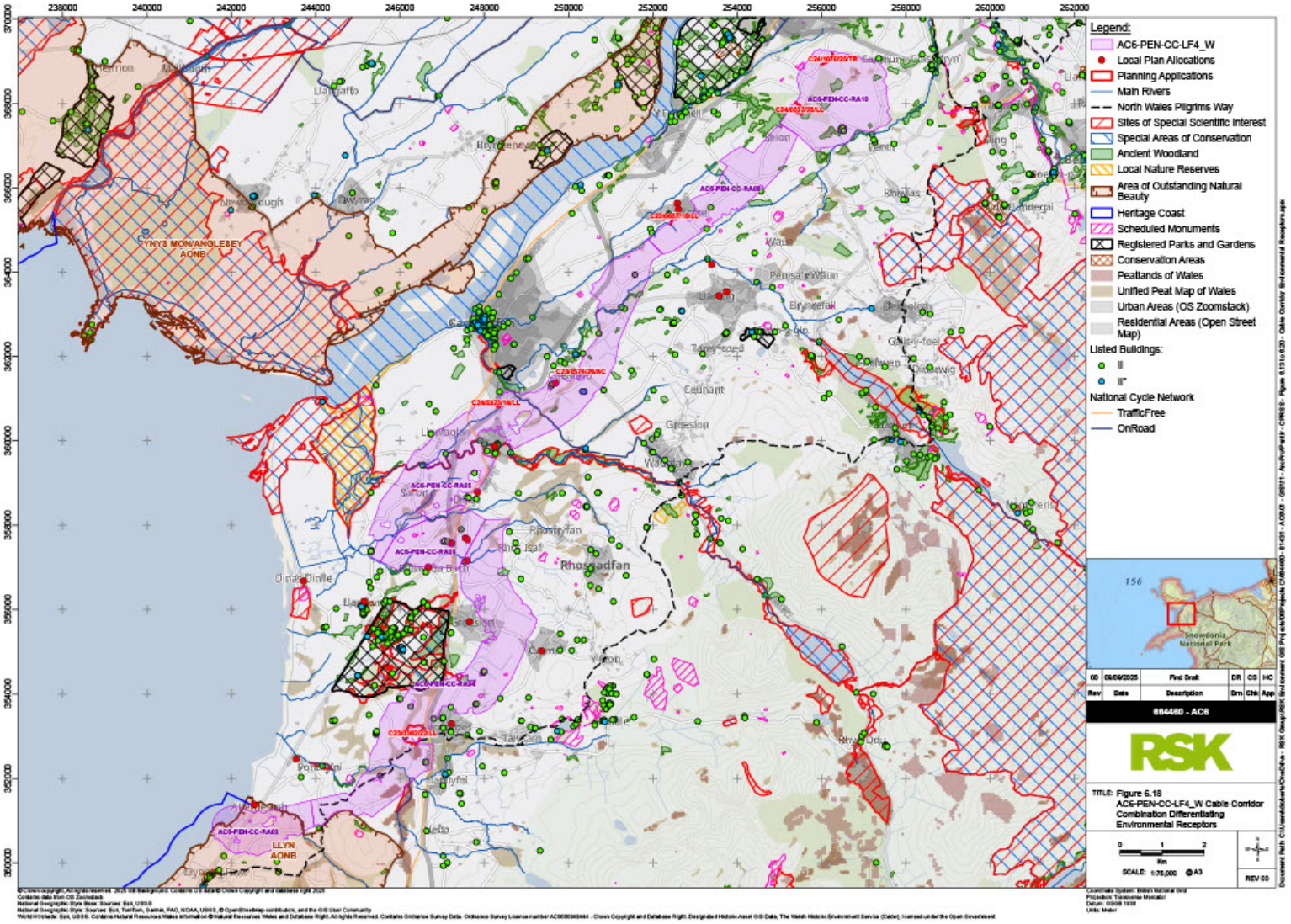
Further findings

Further appraisal work highlights additional considerations that influence the comparative assessment of AC6-PEN-CC-LF4_W. The corridor combination is approximately 10 km longer than the eastern Cable Corridor Combination alternatives, resulting in a larger construction footprint, extended construction duration, and greater resource requirements.

The combination also requires navigating through more urban areas in AC6-PEN-CC-RA04, including Y Groeslon, Carmel and Pen-y-groes, which raises the potential for direct community and amenity impacts. In addition, the Cable Corridor Combination is associated with more challenging terrain in the Landfall Siting Zone (LF4) and Cable Corridor Sections AC6-PEN-CC-RA03 and AC6-PEN-CC-RA04, which may increase engineering complexity, access requirements and construction risks. Collectively, these factors indicate that this corridor may be subject to a higher level of environmental, technical, and socio-economic constraint when compared to other Cable Corridor Combinations.

The Differentiating Environmental Receptors for AC6-PEN-CC-LF4_W as described above were mapped using GIS and are presented in **Figure 6.5.6**: AC6-PEN-CC-LF4_W Cable Corridor Combination Differentiating Environmental Receptors

Figure 6.5.6: AC6-PEN-CC-LF4_W Cable Corridor Combination Differentiating Environmental Receptors



6.5.2.6 AC6-PEN-CC-LF4_E

Biological Environment
AC6-PEN-CC-LF4_E contains areas of priority habitat, notably Purple Moor Grass and Rush Pastures. The Cable Corridor Combination lies approximately 800 m south of the Glynllifon SSSI/SAC and around 2 km east of the Corsydd Eifionydd SAC. The Main River Afon Desach also crosses this combination.

Historic Environment
A key historic feature within this Cable Corridor Combination is the Penarth Burial Chamber Scheduled Monument.

Socio-Economic Environment
The Aberdesach Cluster Local Plan Allocation falls within this combination.

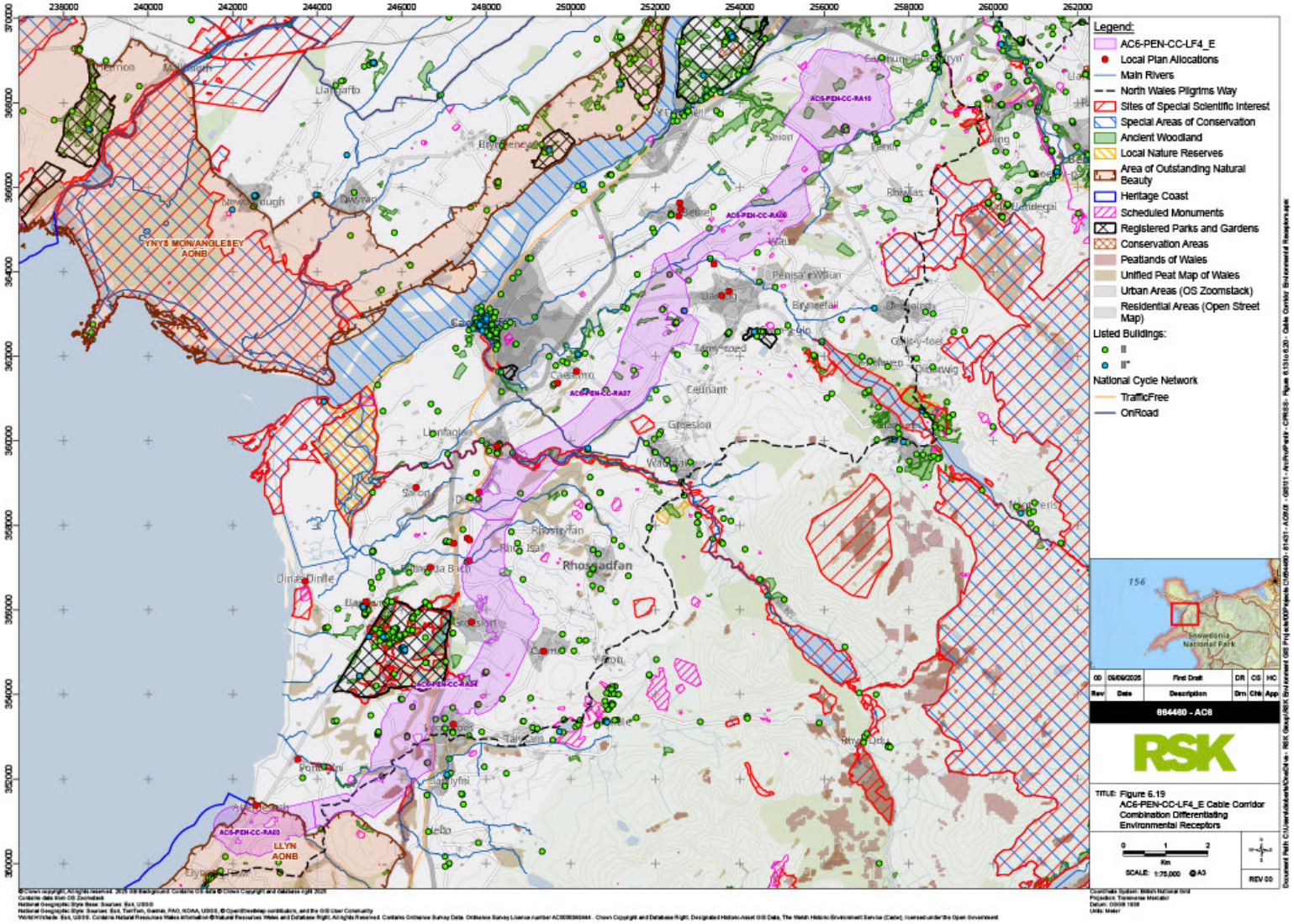
Further findings
Further appraisal work highlights additional considerations that influence the comparative assessment of AC6-PEN-CC-LF4_E. The Cable Corridor Combination interacts with larger flood zone areas around rivers near Rhostryfan and crosses areas of significant peatland deposits near Llanllyfni and Rhostryfan, both of which increase hydrological sensitivity and ground engineering challenges.

The combination also traverses more complex terrain across LF4, AC6-PEN-CC-RA03 and AC6-PEN-CC-RA04, which adds construction challenges and increases potential access and engineering requirements. A wider crossing of the Afon Gwyrfai SSSI in AC6-PEN-CC-RA07 further elevates the scale of environmental disturbance and mitigation effort compared to other corridor combinations.

As with AC6-PEN-CC-LF4_W, this combination also requires navigating through several urban areas, including Y Groeslon, Carmel and Pen-y-groes, where community and amenity impacts may be greater. Taken together, these observations highlight a comparatively higher level of environmental and technical constraint, reinforcing the challenges associated with this combination.

The Differentiating Environmental Receptors for AC6-PEN-CC-LF4_E as described above were mapped using GIS and are presented in **Figure 6.5.7**: AC6-PEN-CC-LF4_E Cable Corridor Combination Differentiating Environmental Receptors

Figure 6.5.7: AC6-PEN-CC-LF4_E Cable Corridor Combination Differentiating Environmental Receptors



6.6 Comparative Appraisal and Summary for Cable Corridor Combinations

From both an engineering and environmental perspective, the AC6-PEN-CC-LF2_W and AC6-PEN-CC-LF2_E options are the most preferred Cable Corridor Combinations. These routes present the shortest overall lengths (21.3 and 21.4 km, respectively) and avoid many of the key receptors and designations that affect other alignments. AC6-PEN-CC-LF2_W is marginally preferred to AC6-PEN-CC-LF2_E as it provides a narrower SSSI crossing and passes through areas with less peatland and fewer priority habitats, thereby reducing both consenting risk and construction complexity. The shorter distance also reduces construction duration, reinstatement time, and associated disturbance to residents and receptors. AC6-PEN-CC-LF2_E performs similarly well, with only a minor increase in length and environmental exposure. Together, these routes present a comparatively reduced risk profile and the most balanced option for delivery into Pentir substation.

The second most favoured combination is the AC6-PEN-LFC-LF3 (A, B or C) + AC6-PEN-CC-RA11 + AC6-PEN-CC-LF2_W or AC6-PEN-CC-LF2_E connection. At approximately 23.6 km, this route remains relatively short and is considered preferable if LF3 is confirmed as the favoured Landfall Siting Zone. The use of AC6-PEN-CC-RA11 to connect into AC6-PEN-CC-LF2_W or AC6-PEN-CC-LF2_E is more favourable than the AC6-PEN-CC-RA04 connection, as AC6-PEN-CC-RA04 would introduce greater length, more urban areas, and increased interactions with sensitive receptors and designated sites. While AC6-PEN-CC-RA11 does carry constraints, notably the Afon Llyfni crossing within the Glynllifon SAC/SSSI bat corridor, these can be more effectively managed than the cumulative risks associated with AC6-PEN-CC-RA04. On this basis, the LF3 + AC6-PEN-CC-RA11 + AC6-PEN-CC-LF2_W/E combination is identified as the second-tier option, contingent on landfall selection.

The AC6-PEN-CC-LF3_E and AC6-PEN-CC-LF3_W combinations are considered the third most favoured. Both routes are longer (25 km and 31 km respectively) and interact with more peatland, more priority habitats, and several urban areas. AC6-PEN-CC-LF3_E requires a wider SSSI crossing, while AC6-PEN-CC-LF3_W is substantially longer at 31.1 km. These factors increase construction duration, community disturbance, and environmental complexity compared with the AC6-PEN-CC-LF2_W/E and AC6-PEN-LFC-LF3(A, B or C) + AC6-PEN-CC-RA11 options. While technically feasible, the overall risk profile is elevated, reducing their relative preference.

The least preferred options are AC6-PEN-CC-LF4_W and AC6-PEN-CC-LF4_E. These routes traverse the Llŷn AONB and Heritage Coast, which significantly increases landscape and visual sensitivity and ensures any works would be subject to greater scrutiny. Both also interact with extensive peatland, priority habitats, and urban areas, alongside more challenging terrain. AC6-PEN-CC-LF4_E requires a wider SSSI crossing and encounters additional planning sensitivities, while LF4_W is the longest route at 31.4 km and includes AC6-PEN-CC-RA04, which is approximately 10 km longer than the western alternatives and requires passage through the urban areas of Y Groeslon, Carmel, and Pen-y-groes. The combination of length, terrain, and environmental constraints makes AC6-PEN-CC-LF4_W one of the least deliverable corridor options.

From a cross-cutting perspective, all corridor combinations will require trenchless techniques at sensitive river crossings, robust soil and peat handling, and proportionate archaeological investigation to ensure impacts remain minor and reversible. Similarly, PRoW crossings and traffic disruption can be managed through a CTMP and early engagement with local stakeholders. However, the balance of environmental risk, constructability, and socio-economic disturbance is lowest for the AC6-PEN-CC-LF2_W and AC6-PEN-CC-LF2_E combinations.

