XLINKS' MOROCCO-UK POWER PROJECT

Environmental Statement

Volume 1, Chapter 4: Need and Alternatives

Document Number: 6.1.4

PINS Reference: EN010164/APP/6.1

APFP Regulations: 5(2)(a)

November 2024

For Issue

xlinks.co

Document status					
Version	**Purpose of document**	**Authored by**	**Reviewed by**	**Approved by**	**Review date**
For Issue	Application	RPS	Xlinks 1 Ltd	Xlinks 1 Ltd	November 2024

Prepared by:

RPS

Prepared for:

Xlinks 1 Limited

Contents

Figures

Glossary

Term	Meaning
Alverdiscott Substation	The existing National Grid Electricity Transmission substation at Alverdiscott, Devon, which comprises 400 kV and 132 kV electrical substation equipment.
Alverdiscott Substation Connection Development	The development required at the existing Alverdiscott Substation Site, which is envisaged to include development of a new 400 kV substation, and other extension modification works to be carried out by National Grid Electricity Transmission. This does not form part of the Proposed Development, however, it is considered cumulatively within the Environmental Impact Assessment as it is necessary to facilitate connection to the national grid.
Alverdiscott Substation site	The National Grid Electricity Transmission substation site within which the Alverdiscott Substation sits.
Applicant	Xlinks 1 Limited.
Bipole	A Bipole system is an electrical transmission system that comprises two Direct Current conductors of opposite polarity (one conductor with positive voltage and one with negative voltage).
Converter station	Part of an electrical transmission and distribution system. Converter stations convert electricity from Direct Current to Alternating Current, or vice versa.
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
HVAC cables	The High Voltage Alternating Current (HVAC) cables which would bring electricity from the converter stations to the new Alverdiscott Substation Connection Development.
HVDC cables	The High Voltage Direct Current (HVDC) cables which would bring electricity to the converter stations from the Moroccan converter stations.
Landfall	The proposed area in which the offshore cables make landfall in the United Kingdom (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Cornborough Range, Devon, between Mean Low Water Springs and the Transition Joint Bay inclusive of all construction works, including the offshore and onshore cable routes, and landfall compound(s).
Maximum design scenario	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Proposed Development.
Mean High Water Springs (MHWS)	The height of mean high water during spring tides in a year.
Mean Low Water Springs (MLWS)	The height of mean low water during spring tides in a year.
National Grid Electricity System Operator (NGESO)	National Grid Electricity System Operator (NGESO) operates the national electricity transmission network across Great Britain. NGESO does not distribute electricity to individual premises, but its role in the wholesale market is vital to ensure a reliable, secure and quality supply to all.
National Grid Electricity Transmission (NGET)	National Grid Electricity Transmission (NGET) owns and maintains the electricity transmission