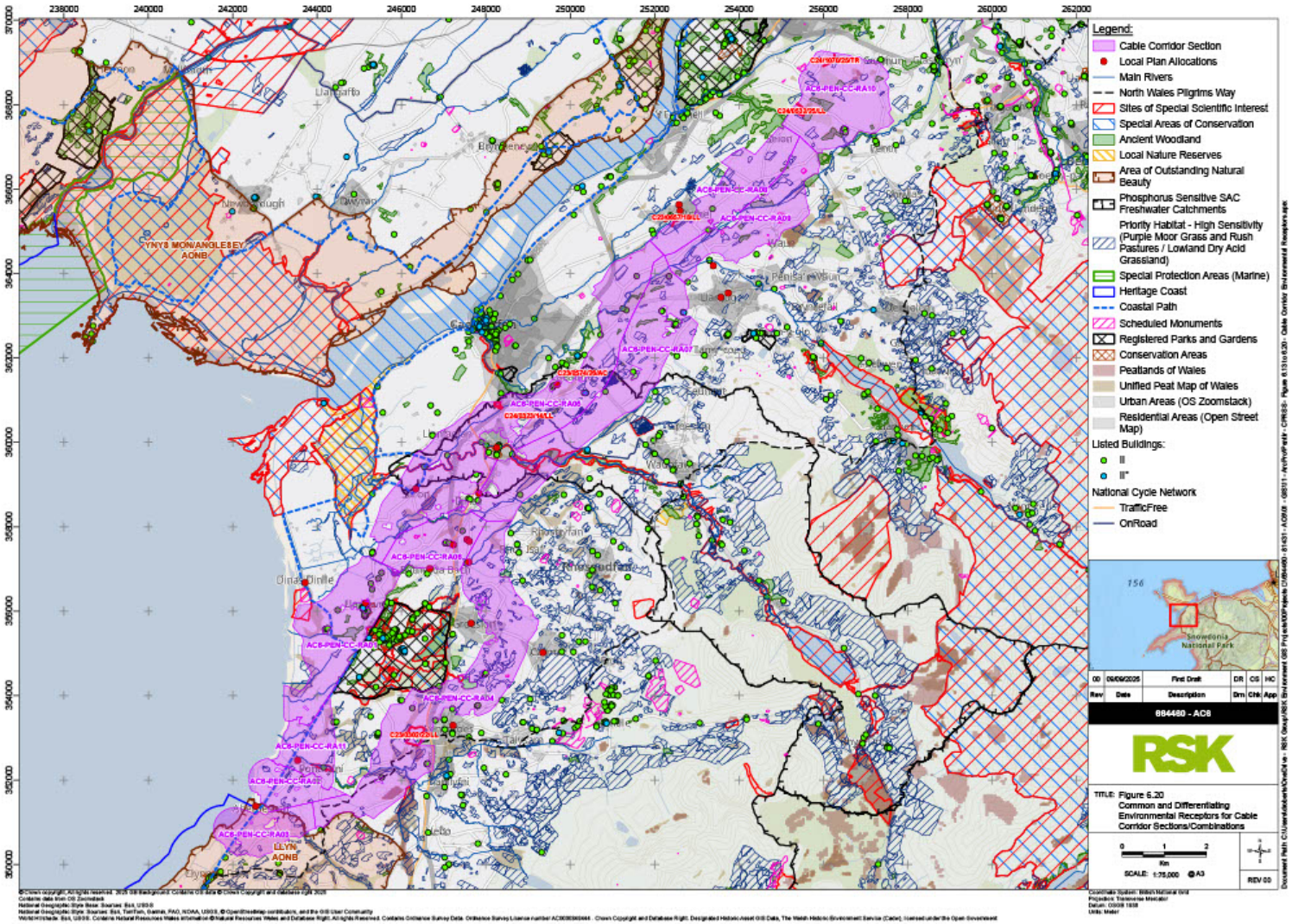
Overall, AC6-PEN-CC-LF2_W is identified as the most preferred Cable Corridor Combination, closely followed by AC6-PEN-CC-LF2_E. If LF3 is selected as the preferred landfall, the AC6-PEN-LFC-LF3(A, B or C) + AC6-PEN-CC-RA11 + AC6-PEN-CC-LF2_W or AC6-PEN-CC-LF2_E combination becomes the second most favoured option. AC6-PEN-CC-LF3_E and LF3_W represent workable but less favourable alignments, while AC6-PEN-CC-LF4_W and AC6-PEN-CC-LF4_E are the least preferred options, constrained by their length, landscape designations, and more challenging environmental and socio-economic context.

To support the summaries in this section, **Figure 6.6.1**: Common and Differentiating Environmental Receptors for Cable Corridor Sections/Combination illustrates the common and differentiating receptors

for all Cable Corridor Sections and combinations, bringing all constraints together for ease of comparison.

Further details and confirmation of the emerging preference to progress to Stage 3: Defined Proposal and Statutory Consultation for the Cable Corridor Combination is provided in **EMERGING PREFERENCES**.

Figure 6.6.1: Common and Differentiating Environmental Receptors for Cable Corridor Sections/Combination



7. OPTIONS APPRAISAL – CONVERTER STATION SITING ZONES

7.1 Introduction

7.1.1 Overview

As described in **OPTIONS APPRAISAL** APPROACH, in Step 5 of the 9-step options appraisal methodology (see **Figure 4.2.1**), four potential Converter Station Siting Zones (outlined in **Table 4.7.1**) were identified near Pentir and brought forward to the options appraisal stage. All four siting zones lie within pastoral farmland served by minor lanes and B-roads, and in proximity to existing National Grid infrastructure at Pentir and the 400 kV OHL network.

The refinement of these four options builds directly upon the Preliminary Converter Station Siting Zones identified during Step 4 of the 9-step options appraisal methodology (refer to **Preliminary Converter** Station Siting Zones). This earlier stage combined appraisal of environmental, planning and socio-economic constraints (RSK) with engineering and feasibility parameters (AtkinsRéalis) to ensure that both sensitivities and technical requirements were considered from the outset. The current appraisal represents the next stage of this process, moving from broad preliminary siting zones toward a focused set of locations with sufficient capacity and flexibility to host converter station infrastructure.

The appraisal in **OPTIONS APPRAISAL** – CONVERTER STATION SITING ZONEScompares Common Environmental Receptors present across all four options (**Common Environmental** Receptors for Converter Station Siting Zones) and Differentiating Environmental Receptors that distinguish between them (**Differentiating Environmental** Receptors for Converter Station Siting Zones), to inform the selection of the most appropriate option for progression to design.

The Converter Station Siting Zones that have been taken forward to appraisal are depicted in **Figure 7.1.1**: Converter Station Siting Zones:

- AC6-PEN-CVT-RA01– Located approximately 1.0 km northeast of the existing 400 kV Pentir substation, this Converter Station Siting Zone is located within the 2 km radius set by NGET in the Converter Station Siting Hierarchy (described in **Converter Station** Siting Hierarchy). The siting zone sits on elevated farmland east of the A4244, enclosed by hedgerows, and accessible via minor roads, with the 400 kV OHL passing nearby;
- AC6-PEN-CVT-RA02– Situated approximately 1.1 km southwest of the existing 400 kV Pentir substation, this Converter Station Siting Zone is also located within the 2 km radius set by NGET in the Converter Station Siting Hierarchy. The zone occupies gently undulating farmland between the B4547 and B4366, with scattered rural dwellings in the wider setting;
- AC6-PEN-CVT-RA03– Positioned approximately 1.9–2.0 km southwest of the existing 400 kV Pentir substation, this Converter Station Siting Zone sits at the edge of the 2 km radius and is split into two land parcels. Located north of the B4366, the parcels lie either side of a minor lane, within rolling farmland framed by hedgerows and a PRoW nearby; and
- AC6-PEN-CVT-RA04– Located approximately 3.0 km south of the existing 400 kV Pentir substation, this Converter Station Siting Zone falls outside the 2 km radius but sits within the 5 km radius set by NGET in the Converter Station Siting Hierarchy. The siting zone lies adjacent to the B4366 and is intersected by a PRoW, within farmland close to Coed Bolyn Lodge, with higher sensitivity due to residential proximity and open views.

This spatial context of each Converter Station Siting Zone is illustrated in **Figure 7.1.1**: Converter Station Siting Zones which provides the geographic framework for the following appraisal. Detailed environmental, historic environment, physical environment, access and socio-economic considerations for each option are presented in **Common Environmental** Receptors for Converter Station Siting Zones and **Differentiating Environmental** Receptors for Converter Station Siting Zones.

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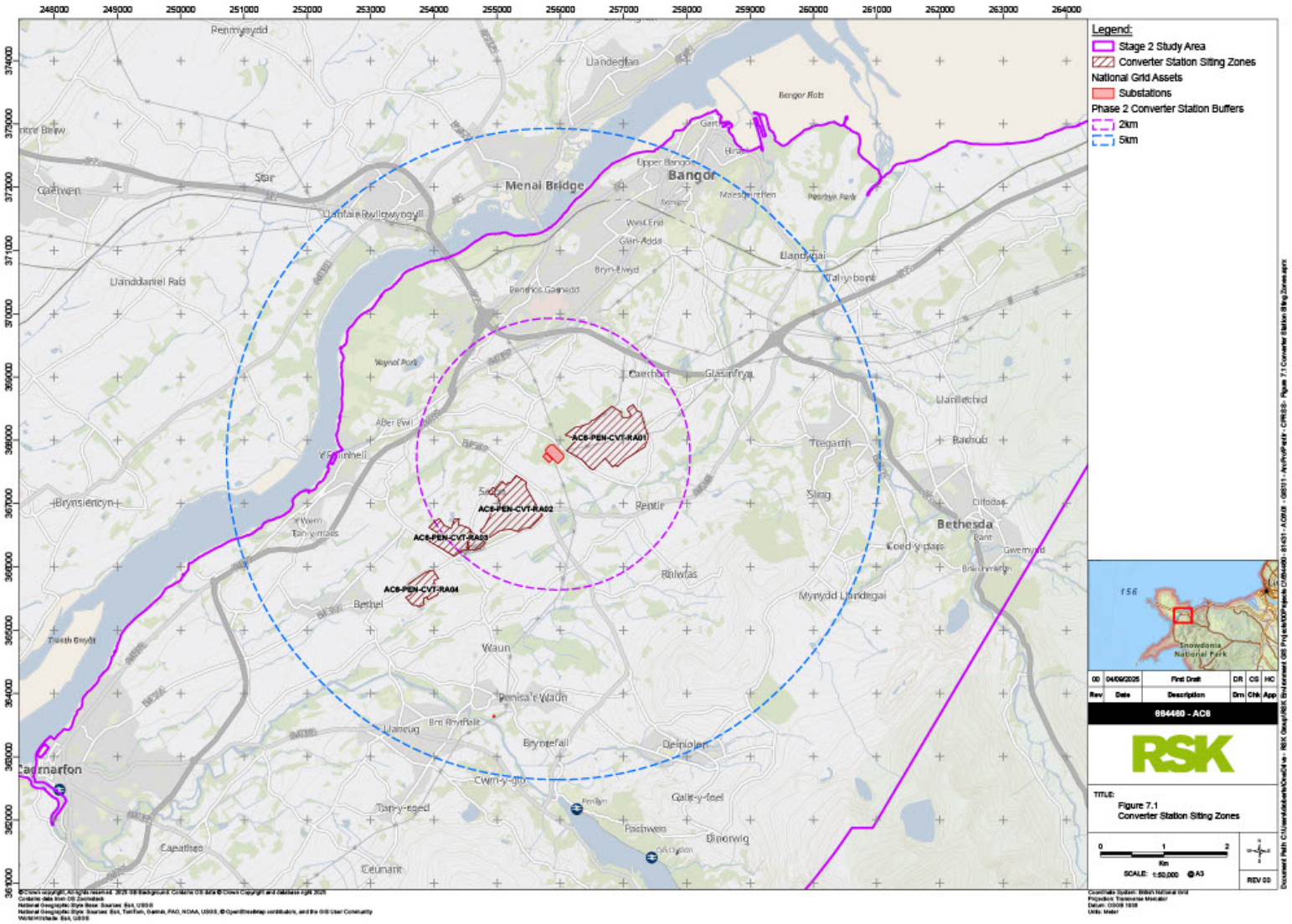
Figure 7.1.1: Converter Station Siting Zones



7.2 Common Environmental Receptors for Converter Station Siting Zones

This section presents the environmental designations and receptors that are consistently present within all four Converter Station Siting Zones (outlined in **Table 4.7.1**). These designations and receptors are considered common because they occur across every siting zone option, either directly intersecting the footprint or located within 250 m of the siting zone boundary.

While these receptors form an important part of the baseline environment and may influence design or mitigation measures, they do not provide a basis for distinguishing between siting zone options, as they are unavoidable across all locations.

Further information on Common Environmental Receptors is available in **Common Environmental** Receptors of this TCPRSS.

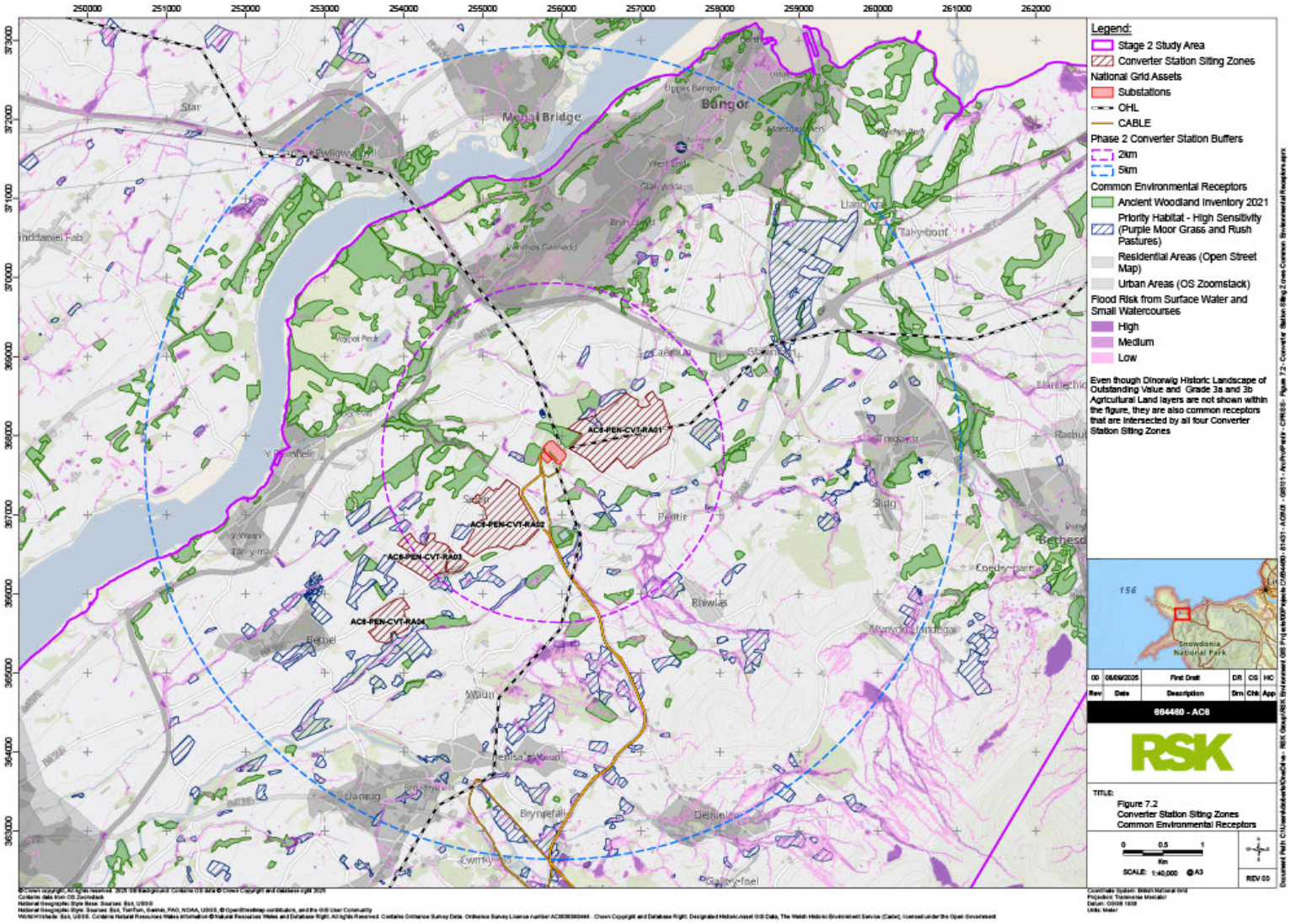
The following Common Environmental Receptors have been identified:

- Ancient Woodland within close proximity of the siting zone boundary;
- Priority Habitats (Purple Moor Grass and Rush Pastures);
- Dinorwig Landscape of Outstanding Historic Interest;
- Grade 3a and 3b Agricultural Land; and
- Surface Water Flood Risk.

Although these receptors are not used to differentiate between siting zones, their relative scale and context may be revisited during decision-making to help refine the understanding of overall feasibility and potential mitigation requirements.

The Common Environmental Receptors within all four Converter Station Siting Zones as described are presented in **Figure 7.2.1**: Converter Station Siting Zones Common Environmental Receptors

Figure 7.2.1: Converter Station Siting Zones Common Environmental Receptors



7.3 Differentiating Environmental Receptors for Converter Station Siting Zones

This section presents the environmental designations and receptors that vary between the Converter Station Siting Zones. These differentiating receptors represent the key features that enable a comparison of siting options.

The appraisal of Differentiating Environmental Receptors forms the core of the comparative assessment, providing insight into how each siting zone interacts with distinct environmental, socio-economic, or planning constraints. These receptors therefore underpin the evaluation of relative risk, opportunity, and feasibility of each option.

Any environmental constraints that do not intersect or fall within the 250 m buffer of the Converter Station Siting Zone boundaries have been taken into account during the appraisal process; however, they are not described in this section as they do not directly influence or constrain the siting zones. A detailed summary of the Converter Station Siting Zone options is provided in the subsections below.

Further information on Differentiating Environmental Receptors is available in **Differentiating Environmental** Receptors of this TCPRSS.

7.3.1 Options Appraisal Assumptions

As the Project is still in its early design stage, with construction and operational methods yet to be finalised, it is appropriate that a number of informed assumptions have been made to support the appraisal of the potential Converter Station Siting Zones. These assumptions reflect standard practice at this point in the process and help ensure a robust and flexible approach to site evaluation. Additional information is provided in **Engineering Parameters** of this report. Engineering parameters will be further refined and developed during Stage 3: Defined Proposal and Statutory Consultation.

7.3.2 AC6-PEN-CVT-RA01

7.3.2.1 Biological Environment

Special Areas of Conservation (SACs)/ Sites of Special Scientific Interest (SSSIs)

AC6-PEN-CVT-RA01 lies approximately 1.6 km east of the Moelyci a Chors Ty'n y Caeau SSSI, which is designated for its diverse assemblage of grassland fungi and for its neutral grassland and mire habitats. Although the SSSI lies within 2 km of AC6-PEN-CVT-RA01, there is unlikely to be any hydrological connection. AC6-PEN-CVT-RA01 does not directly intersect any European designated Habitat sites, however, Snowdonia SAC (UK0012946) and Menai Strait and Conwy Bay SAC (UK0030202) are located approximately 2 km east and 3.65 km west of AC6-PEN-CVT-RA01, respectively. Both SACs are designated for habitats only, and given the distance, no habitat loss is anticipated to occur. Neither SAC are designated for mobile qualifying species and therefore functionally linked offsite habitat is not considered to be present at AC6-PEN-CVT-RA01. Despite this, the potential use of AC6-PEN-CVT-RA01 by Eurasian curlew for nesting (as functionally linked offsite habitat) will need to be determined through site surveys.

Special Protection Areas (SPAs)

Lavan Sands, Conway Bay SPA (UK9013031) designated for oystercatcher, red-breasted merganser, Eurasian curlew, great crested grebe and common redshank, is located approximately 4.7 km from AC6-PEN-CVT-RA01. The Core Management Plan for this SPA only lists oystercatcher as a qualifying feature. Apart from Eurasian curlew, the other species are waders and/or waterbirds that are unlikely to utilise offsite farmland habitat. Curlew tracking from the Severn shows the species can range for large distances, although predominantly up and down the estuary. The value of the farmland habitat would need to be confirmed within any survey work.

7.3.2.2 Physical Environment

Landscape & Visual Amenity

Visual receptors of the Converter Station Siting Zone encompass a few residential properties adjacent to or within immediate context with proposed views into AC6-PEN-CVT-RA01. Fleeting views of AC6-PEN-CVT-RA01 are proposed from local minor roads near Tyddyn Heilyn, Caerhun, Ty`n-y-ffridd Cottage (and Pen-y-cefn) and Niwbwrch to the north-east and east, inclusive of adjoining PRoW. Despite this, existing energy infrastructure (pylons and OHLs) within the AC6-PEN-CVT-RA01 boundary will remain the dominant features in the landscape regardless of the proposed development.

AC6-PEN-CVT-RA01 lies within the LANDMAP GWNDDVS006 Visual and Sensory Area. Wide ranging views of upland landscapes including views towards Snowdonia and Menai Straits described in LANDMAP evaluation are unlikely to be significantly affected by the introduction of AC6-PEN-CVT-RA01, but impacts will be greatest during construction.

Potential landscape impacts include the removal of ground cover and boundary hedgerows to accommodate the footprint and access tracks of AC6-PEN-CVT-RA01, along with the introduction of additional energy infrastructure within a rolling farmland landscape of local importance. While AC6-PEN-CVT-RA01 would present an addition to existing energy infrastructure that forms part of the current baseline, micrositing within lower lying parts of the siting zone (generally towards the north-western boundary) and near existing farm buildings (if possible) is recommended. There is opportunity to mitigate effects through planting of native hedgerow, thicket or tree planting appropriate to local landscape character.

Peatland

Mapped peatland is located within 250 m of the Converter Station Siting Zone boundary. While AC6-PEN-CVT-RA01 does not directly intersect peatland, the presence of peatland within close proximity raises the potential for indirect impacts that may influence changes to local hydrology, drainage patterns, or water table levels during construction, which could degrade nearby peat-forming habitats. Mitigation would focus on maintaining hydrological separation between the construction site and the adjacent peatland. This may involve implementing buffer zones, controlling surface water runoff and managing construction timing within drier periods to reduce soil damage within the proximity to peatlands.

7.3.2.3 Historic Environment

Scheduled Monuments

There are no designated heritage assets within the Converter Station Siting Zone. However, it lies within 2 km of five Scheduled Monuments, including Gors y Brithdir Enclosed Hut Group & Ancient Fields, Fodol Ganol Enclosed Hut Group, Penrhyn Quarry Railway, Gerlan Hut Group and Goetre Uchaf barrow. Construction activities may potentially cause adverse effects from changes within the setting of these assets.

7.3.2.4 Access

Highway Access

AC6-PEN-CVT-RA01 is accessible via two minor B-roads (accessed via the A4244) that run along the site boundary (Road from Pont Y Felin to Lôn Bryn Gwredog to the west and Lôn Tŷ'n Llwyn (Norman Lane) to the north). These roads may not be able to accommodate high volumes of HGV traffic and may be subject to weight or width restrictions that constrain vehicle access. Lôn Tŷ'n Llwyn is signposted as unsuitable for wide vehicles, however an existing access to the area is present along this route. A new access may be required off the Road from Pont Y Felin to Lôn Bryn Gwredog.

Construction traffic will present additional adverse effects including accelerated road surface degradation and increased safety risks at pinch points and junctions. Increased traffic movements may also contribute to increased congestion, particularly where temporary road closures are required. There is a bridge located directly south of the junction with Pont Felin and Norman Lane which would require further assessment. There are no PRoW within the immediate vicinity of the Converter Station Siting Zone.

Early engagement with Cyngor Gwynedd, MNWTRA and private landowners will be required to agree a preferred access route and any necessary upgrades. A CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures (detailing timing of deliveries, banksmen, signage, wheel-wash and road cleanliness) to minimise disruption.

7.3.2.5 Socio-Economic Environment

Local Planning Receptors

There are no local development plan allocations intersecting AC6-PEN-CVT-RA01 and no urban areas within 250 m. However, there are small areas of settlements (surrounding Caerhun), and two individual residential properties within 250 m of the site boundary. There is relatively little socio-economic activity associated with this Converter Station Siting Zone option. The siting zone does not intersect any PRoW however; there are four PRoW within 250m of the AC6-PEN-CVT-RA01 boundary (three footpaths and one restricted byway).

The main socio-economic effects will be short-term disturbance from construction traffic, dust, noise and visual intrusion, particularly to the two individual residential properties within 250m of the AC6-PEN-CVT-RA01 boundary. Potential mitigation could involve screening to preserve visual amenity, effective communication with nearby residents, traffic management measures, construction noise/dust controls, and carefully planned construction timing and phasing. The layout will need to maximise setback distances and position taller elements away from key viewpoints. During construction, best practice measures such as implementation of CTMP would be needed.

Major Planning Applications

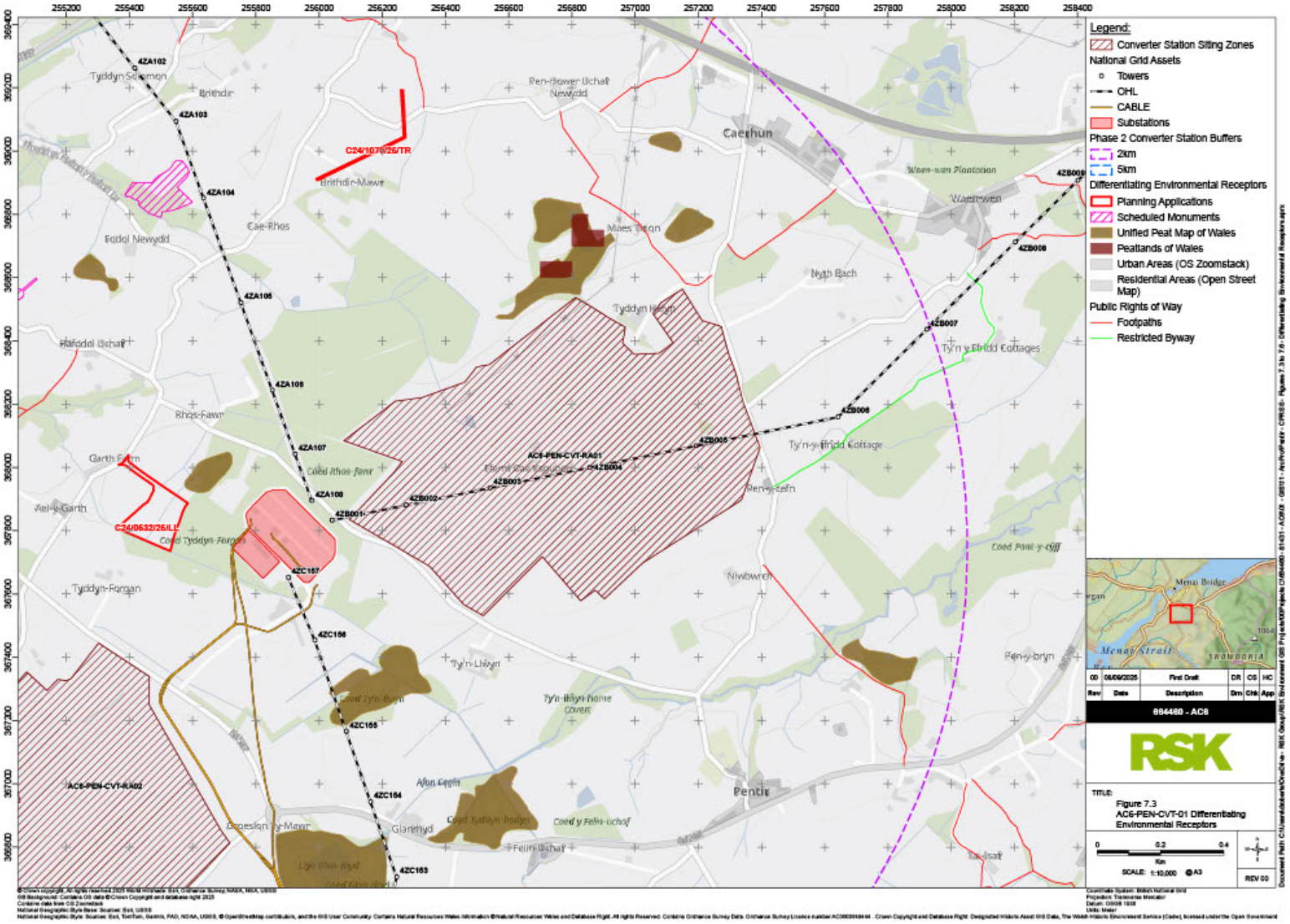
There are two major planning applications that are planned in the areas around AC6-PEN-CVT-RA01. One major planning application was approved in January 2025 and proposes the upgrade of an existing OHL (C24/1070/25/TR) while the other was approved in September 2024 for the development of a Battery Energy Storage System, with a grid connection import and export capacity of 57 MWac (C24/0532/25/LL). As a result, there is potential for interaction or overlap between these planning applications and the proposed works associated with AC6-PEN-CVT-RA01. Early awareness of neighbouring planning permissions will support coordinated project delivery and reduce proposed disruption.

National Grid Assets

There is an existing 400 kV OHL running through the middle of the Converter Station Siting Zone. This introduces potential safety risks for construction due to proximity to high-voltage infrastructure and may constrain site layout, limit usable development area, and pose operational challenges related to access and equipment installation. There is also the potential for construction activities to temporarily disrupt OHL maintenance access or require coordination with the network operator. Potential mitigation would include early and continuous liaison with the OHL operator (e.g. National Grid) to establish safe working distances, access protocols, and exclusion zones. Detailed site design and phasing plans would ensure infrastructure is positioned outside of required OHL safety clearances, and temporary construction activities are carefully managed to avoid conflicts.

The Differentiating Environmental Receptors for AC6-PEN-CVT-RA01 as described above were mapped using GIS and are presented in **Figure 7.3.1**: AC6-PEN-CVT-RA01 Differentiating Environmental Receptors

Figure 7.3.1: AC6-PEN-CVT-RA01 Differentiating Environmental Receptors



7.3.3 AC6-PEN-CVT-RA02

7.3.3.1 Biological Environment

Special Areas of Conservation (SACs)/ Sites of Special Scientific Interest (SSSIs)

AC6-PEN-CVT-RA02 does not fall within 2 km of any SSSIs. AC6-PEN-CVT-RA02 does not directly intersect any European designated sites, however, Snowdonia SAC (UK0012946) and Menai Strait and Conwy Bay SAC (UK0030202) are located approximately 2.9 km east and 2.4 km west of AC6-PEN-CVT-RA02 respectively.

The two SAC sites are designated for habitats only, and given the distance, no habitat loss is anticipated to occur. Neither SACs are designated for mobile qualifying species and therefore functionally linked offsite habitat is not considered to be present at the proposed siting zone. Despite this, the potential use of the site by Eurasian curlew for nesting (as functionally linked offsite habitat) needs to be determined through site surveys. The SACs are also considered to be sufficiently distant such that noise and dust issues are unlikely, assuming good practice construction techniques and standard pollution prevention measures are employed.

Special Protection Areas (SPAs)

Lavan Sands, Conway Bay SPA (UK9013031) designated for oystercatcher, red-breasted merganser, Eurasian curlew, great crested grebe and common redshank, is located approximately 6.78 km north of AC6-PEN-CVT-RA02. The Core Management Plan for the site only lists oystercatcher as a qualifying feature of the SPA. Apart from Eurasian curlew, the other species are waders and/or waterbirds that are unlikely to utilise offsite farmland habitat. Curlew tracking from the Severn shows the species can range for large distances, although predominantly up and down the estuary. The value of the farmland habitat would need to be confirmed within survey work.

7.3.3.2 Physical Environment

Landscape & Visual Amenity

Visual receptors within proximity of the Converter Station Siting Zone encompass a few residential properties, some scattered individual properties with a terrace (Tai-Cae Rhos to the north-west and Tai Seion and Seion to the west), and a few nearby PRoW (one at Seion and another joining the B4366 near Ty-mawr to the south-east). AC6-PEN-CVT-RA02 lies within the LANDMAP GWNDDVS006 Visual and Sensory Area. There will potentially be conflict with heritage assets on elevated ground near the B4366 where the setting would be affected by the prominence of AC6-PEN-CVT-RA02. Key aspects of views of background hills and mountains will remain largely unaffected. These views are likely to contain existing elements of energy infrastructure.

Potential landscape impacts include the removal of ground cover and boundary hedgerows to accommodate the footprint and access tracks of AC6-PEN-CVT-RA02, along with the introduction of additional energy infrastructure within a rolling pasture farmland (with transition to upland) of local importance. Micrositing will be leveraged to position lower lying parts of the site away from potential receptors and heritage assets, while additional opportunities exist to use a belt of woodland planting on the B4366 corridor for screening. Mitigation planting in the form of woodland or thicket would replicate existing features in the landscape and would be appropriate to local landscape character. Micrositing near the roundabout of B4366 / B4512 / A2144 will follow the pattern of infrastructure near transport corridors and will be effectively screened by mitigation planting (although these may conflict with recent underground works).

Peatland

There is one area of peatland located within 250 m of the Converter Station Siting Zone boundary (no direct intersection). AC6-PEN-CVT-RA02 does not directly intersect peatland, but the presence of peatland within close proximity raises the potential for indirect impacts that may influence changes to local hydrology, drainage patterns, or water table levels during construction, which could degrade nearby peat-forming habitats. Mitigation would focus on maintaining hydrological separation between the construction site and the adjacent peatland. This may involve implementing buffer zones, controlling

surface water runoff and managing construction timing within drier periods to reduce soil damage within the proximity to peatlands.

Main Rivers, Water Courses and Surface Waters

While the Converter Station Siting Zone does not intersect any Main Rivers, one small watercourse does run through the middle of the siting zone. Construction activities pose a range of potential adverse effects including sediment-laden runoff, accidental spillage of fuels or chemicals, and physical disturbance to the onsite watercourse. These risks may lead to pollution or degradation of local water quality and hydrological regimes, both within the siting zone and in nearby connected water bodies. A suite of mitigation measures would be implemented to protect the onsite watercourse and nearby surface water features. These would include controlled drainage strategies, sediment control measures, and strict pollution prevention protocols during construction. A minimum buffer would be maintained around the onsite watercourse, and any diversion or culverting works would follow regulatory guidance to maintain ecological and hydrological function.

7.3.3.3 Historic Environment

Scheduled Monuments

There are no designated heritage assets within the Converter Station Siting Zone. However, the siting zone lies within 2 km of eight SMs, including Gors y Brithdir Enclosed Hut Group & Ancient Fields, Fodol Ganol Enclosed Hut Group, Penrhyn Quarry Railway, Gerlan Hut Group and Goetre Uchaf barrow Gors y Brithdir Enclosed Hut Group & Ancient Fields, Fodol Ganol Enclosed Hut Group, Rectangular Earthwork 110m NW of Coed Ty Mawr, Dinas Dinorwic Camp, Glascoed Ancient Village, Glascoed Round Cairn, Cae Metta Hut Group and Cefn Mawr Hut Group. Construction activities may potentially cause adverse effects from changes within the setting of the assets.

7.3.3.4 Access

Highway Access

AC6-PEN-CVT-RA02 is accessible via two high-quality B-roads (the B4547 to the north and the B4366 to the east). These roads may not be designed to accommodate high volumes of HGV traffic and may be subject to weight or width restrictions that constrain vehicle access. A temporary access for works on underground cables to Dinorwig Power Station currently exists off the B4547. For access from the B4366, an existing farm access would need to be upgraded and improved, or a new access would need to be formed. Construction traffic would present additional adverse effects including accelerated road surface degradation and increased safety risks at pinch points and junctions. Increased traffic movements may also contribute to increased congestion, particularly where temporary road closures are required. There is also potential for temporary noise, dust, and vibration to affect road users and nearby receptors. There are no PRoW within the immediate vicinity of the Converter Station Siting Zone.

Early engagement with Cyngor Gwynedd, MNWTRA and private landowners will be required to agree a preferred access route and any necessary upgrades. A CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures (detailing timing of deliveries, banksmen, signage, wheel-wash and road cleanliness) to minimise disruption. While proximity to B-roads introduces some construction and visibility concerns, these are considered manageable through standard mitigation and good construction practices.

7.3.3.5 Socio-Economic Environment

Local Planning Receptors

There are no local development plan allocations intersecting AC6-PEN-CVT-RA02 and no urban areas within 250 m. However, there are small areas of settlements (surrounding Llŷn Glan-rhyd), and seven individual residential properties within 250 m of the site boundary. There is relatively little socio-economic activity associated with this Converter Station Siting Zone option. The site does not intersect any PRoW, however, there is one PRoW within 250m of AC6-PEN-CVT-RA02 site boundary. Construction and operation of AC6-PEN-CVT-RA02 may contribute towards temporary changes in the local visual environment, noise levels, and general amenity for PRoW users.

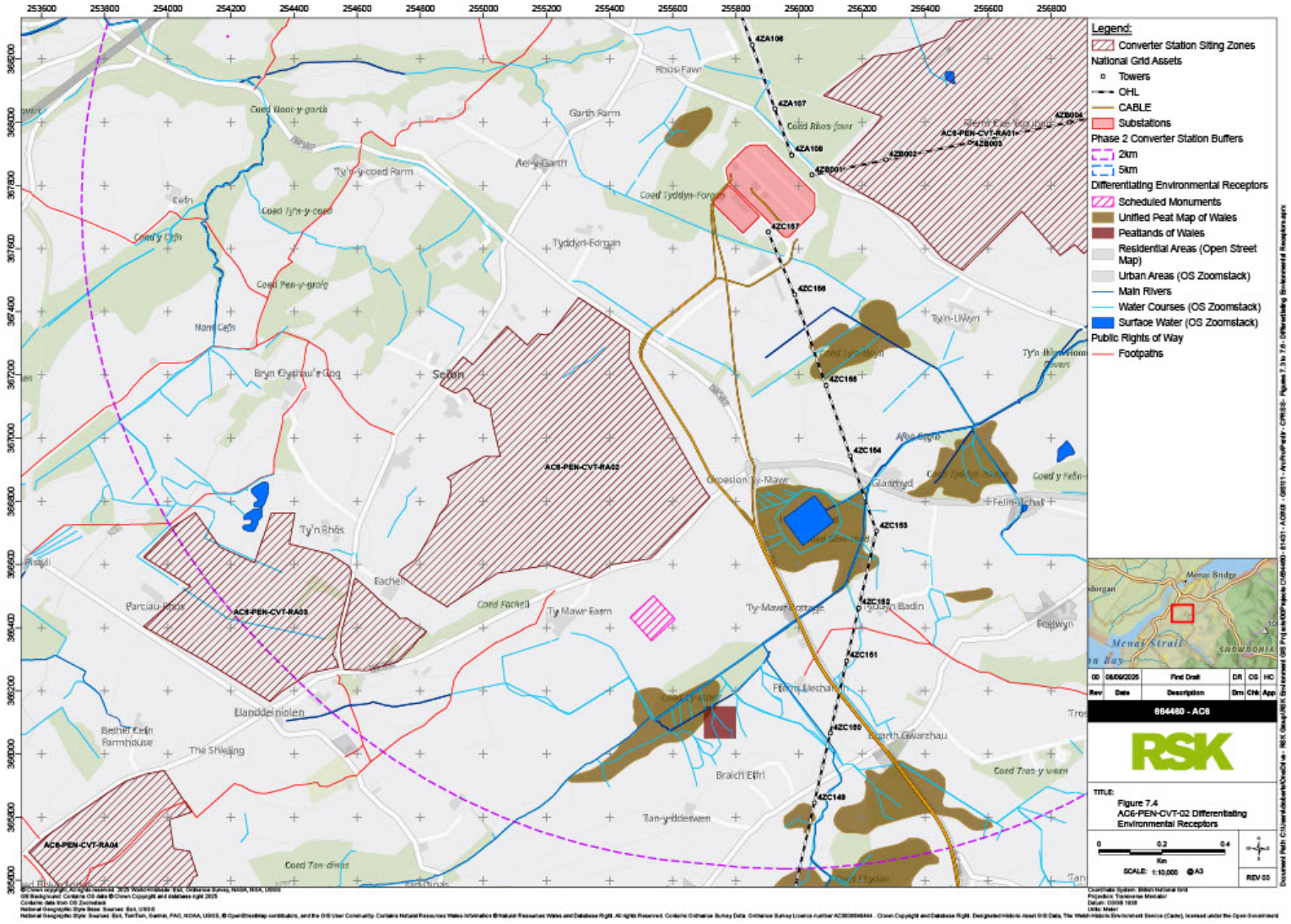
The main socio-economic effects will be short-term disturbance from construction traffic, dust, noise and visual intrusion particularly to nearby receptors within 250m of the AC6-PEN-CVT-RA02 boundary. Mitigation will involve screening to preserve visual amenity, effective communication with nearby residents, traffic management measures, construction noise/dust controls and carefully planned construction timing and phasing. The layout will need to maximise setback distances and position taller elements away from key viewpoints. During construction, best practice measures such as implementation of CTMP would be needed.

National Grid Assets

This Converter Station Siting Zone does not intersect any underground cables, OHLs or substations however, Pentir substation and two associated underground cables are located within 250 m of the siting zone boundary. Potential adverse effects include accidental cable strikes during excavation or earthworks, which could result in safety hazards, service disruption, and costly repairs. Construction activities may also hinder access to cables for maintenance or emergency interventions, contravening required easement or buffer zones. Long-term, the permanent footprint of the converter station may restrict future asset upgrades or operational flexibility for the cable owner, reducing network resilience and operational efficiency. Mitigation would include early engagement with the cable operator (National Grid) to confirm cable location and condition, establishment of clear easement and exclusion zones, and use of detailed utility surveys. Access routes and working arrangements would be developed in collaboration with the cable owner to ensure constant access is maintained.

The Differentiating Environmental Receptors for AC6-PEN-CVT-RA02 as described above were mapped using GIS and are presented in **Figure 7.3.2**: AC6-PEN-CVT-RA02 Differentiating Environmental Receptors

Figure 7.3.2: AC6-PEN-CVT-RA02 Differentiating Environmental Receptors



7.3.4 AC6-PEN-CVT-RA03

7.3.4.1 Biological Environment

Special Areas of Conservation (SACs)/ Sites of Special Scientific Interest (SSSIs)
AC6-PEN-CVT-RA03 does not fall within 2 km of any SSSIs. AC6-PEN-CVT-RA03 does not directly intersect any European designated Habitat sites however, Snowdonia SAC (UK0012946) and Menai Strait and Conwy Bay SAC (UK0030202) are located approximately 3.9 km east and 1.85 km west of AC6-PEN-CVT-RA03, respectively.

The two SAC sites are designated for habitats only, and given the distance, no habitat loss is anticipated to occur. Neither SAC are designated for mobile qualifying species and therefore functionally linked offsite habitat is not considered to be present at the proposed siting zone. Despite this, the potential use of the site by Eurasian curlew for nesting (as functionally linked offsite habitat) needs to be determined through site surveys. The SACs are also considered to be sufficiently distant such that noise and dust issues are unlikely, assuming good practice construction techniques and standard pollution prevention measures are employed.

Special Protection Areas (SPAs)
Lavan Sands, Conway Bay SPA (UK9013031) designated for oystercatcher, red-breasted merganser, Eurasian curlew, great crested grebe and common redshank, is located approximately 7.77 km north of AC6-PEN-CVT-RA03. The Core Management Plan for the site only lists oystercatcher as a qualifying feature of the SPA. Apart from Eurasian curlew, the other species are waders and/or waterbirds that are unlikely to utilise offsite farmland habitat. Curlew tracking from the Severn shows the species can range for large distances, although predominantly up and down the estuary. The value of the farmland habitat would need to be confirmed through survey work.

7.3.4.2 Physical Environment

Landscape & Visual Amenity
Visual receptors within proximity of the Converter Station Siting Zone encompass a few residential properties, Ty'n Rhos Country House Hotel, and a few nearby PRoW (between Cefn Gwyn and Coed Pen-y-graig to the southwest and in and around Llanddeiniolen to the southeast). AC6-PEN-CVT-RA03 lies within the LANDMAP GWNDDVS006 Visual and Sensory Area. There is potential for cumulative impacts with cable installation works in AC6-PEN-CC-RA08, although wide ranging views of the upland landscape including views towards Snowdonia and Menai Straits (described in LANDMAP evaluation) are unlikely to be affected by the introduction of AC6-PEN-CVT-RA03. Effects are anticipated to be greatest during construction. Views from scattered properties and the Ty'n Rhos Country House Hotel should be considered.

Potential landscape impacts include the removal of ground cover and boundary hedgerows to accommodate the footprint and access tracks of AC6-PEN-CVT-RA03, along with the introduction of additional energy infrastructure within a rolling landscape (with upland traits) of local importance. Micrositing would be leveraged to position lower lying parts of the site away from potential receptors, while maintaining existing boundary features, such as hedgerows for additional screening. Mitigation planting in the form of woodland, thicket or woodland pocket planting would replicate existing features in the landscape and would be appropriate to local landscape character.

Main Rivers, Water Courses and Surface Waters
While the Converter Station Siting Zone does not intersect any Main Rivers, two small watercourses run through the middle of the area while two surface water bodies are located within 250 m of the siting zone boundary. Construction activities pose a range of potential adverse effects including sediment-laden runoff, accidental spillage of fuels or chemicals, and physical disturbance to the onsite watercourse. These risks may lead to pollution or degradation of local water quality and hydrological regimes, both within the site and in nearby connected water bodies. A suite of mitigation measures would be implemented to protect the onsite watercourse and nearby surface water features. These may include controlled drainage strategies, sediment control measures, and strict pollution prevention protocols during construction. A minimum buffer would be maintained around the onsite watercourse,

and any diversion or culverting works would follow regulatory guidance to maintain ecological and hydrological function.

7.3.4.3 Historic Environment

Scheduled Monuments

There are no designated heritage assets within the Converter Station Siting Zone. However, the site lies within 2 km of eight Scheduled Monuments, including Fodol Ganol Enclosed Hut Group, Rectangular Earthwork 110m NW of Coed Ty Mawr, Dinas Dinorwic Camp, Glascoed Ancient Village, Glascoed Round Cairn, Cae Metta Hut Group, Cefn Mawr Hut Group and Pen-y-Gaer Camp. Construction activities may potentially cause adverse effects from changes within the setting of these assets.

7.3.4.4 Access

Highway Access

This Converter Station Siting Zone comprises two parcels (located north of the B4366), which will require two individual accesses. Access to the siting zone would be via this high-quality B-road and additional minor roads. One of these minor roads passes between the larger and smaller parcels. These roads may not be designed to accommodate high volumes of HGV traffic and may be subject to weight or width restrictions that constrain vehicle access (the road from the B4336 passing Seion Village is signposted as unsuitable for HGVs). As such, a new access road would be required from the B4366 to the larger parcel. Access to the larger parcel could also be taken from a new access off the road from Cefn Gwyn passing Parciau Rhos. There is one PRoW located directly north of the Converter Station Siting Zone that requires consideration.

Early engagement with Cyngor Gwynedd, MNWTRA and private landowners would be required to agree a preferred access route and any necessary upgrades. A CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures (detailing timing of deliveries, banksmen, signage, wheel-wash and road cleanliness) to minimise disruption.

7.3.4.5 Socio-Economic Environment

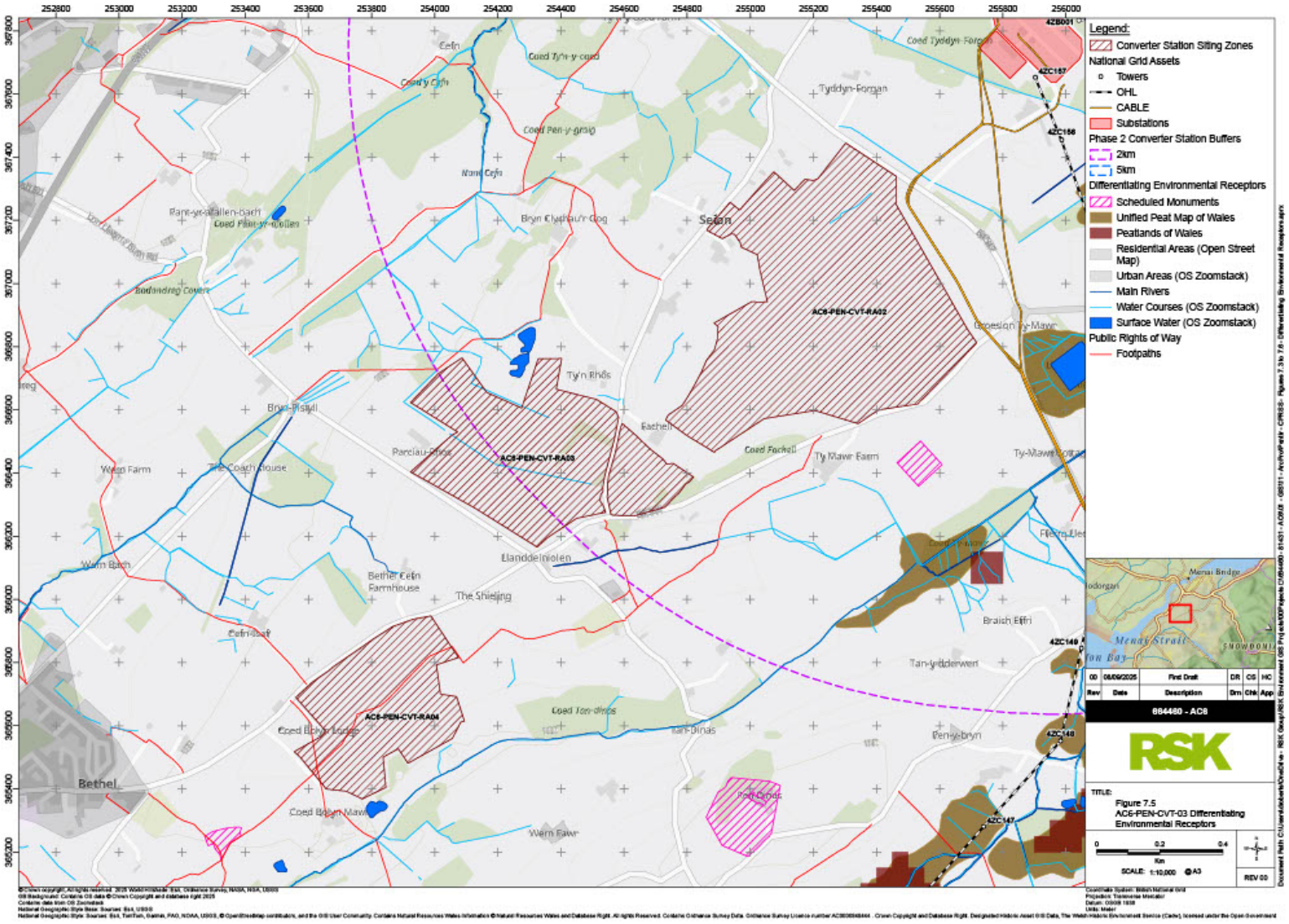
Local Planning Receptors

There are no local plan allocations intersecting AC6-PEN-CVT-RA03 and no urban Areas within 250 m. However, there are small areas of settlements (surrounding Llanddeiniolen), and two individual residential properties within 250 m of the site boundary. There is relatively little socio-economic activity associated with this Converter Station Siting Zone option. The site does not intersect any PRoW however; there are two PRoW within 250 m of the siting zone boundary (three footpaths and one restricted byway).

The main socio-economic effects would be short-term disturbance from construction traffic, dust, noise and visual intrusion. Mitigation would involve screening to preserve visual amenity, effective communication with nearby residents, traffic management measures, construction noise/dust controls, and carefully planned construction timing and phasing. The layout would need to maximise setback distances and position taller elements away from key viewpoints. During construction, best practice measures such as implementation of CTMP will be needed.

The Differentiating Environmental Receptors for AC6-PEN-CVT-RA03 as described above were mapped using GIS and are presented in **Figure 7.3.3**: AC6-PEN-CVT-RA03 Differentiating Environmental Receptors

Figure 7.3.3: AC6-PEN-CVT-RA03 Differentiating Environmental Receptors



7.3.5 AC6-PEN-CVT-RA04

7.3.5.1 Biological Environment

Special Areas of Conservation (SACs)/ Sites of Special Scientific Interest (SSSIs)

AC6-PEN-CVT-RA04 does not fall within 2 km of any SSSIs. AC6-PEN-CVT-RA04 does not directly intersect any European designated sites, however, Snowdonia SAC (UK0012946) and Menai Strait and Conwy Bay SAC (UK0030202) are located approximately 3.44 km east and 2.15 km west of AC6-PEN-CVT-RA04 respectively.

The two SAC sites are designated for habitats only, and given the distance, no habitat loss is anticipated to occur. Neither SAC are designated for mobile qualifying species and therefore functionally linked offsite habitat is not considered to be present at the siting zone. Despite this, the potential use of the site by Eurasian curlew for nesting (as functionally linked offsite habitat) needs to be determined through site surveys. The SACs are also considered to be sufficiently distant such that noise and dust issues are unlikely, assuming good practice construction techniques and standard pollution prevention measures are employed.

Special Protection Areas (SPAs)

Lavan Sands, Conway Bay SPA (UK9013031) designated for oystercatcher, red-breasted merganser, Eurasian curlew, great crested grebe and common redshank, is located approximately 8.84 km north of AC6-PEN-CVT-RA04. The Core Management Plan for the siting zone only lists oystercatcher as a qualifying feature of the SPA. Apart from Eurasian curlew, the other species are waders and/or waterbirds that are unlikely to utilise offsite farmland habitat. Curlew tracking from the Severn shows the species can range for large distances, although predominantly up and down the estuary. The value of the farmland habitat would need to be confirmed within survey work.

7.3.5.2 Physical Environment

Landscape & Visual Amenity

Visual receptors within proximity of the Converter Station Siting Zone encompass a few residential properties (Coed Bolyn Lodge and terrace at Erw-Bian on B4366) and existing PRoW immediately adjacent to AC6-PEN-CVT-RA04 at Coed Bolyn Lodge, then crossing the site towards Coed Bolyn Mawr. Another PRoW crosses the siting zone between Coed Bolyn Mawr and Llanddeiniolen. The greatest visual impacts are anticipated to affect users of these PRoW; however, the magnitude of effects will vary along the route depending on distance from the site and inter-visibility with the converter station, as well as from natural screening. Depending on micrositing these may require diversion (temporary or permanent) to accommodate construction. While there is high potential for views from these PRoW to be adversely affected, backdrop views of Snowdonia will remain unaffected.

Potential landscape impacts include the removal of ground cover and boundary hedgerows to accommodate the footprint and access tracks of AC6-PEN-CVT-RA04, along with the introduction of additional energy infrastructure within a rolling farmland of local importance. Micrositing of the converter station structure towards the lower southern part of siting zone below Coed Bolyn Lodge is preferable, reducing the prominence of the structure and positioning it further from the road (although views from Coed Bolyn Lodge would still be impacted).

Historic Landfill Sites

The Converter Station Siting Zone does not directly intersect any Historic Landfill Sites, however there is a large Historic Landfill Site located on the siting zone boundary. This presents several environmental and technical construction risks associated with the disturbance of contaminated ground that can lead to the mobilisation of pollutants such as leachate, landfill gas (e.g. methane), or hazardous materials. This could pose risks to human health, local water quality, and soil integrity.

Detailed site investigations would be required to assess the nature and extent of any contamination, gas generation potential, and ground stability. Foundation design would be adapted to account for variable ground conditions, with potential use of piling or ground improvement techniques. A contamination land risk assessment would inform the need for protective barriers, drainage controls, or landfill gas protection measures.

7.3.5.3 Historic Environment

Scheduled Monuments

There are no designated heritage assets within the Converter Station Siting Zone. However, the site lies within 2 km of nine Scheduled Monuments, including Rectangular Earthwork 110m NW of Coed Ty Mawr, Dinas Dinorwic Camp, Glascoed Ancient Village, Glascoed Round Cairn, Cae Metta Hut Group, Cefn Mawr Hut Group, Pen-Y-Gaer Camp and Settlement NW of Waen Rhythallt. Construction activities may potentially cause adverse effects from changes within the setting of these assets.

7.3.5.4 Access

Highway Access

The Converter Station Siting Zone is accessible via one high-quality B-road (B4366) north of the siting zone, while one private road (providing access to Snowdonia Stone) also runs adjacent (within 250 m) to the west of the siting zone boundary. This B-road may not be designed to accommodate high volumes of HGV traffic and may be subject to weight or width restrictions that constrain vehicle access.

For access from the B4366 a new access would need to be formed. Construction traffic will present additional adverse effects including accelerated road surface degradation and increased safety risks at pinch points and junctions. Increased traffic movements may also contribute to increased congestion, particularly where temporary road closures are required.

AC6-PEN-CVT-RA04 intersects two PRoW. These run through the middle of siting zone and may create direct land use conflict and require permanent diversion, stopping-up, or significant design alteration. Potential effects include the loss of public access, amenity, and connectivity. The PRoW status as a legal highway also introduces procedural and consenting implications. Mitigation would typically involve the preparation of a formal diversion or stopping-up order under the TCPA 1990, in consultation with the Local Highways Authority (if construction is planned to impact these PRoW).

Early engagement with Cyngor Gwynedd, MNWTRA, user groups and private landowners would be required to agree a preferred access route, any necessary upgrades and suitable diversions that maintain accessibility and user experience. A CTMP may be required, which would, as necessary, outline mitigations for HGV routing, traffic controls and safety measures (detailing timing of deliveries, banksmen, signage, wheel-wash and road cleanliness) to minimise disruption.

7.3.5.5 Socio-Economic Environment

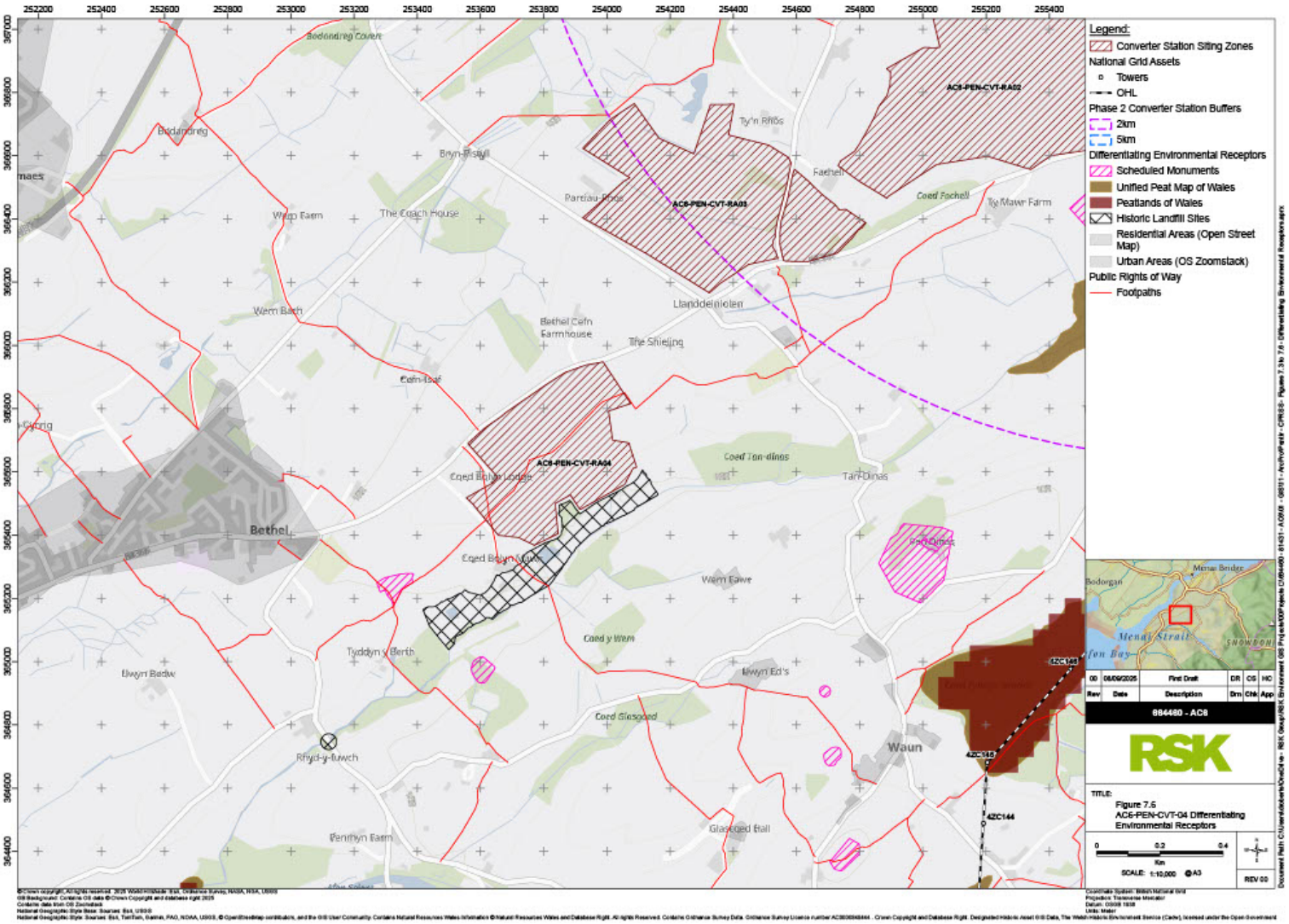
Local Planning Receptors

There are no local plan allocations intersecting the Converter Station Siting Zone and no Urban Areas within 250 m. However, there are three individual residential properties within 250 m of the siting zone boundary. Construction activity may lead to temporary changes in the local visual environment, and noise levels. The siting of a converter station within 250 m of individual residential properties may impact the setting of these receptors by altering the local landscape character, visual amenity, and potentially contributing to perceptible noise or light intrusion. Thus, the two individual residential properties that lie within 250m of the site boundary would need to be considered during the design phase.

Potential mitigation would include use of screening to preserve visual amenity, and clear communication with nearby residents during construction. Consideration of construction timing and phasing in relation to other nearby developments would help avoid conflict or overload of local infrastructure. To mitigate the impact of a permanent converter station within 250 m of residential properties, a combination of landscape screening (e.g. native planting, bunds), sensitive design (muted colours, minimal lighting), and noise reduction measures (acoustic barriers, low-noise equipment) could be implemented. The layout should maximise setback distances and position taller elements away from key viewpoints. During construction, best practice measures such as implementation of CTMP may be needed.

The Differentiating Environmental Receptors for AC6-PEN-CVT-RA04 as described above were mapped using GIS and are presented in **Figure 7.3.4**: AC6-PEN-CVT-RA04 Differentiating Environmental Receptors**.**

Figure 7.3.4: AC6-PEN-CVT-RA04 Differentiating Environmental Receptors



7.4 Engineering Factors

7.4.1 AC6-PEN-CVT-RA01

AC6-PEN-CVT-RA01 is strategically positioned near Pentir substation and key road networks, forming one of the shortest routing options (comparable to CVT-02). Despite this, the site is heavily constrained by existing utilities infrastructure (including gas, telecommunications, water, and electrical lines) within and around the site, which may require careful management. Diversions, overhead clearance issues and temporary restrictions may lead to construction delays, while diverting around these features may result in limited layout options and complex, extended cable routing. A major overhead line running southwest to northeast effectively bisects the site, creating a potential overhead clearance issue. Modifications to this existing overhead line may be required for the expansion of the existing Pentir Substation to preserve operational flexibility.

Topographically, moderate portions of the central and southern areas exhibit slopes ranging from 5° to over 10°, which will likely require earthworks to achieve suitable development platforms. Additionally, shallow bedrock, glacial soils, with a high concentration of gravel and boulders and uncertain water table depth may complicate construction methods and necessitate deeper pile foundations.

Standard topographic surveys and site-specific ground investigations, alongside early engagement with landowners and contractors will be essential to inform the design process, substation layout, earthwork requirements, and support swept path analysis for construction access and vehicle movements. While the site, along with AC6-PEN-CVT-RA02 offers the most direct theoretical route to the Pentir substation the presence of steep terrain and extensive utility crossings introduces significant design challenges. The site is spatially extensive, allowing for numerous options for the siting and orientation of above ground infrastructure.

7.4.2 AC6-PEN-CVT-RA02

AC6-PEN-CVT-RA02 is strategically positioned near Pentir substation with good connectivity to the B4547 and B4366 road network and forms one of the shortest routing options (comparable to AC6-PEN-CVT-RA01). The presence of an 11 kV overhead electric line to the northeast of the site represents a key engineering constraint due to potential overhead clearance issues.

Topographically large portion of the central and southern areas exhibit slopes ranging from 5° to over 10°, which will require substantial earthworks to achieve suitable development platforms. Additionally, shallow bedrock, glacial soils, with a high concentration of gravel and boulders and uncertain water table depth may complicate construction methods and necessitate deeper pile foundations. A shallow water table is expected in the north of the site which may require piled foundations due to the risk of settlement. The site also hosts reed swamps, which will need to be carefully manages to avoid development of acetic conditions for the onshore cables.

Standard topographic surveys and site-specific ground investigations, alongside early engagement with landowners and contractors will be essential to inform the design process, substation layout, earthwork requirements, and support swept path analysis for construction access and vehicle movements. Challenges associated with steep terrain are expected to persist and should be carefully addressed during the design phase.

7.4.3 AC6-PEN-CVT-RA03

AC6-PEN-CVT-RA03 is the second furthest location from the Pentir substation, accessible via an indirect road connection. However, the suitability for abnormal load vehicle access is currently unverified. Haul roads, road reinforcements, extensions, and bellmouths are likely to be required to facilitate construction access. The presence of an 11 kV overhead electric line crossing the site from northeast to southwest bisects the western portion of the site, presenting a moderate technical constraint to overhead clearance risk. If adequate clearance cannot be achieved, this may constrain substation layout options and require design diversions.

Topographically, a limited portion of the central and eastern areas features slopes ranging from 5° to over 10°, which may require targeted earthworks to establish suitable development platforms. Additionally, shallow bedrock, glacial soils, with a high concentration of gravel and boulders and

uncertain water table depth may complicate construction methods and necessitate deeper pile foundations.

Standard topographic surveys and site-specific ground investigations, alongside early engagement with landowners and contractors will be essential to inform the design process, substation layout, earthwork requirements, and support swept path analysis for construction access and vehicle movements. The site is the second least direct to the Pentir substation, but the absence of extensive utility crossings makes the site less challenging than AC6-PEN-CVT-RA02. Land availability is a key risk to delivery of this site, and impacts flexibility in orientation of the converter station for natural screening.

7.4.4 AC6-PEN-CVT-RA04

AC6-PEN-CVT-RA04 is the furthest location from the Pentir substation, accessible via indirect connections to Y Ddol and Barrington Roads. However, the suitability for abnormal load vehicle access remains unverified. Construction access will likely require the development of haul roads, road reinforcements, extensions, and bellmouths. The presence of utilities is currently unknown and should be confirmed through detailed utility searches and further investigation. Increased distance may necessitate reactive compensation for the AC buried cables, especially if crossing other buried utilities. A historical landfill site is located to the south of the proposed site and uncertainties related to this location increase the residual risk.

Topographically, a limited portion of the eastern area features slopes ranging from 5° to over 10°, which may require targeted earthworks to establish suitable development platforms. Additionally, shallow bedrock, glacial soils, with a high concentration of gravel and boulders and uncertain water table depth may complicate construction methods and necessitate deeper pile foundations.

Standard topographic surveys and site-specific ground investigations, alongside early engagement with landowners and contractors will be essential to inform the design process, substation layout, earthwork requirements, and support swept path analysis for construction access and vehicle movements. The site is the least direct to the Pentir substation, but the absence of significant steep terrain and extensive utility crossings makes the site less challenging than AC6-PEN-CVT-RA02. Land availability is a key risk to delivery of this site, and impacts flexibility in orientation of the converter station for natural screening.

7.5 Comparative Appraisal and Summary for Converter Station Siting Zones

From both an engineering and environmental perspective, AC6-PEN-CVT-RA01 is the most preferred siting zone. It lies within the 2 km radius of Pentir substation, sits in enclosed rolling farmland, and can be accessed from the A4244 via minor B-roads with proposed upgrades. The principal differentiating risks are proximity to existing assets and OHL clearance, which are manageable through early engagement with National Grid Electricity Transmission/National Gas Transmission (NGT) or National Gas Distribution (NGD) and a construction access assessment. No direct peatland, SSSI or SPA conflicts; potential effects on nearby Ancient Woodland and five nearby Scheduled Monuments are limited to setting and can be addressed through micrositing, screening and a proportionate WSI. With limited receptors within 250 m and no PRoW crossings, the socio-economic risk profile is low and largely construction-phase only. Overall, AC6-PEN-CVT-RA01 offers the best balance of deliverability, consenting confidence and operational flexibility.

AC6-PEN-CVT-RA02 is the second preferred siting zone. It also sits within 2 km of Pentir and benefits from direct frontage to two high-quality B-roads (B4547/B4366), simplifying Abnormal Indivisible Load (AIL) routing subject to junction improvements. Differentiating risks relate to cut-and-fill, existing buried/adjacent assets, and settlement potential. These are well bounded: converter siting refinement, targeted ground investigation, and early engagement with telecoms/utility owners are expected to reduce risk. One minor watercourse traverses the site; a standard buffer, pollution prevention and sustainable drainage strategy will reduce hydrological effects. Visual effects are manageable with micrositing toward lower ground and woodland/thicket planting along the B4366. Receptors within 250 m are few; PRoWs lie outside the footprint. On balance, AC6-PEN-CVT-RA02 is highly viable, with a slightly higher engineering effort than AC6-PEN-CVT-RA01 due to platform formation and utilities diversion coordination. However, RA01 remains the preferred option overall, as it combines proximity

to Pentir substation, fewer environmental constraints, low socio-economic risk and manageable engineering challenges that offers greater consenting confidence and clearer pathway to operation.

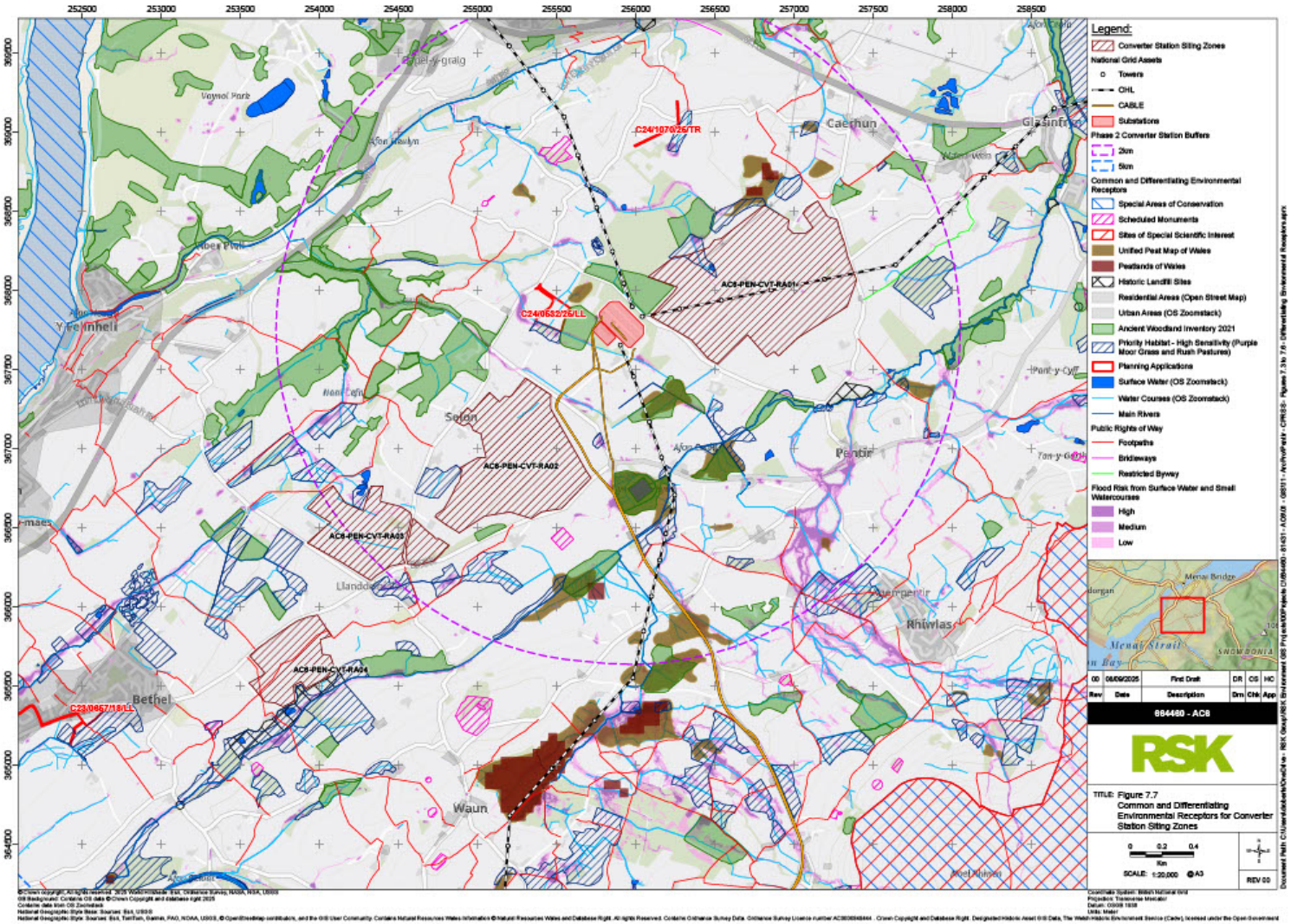
AC6-PEN-CVT-RA03 option is third-ranked. Although still within the 2 km radius, it comprises two separate parcels north of the B4366, which increases access complexity for AIL, internal logistics and construction phasing. Risks are AIL access, existing assets, settlement, and a restricted developable area; mitigations include swept-path assessment, early engagement with telecoms, and ground investigation, but the split-parcel layout continues to constrain layout and landscaping opportunities. Two small watercourses and nearby surface waters elevate construction water-management needs. Views from scattered properties and the Ty'n Rhos Country House Hotel require careful design and planting; PRoW in close proximity add sensitivity during construction. These issues are not prohibitive, but they increase complexity, programme risk and stakeholder interface compared with AC6-PEN-CVT-RA01 or AC6-PEN-CVT-RA02.

AC6-PEN-CVT-RA04 is the least preferred siting zone. It lies outside the 2 km radius (approximately 3 km from Pentir), directly intersects two PRoWs, and sits beside the B4366 with nearby residences (e.g., Coed Bolyn Lodge). Differentiating risks include AIL access, existing assets, settlement, restricted site area, and a potential groundwater/landfill constraint on the boundary. While AIL access could be engineered (swept-path design, junction works), the combination of PRoW diversions or stopping-up, closer residential viewpoints, and the need for a landfill desk study/hydrogeology assessment (with possible gas/leachate controls and foundation adaptation) elevates consenting and construction risk. Landscape and visual effects are also harder to contain due to the PRoW that cross the siting zone, requiring robust mitigation. AC6-PEN-CVT-RA04 presents the highest planning and delivery risk of the four options.

To support the summaries in this section, **Figure 7.5.1**: Common and Differentiating Environmental Receptors for Converter Station Siting Zones illustrates the common and differentiating receptors for all Converter Station Siting Zone, bringing all constraints together for ease of comparison.

Further details and confirmation of the emerging preference to progress to Stage 3: Defined Proposal and Statutory Consultation for the Converter Station Siting Zones is provided in **EMERGING PREFERENCES**.

Figure 7.5.1: Common and Differentiating Environmental Receptors for Converter Station Siting Zones



8. EMERGING PREFERENCES

8.1 Landfall Siting Zone

As detailed in **Landfall Siting** Zones, landfall siting activities commenced during Stage 1: Strategic Options and were subsequently verified and refined through Stage 2: Options Identification and Selection. The selection of Pentir as the preferred onshore connection point for North Wales led to the identification of six Landfall Siting Zones along a 5.5 km stretch of the Caernarfon Bay coastline, between Dinas Dinlle and Clynnog Fawr.

During Stage 2, these six zones underwent detailed technical assessment by AtkinsRéalis and Evolv Energies. Zones LF1 to LF4 were found to be technically viable, pending further geophysical surveys to inform seabed and subsurface conditions and the construction feasibility, including the use of trenchless installation methods (e.g. HDD). In contrast, LF5 and LF6 were discounted due to significant HDD limitations, as outlined in **Stage 2**: Options Identification and Selection.

Following the initial Stage 2 appraisal, as outlined in **Chapter** Error! Reference source not found., further marine engineering review was undertaken by Evolv Energies and AtkinsRéalis. This review informed the emerging preferences and identified specific marine engineering feasibility constraints associated with LF1. These constraints included constructability and offshore installation considerations, which reduced confidence in LF1's suitability compared to the remaining three options.

These findings were discussed during the Landfall Challenge and Review (C&R). Through this collaborative review process and having regard to the conclusions of the marine engineering decisions, it was agreed that LF1 should be discounted from further consideration at this stage of the Project and would not be carried forwards into Stage 3: Defined Proposal and Statutory Consultation.

It was concluded that none of the technically viable zones (LF2 to LF4) could be confirmed or parked from progression to Stage 3 at this time. This reflects ongoing nearshore marine geophysical surveys, which aim to resolve anomalies in existing bathymetric datasets and identify additional constraints such as wrecks, seabed features, or Annex I biogenic reef habitats that may not have been previously captured.

The survey programme is currently underway, with completion in 2026. However, notwithstanding the pending survey data, the outcomes of the marine engineering technical review and the Landfall C&R provided sufficient certainty to discount LF1 at this stage. Until the new data is received and analysed, the viability of individual landfall options cannot be confirmed. Therefore, it was agreed that LF2 to LF4 will remain under consideration and be progressed to Stage 3.

Based on current assessments and pending further marine data, the emerging preferred Landfall Siting Zones are (in no order of preference):

- LF2;
- LF3; and
- LF4.

These zones will be carried forward into Stage 3 and included in EIA Scoping, ensuring the Welsh Onshore Project retains sufficient optionality as the design evolves. At this stage there is no preference between LF2, LF3 and LF4.

8.2 Landfall Compound Siting Area

The identification and ranking of Landfall Compound Siting Areas were undertaken independently of the broader Landfall Siting Zone appraisals, although they are inherently linked to the viability of their associated siting zones.

From both a technical and environmental perspective, it was agreed that the Landfall Compound Siting Areas are ranked in the following order of preference:

1. AC6-PEN-LFC-LF2AB
2. AC6-PEN-LFC-LF3A/3B/3C;
3. AC6-PEN-LFC-LF4A/4B; and
4. AC6-PEN-LFC-LF1A.

Details of the reasons behind this ranking are provided in **OPTIONS APPRAISAL** – LANDFALL COMPOUND SITING AREAS.

During the Challenge and Review, RSK reiterated that while each compound area had undergone environmental appraisal, the final selection will be more heavily influenced by technical feasibility, marine constraints, and land ownership/deliverability which is consistent with the approach taken for Landfall Siting Zones. Environmental considerations remain important for identifying risks and opportunities, but they are not the primary drivers of decision-making.

It is important to note that the viability of each compound is contingent upon the progression of its associated Landfall Siting Zone. As outlined in **Landfall Siting** Zone, LF1 has been discounted from further consideration, and therefore its associated Landfall Compound Siting Area (AC6-PEN-LFC-LF1A) is not being progressed into Stage 3.

Accordingly, Landfall Compound Siting Areas associated with LF2, LF3 and LF4 (see **Landfall Siting** Zone), will be progressed into Stage 3 to maintain flexibility and ensure alignment with the emerging preferred Landfall Siting Zones. This approach will enable the Welsh Onshore Project to retain sufficient optionality as further technical and marine data becomes available.

8.3 Cable Corridor Combination

As outlined in **Comparative Appraisal** and Summary for Cable Corridor Combinations and following Step 7 of the 9-step options appraisal methodology (see **OPTIONS APPRAISAL** APPROACH), AC6-PEN-CC-LF2_W has been identified as the most preferred Cable Corridor Combination, closely followed by LF2_E. If LF3 is selected as the preferred landfall, the AC6-PEN-CC-LF3 (A, B and C) + AC6-PEN-CC RA11 + AC6-PEN-CC-LF2_W/E combination becomes the second most favoured option. Other alignments such as AC6-PEN-CC-LF3_E and LF3_W are considered workable but less favourable, while AC6-PEN-CC-LF4_W and LF4_E are the least preferred due to their greater length, landscape designations, and more challenging environmental and socio-economic constraints.

The appraisal findings, based on the five-phase approach illustrated in **Figure 4.9.7**, were discussed during the Cable Corridor Challenge and Review.

8.3.1 Challenge and Review Outcomes and Next Steps

Although AC6-PEN-CC-LF2_W remains the confirmed preferred Cable Corridor Combination, the project team has agreed to refine its boundary to increase flexibility as the corridor transitions into the Graduated Swathe model. This refinement involved a realignment and integration of multiple Cable Corridor Sections to reinforce connectivity with the main AC6-PEN-CC-LF2_W route.

To optimise connectivity across Landfall Siting Zones (LF2, LF3 and LF4), the team incorporated unconstrained areas from various corridor combinations originating within each Landfall Siting Zone. Additionally, Cable Corridor Section AC6-PEN-CC-RA11 was introduced to enhance connectivity specifically to LF3 and LF4. This approach reflects the decision to discount LF1 and concentrates the Graduated Swathe on the landfall options progressing into Stage 3.

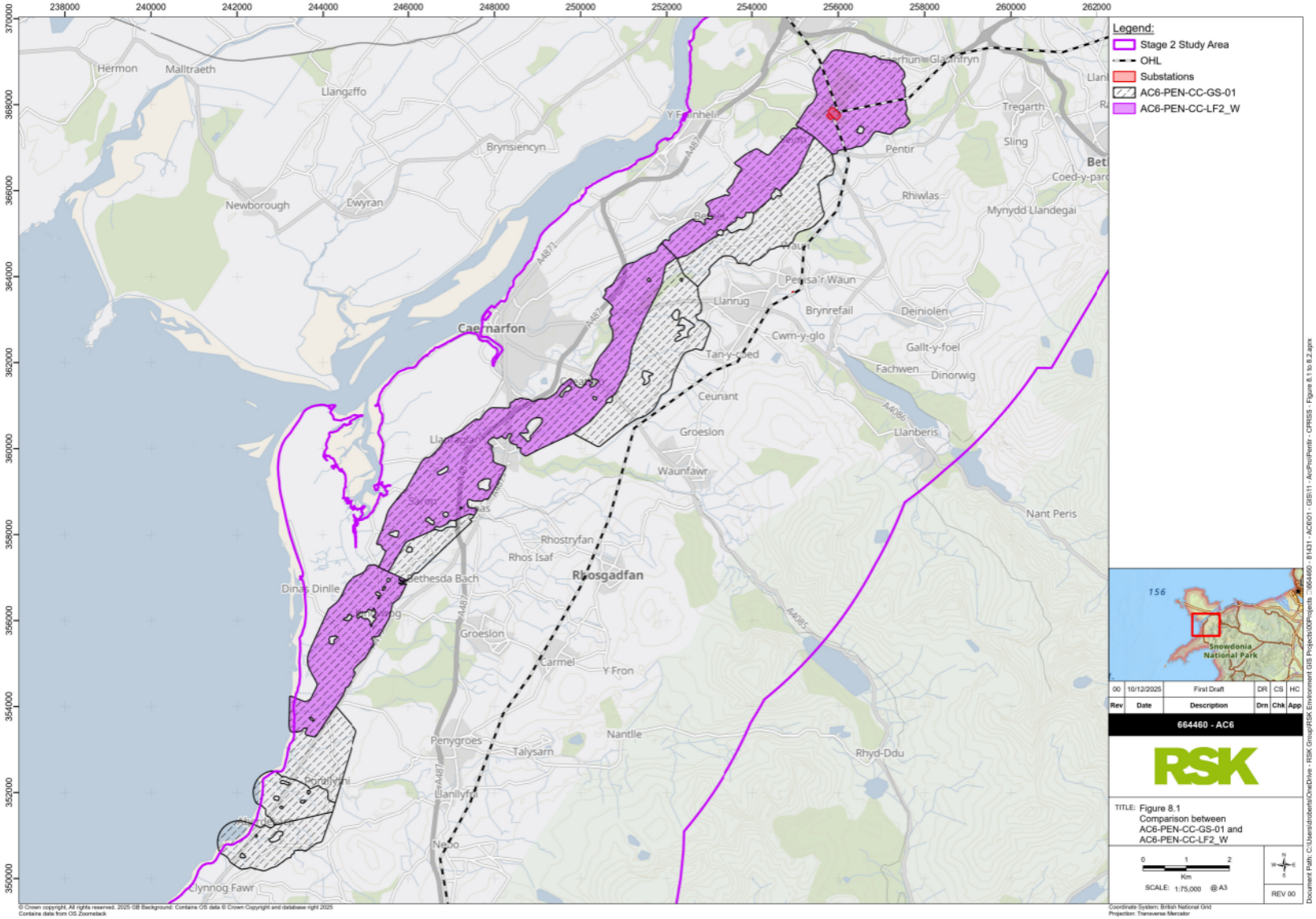
The following changes were agreed upon:

- Routes southwest of Glynllifon SAC/SSSI and AC6-PEN-CC-RA04 have been parked and will not be taken forward to Stage 3: Defined Proposal and Statutory Consultation;
- Revisions to Cable Corridor Section boundaries for AC6-PEN-CC-RA05, AC6-PEN-CC-RA06, AC6-PEN-CC-RA07, AC6-PEN-CC-RA08, and AC6-PEN-CC-RA09 to support the Graduated Swathe model;
- Cable Corridor Section AC6-PEN-CC-RA07 is parked due to the longer crossing distance over Afon Gwyrfai SSSI compared to AC6-PEN-CC-RA05. A small section of AC6-PEN-CC-RA07 will be retained for potential future use;
- Cable Corridor Sections AC6-PEN-CC-RA08 and AC6-PEN-CC-RA09 will be combined and refined; and
- AC6-PEN-CC-RA03, AC6-PEN-CC-RA02, and AC6-PEN-CC-RA11 will be refined to create a Graduated Swathe corridor providing access to LF3 and LF4, maintaining optionality.

8.3.2 Formation of AC6-PEN-CC-GS-01

A new Cable Corridor Combination, AC6-PEN-CC-GS-01, will be established to reflect the changes outlined above and to clearly differentiate it from the Cable Corridor Combinations used during Stage 2. As the Welsh Onshore Project advances into Stage 3, this new combination will serve as the corridor boundary for the Graduated Swathe. **Figure 8.3.1**: Comparison between AC6-PEN-CC-GS-01 and AC6-PEN-CC-LF2_W illustrates the distinctions between AC6-PEN-CC-GS-01 and AC6-PEN-CC-LF2_W, highlighting areas where the boundary has been expanded to incorporate additional corridor sections. These adjustments are intended to enhance flexibility and accommodate evolving project requirements.

Figure 8.3.1: Comparison between AC6-PEN-CC-GS-01 and AC6-PEN-CC-LF2_W



In conclusion, the emerging preferred Cable Corridor Combination is AC6-PEN-CC-GS-01, which is primarily based on AC6-PEN-CC-LF2_W, with key unconstrained areas from other sections incorporated. This approach ensures greater optionality and adaptability as the Welsh Onshore Project moves into Stage 3: Defined Proposal and Statutory Consultation.

8.4 Converter Station Siting Zones

As outlined in **Section 5.5**, the Converter Station Siting Zones have been ranked in order of preference based on both technical and environmental considerations:

1. AC6-PEN-CVT-RA01;
2. AC6-PEN-CVT-RA02;
3. AC6-PEN-CVT-RA03; and
4. AC6-PEN-CVT-RA04.

During the Challenge and Review (Step 8 of the 9-step options appraisal methodology), each siting zone was assessed against Common and Differentiating Environmental Receptors, detailed in **Common Environmental** Receptors for Converter Station Siting Zones and **Differentiating** Environmental Receptors for Converter Station Siting Zones, respectively. Following this, it was agreed that AC6-PEN-CVT-RA03 and AC6-PEN-CVT-RA04 would be parked and not progressed to Stage 3, for the following primary reasons.

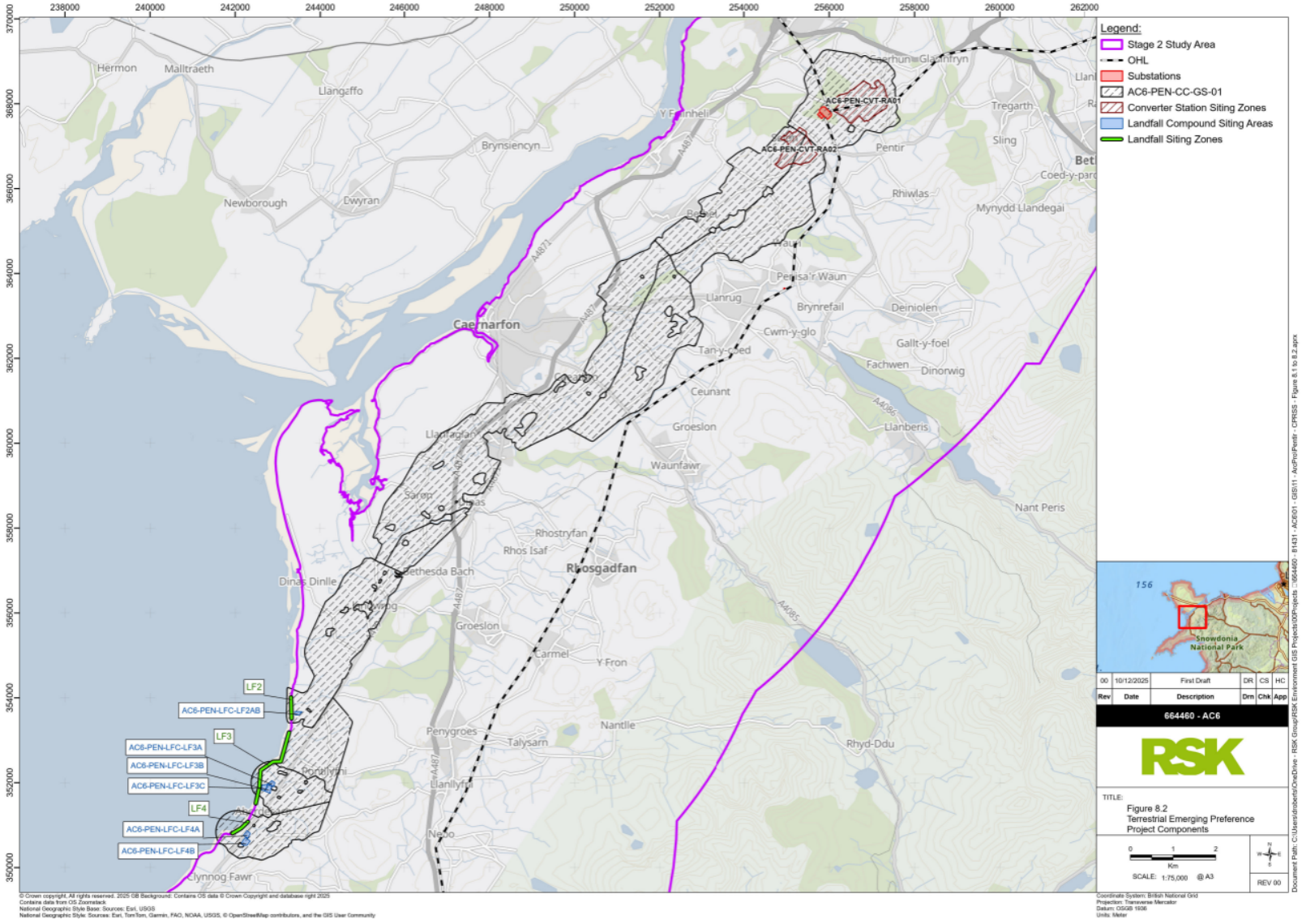
- AC6-PEN-CVT-RA03 is bisected by the B4366, presenting significant logistical challenges for AIL and HGV access; and
- AC6-PEN-CVT-RA04 is located adjacent to the Coed Bolyn Mawr Farm Historic Landfill Site. The site is privately owned, with no records of deposited materials, posing a high risk of groundwater contamination and leachate migration into the siting zone.

In addition to environmental and logistical constraints, both AC6-PEN-CVT-RA03 and AC6-PEN-CVT-RA04 are considerably smaller than the emerging preferred options, less than half the size of AC6-PEN-CVT-RA02 and approximately a quarter the size of AC6-PEN-CVT-RA01, resulting in reduced siting optionality. They are also located further from the existing Pentir substation compared to AC6-PEN-CVT-RA01 and AC6-PEN-CVT-RA02, as shown in **Table 4.7.1**.

This leaves AC6-PEN-CVT-RA01 and AC6-PEN-CVT-RA02 as the emerging preferences for progression to Stage 3. Although AC6-PEN-CVT-RA01 is ranked higher, further clarity is required regarding land availability, acquisition, and the potential need to modify the existing National Grid Deeside–Pentir 400kV 50Hz overhead line, which bisects the site and would need to be diverted to facilitate construction.

In order to present a consolidated overview of the emerging preference outcomes identified in this chapter, **Figure 8.4.1**: Welsh Onshore Project Emerging Preference Project Components presents the Welsh Onshore Project, including the Landfall Siting Zones, Landfall Compound Siting Areas, Cable Corridor Combination, and Converter Station Siting Zones, that will be carried forward into Stage 3.

Figure 8.4.1: Welsh Onshore Project Emerging Preference Project Components



9. GRADUATED SWATHE

9.1 Introduction

The ‘graduated swathe’ is a visual and analytical tool developed to illustrate areas within the emerging preferences (as outlined in **EMERGING PREFERENCES**) where permanent terrestrial infrastructure is more or less likely to be located. It utilises a gradient of shading to communicate likelihood: darker shades indicate areas with a higher probability of hosting infrastructure, while lighter shades suggest a lower likelihood.

This model is preliminary and indicative, designed to support pre-application consultation and engagement with stakeholders, including local communities, landowners, and statutory bodies. It reflects current thinking based on a combination of environmental, engineering, and spatial constraints, and will be refined in response to stakeholder feedback, further technical assessments and engineering design development.

It is important to note that the graduated swathe applies exclusively to Welsh Onshore Project and is not applicable to the marine component.

9.2 Graduated Swathe Description, Purpose and Scope

Following the identification of emerging preferences for terrestrial infrastructure (**GRADUATED SWATHE**), further development of routing and siting options was undertaken. This process considered:

- Environmental constraints;
- Socio-economic impacts;
- Cost;
- Statutory duties;
- Engineering feasibility; and
- Proximity to sensitive receptors (e.g. residential properties, woodlands, existing infrastructure).

The graduated swathe model was developed to preserve flexibility in routing and siting decisions, support informed future decision-making and present multiple routing and siting alternatives for consultation and future design stages.

As described in **Graduated Swathe**, the model integrates the following emerging preferences:

- Converter Station Siting Zones:
  - AC6-PEN-CVT-RA01; and
  - AC6-PEN-CVT-RA02.
- Cable Corridor Combination:
  - AC6-PEN-CC-GS-01
    (The formation of this combination is described in **Formation of** AC6-PEN-CC-GS-01)

Within the Converter Station Siting Zones, the graduated swathe enables the identification of potential siting areas by subdividing each zone into optimal locations (formally named siting areas) for the permanent converter station. The dimensions of these locations are determined using engineering parameters Section outlined in **Engineering Parameters**South Wales Strategic Option – AC6-9 (Bridgend. This structured approach ensures a diverse range of viable options remains available, preserving flexibility and supporting informed decision-making as the project progresses.

For cable routing, the model supports the identification of route options within the defined boundaries of the Cable Corridor Combination, AC6-PEN-CC-GS-01. This enables the presentation of multiple routing alternatives, which will inform both the pre-application consultation process and the more detailed routing studies planned for Stage 3: Defined Proposal and Statutory Consultation.

Landfall Siting Zones are currently excluded from the graduated swathe model. This is due to ongoing offshore and intertidal geophysical surveys which are expected to inform the identification of emerging preferred Landfall Siting Zones. Further details regarding the exclusion are provided in **Graduated Swathe**. Landfall Siting Zones are not expected to be included in the graduated swathe model, as they

have already undergone detailed appraisal to identify unconstrained areas of coastline suitable for cable landfall. The selection of the final landfall location will instead be guided by marine and technical considerations.

Landfall Compound Siting Areas are also excluded from the model. These areas have already been sized appropriately to accommodate all necessary temporary and permanent infrastructure required for construction and operation. As these areas are considered optimally sized, no further optionality is required, and therefore, the application of the graduated swathe is not necessary.

9.3 Development of the Graduated Swathe

The graduated swathe was developed through a combination of:

- Desktop mapping and GIS analysis;
- Site visits and ground-truthing;
- Identification of sensitive sites and features; and
- Preliminary engineering design aligned with environmental and technical standards.

The graduated swathe is divided into three categories to communicate the relative likelihood of infrastructure placement:

1. Preferred – darkest shading
2. Alternative – medium shading
3. Considered – lightest shading

These categories help preserve route optionality and communicate the design rationale to stakeholders. To accommodate uncertainty and spatial constraints, the swathe width may locally exceed 250 m, particularly in areas with high-risk constraints or limited routing flexibility.

The key design principles applied to the graduated swathe model include:

- Avoidance of residential properties and settlements wherever possible;
- Flood risk assessment using NRW datasets, applying sequential and exception tests to steer infrastructure away from high-risk zones;
- Good design practices for cable routing, favouring straight sections and minimising directional changes to reduce environmental and engineering impacts; and
- These principles ensure that the graduated swathe reflects both technical feasibility and environmental sensitivity, while maintaining transparency and adaptability.

9.4 Graduated Swathe Results

The graduated swathe models have been developed for the following components:

- AC6-PEN-CC-GS-01 (Cable Corridor Combination);
- AC6-PEN-CVT-RA01 (Converter Station Siting Zone); and
- AC6-PEN-CVT-RA02 (Converter Station Siting Zone).

Figure 9.4.1: Graduated Swathe – Cable Corridor Combination (AC6-PEN-CC-GS-01) and **Figure 9.4.2: Graduated Swathe – Converter Station Siting Zones (AC6-PEN-CVT-RA01 and AC6-PEN-CVT-RA02)** illustrate the results of the graduated swathe, illustrating areas of higher and lower likelihood for infrastructure placement. These visual outputs will be used to support stakeholder engagement and inform the next stages of design development.

Figure 9.4.1: Graduated Swathe – Cable Corridor Combination (AC6-PEN-CC-GS-01)

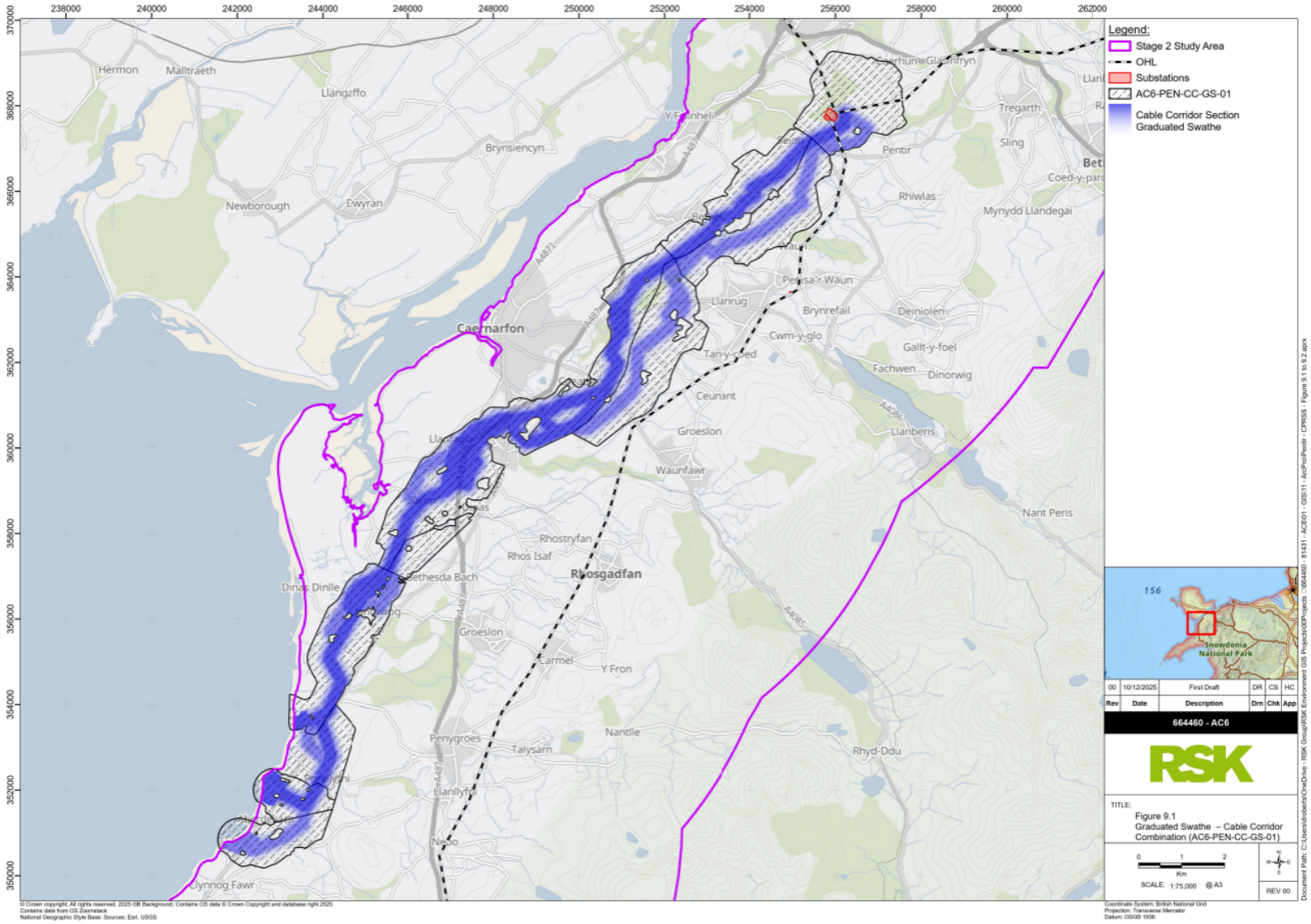
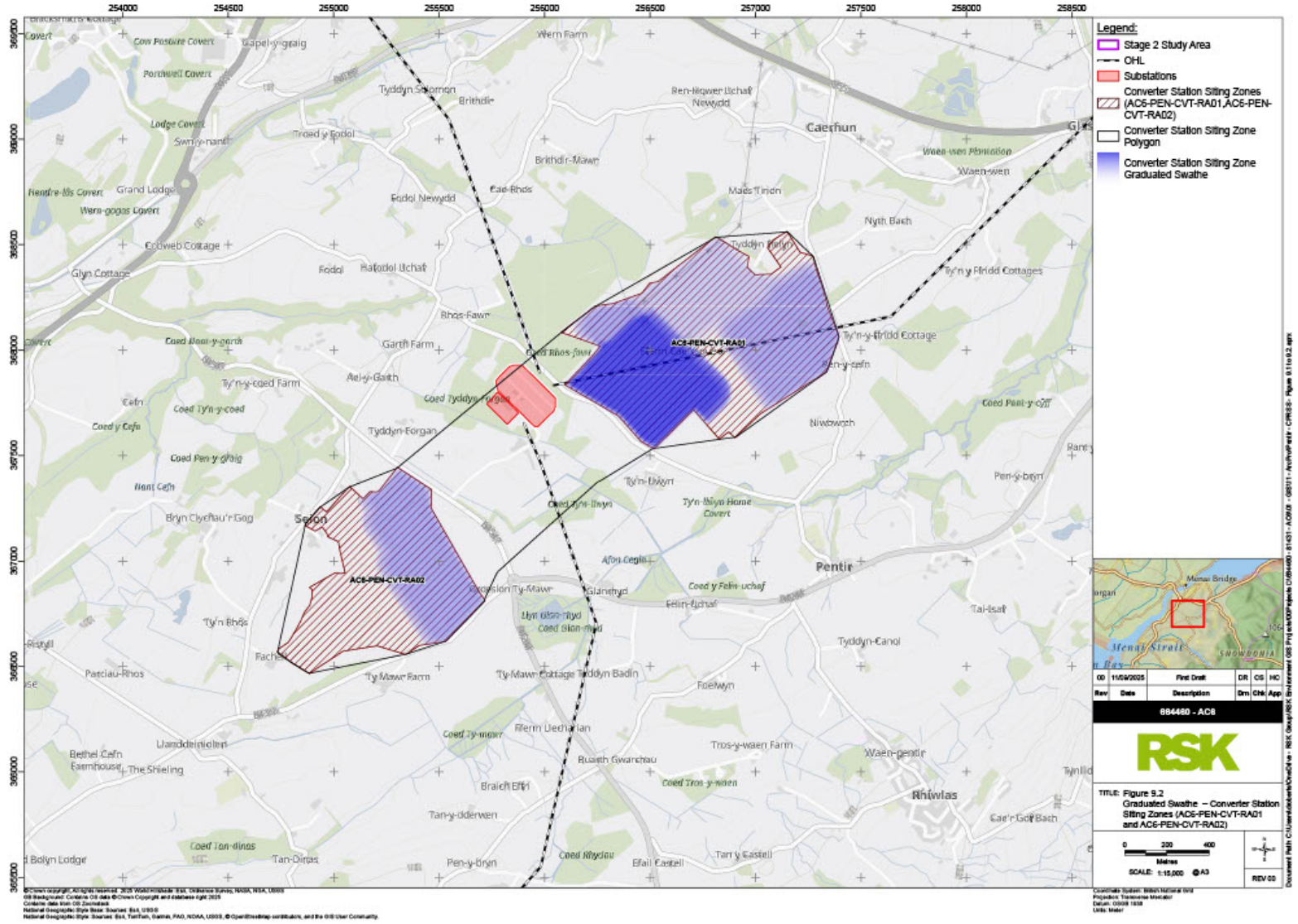


Figure 9.4.2: Graduated Swathe – Converter Station Siting Zones (AC6-PEN-CVT-RA01 and AC6-PEN-CVT-RA02)



9.5 Summary and Next Steps

The graduated swathe represents the current understanding of where the Welsh Onshore Project infrastructure is most likely to be located. It is a dynamic tool that will be refined through:

- Stakeholder and community feedback;
- Detailed environmental and technical surveys; and
- Further design development and engineering assessments.

It is important to note that feedback may lead to routing through areas currently shown as less preferable. All input will be captured and summarised in a Consultation Report during the next stage of the Welsh Onshore Project.

As the Welsh Onshore Project progresses, the graduated swathe will be progressively narrowed, ultimately informing the definition of the red-line boundary for the planning application.

10. SUMMARY AND NEXT STEPS

10.1 Summary of Options Identification and Selection Process (Stage 2)

As detailed in **OPTIONS APPRAISAL** APPROACH, a comprehensive options identification and selection process has been undertaken to support the development of the Welsh Onshore Project components. The primary output of this process is the development of this TCRPSS.

Following a balanced appraisal of technical, environmental, planning, and socio-economic receptors and designations, and taking into account the additional marine engineering assessment, the emerging preferred Welsh Onshore Project components are:

- Landfall Siting Zones: LF2, LF3, and LF4;
- All Landfall Compound Siting Areas associated with LF2, LF3 and LF4;
- Cable Corridor Combination: AC6-PEN-CC-GS-01; and
- Converter Station Siting Zones: AC6-PEN-CVT-RA01 and AC6-PEN-CVT-RA02.

10.1.1 EIA Scoping and pre-application consultation

This report will inform consultation materials, facilitating engagement with stakeholders and informing the development of the Project. It is anticipated that pre-application consultation will take place in Q1 2026, focusing on the outcomes of Stage 2: Options Identification and Selection process and the progression toward a defined proposal.

Feedback received during pre-application consultation will be used to refine the Welsh Onshore Project. Stakeholder input on the emerging preferences identified in this report will be collated and considered in subsequent design iterations.

In parallel, EIA Scoping will commence, supported by RSK. This process will be based on the emerging preferences outlined in **EMERGING PREFERENCES** and updated project parameters, ensuring that environmental factors are appropriately considered in the EIA Scoping Report. The aim is to produce a proportionate, accurate, and comprehensive submission, which is also expected in Q1 2026.

10.2 Defined Proposal and Statutory Consultation (Stage 3)

Upon completion of EIA Scoping and pre-application consultation, and following analysis of stakeholder feedback, the Project will progress to Stage 3: Defined Proposal and Statutory Consultation.

This stage will include:

- Early preparation of the Welsh Onshore Environmental Statement;
- Further survey work; and
- Iterative design development.

These activities will enable further assessment and appraisal and ensure the proposal is even more robust and is deliverable and fully informed by stakeholder feedback and environmental considerations. This will support the continued development of the Environmental Statement and preparation for planning application submission during Stage 4: Assessment and Land Rights, and Stage 5: Application, Examination, and Decision.

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APPENDICES

Appendix A: Stage 2 BRAG List

National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom
Registered in England and Wales
No. 4031152

nationalgrid.com

nationalgrid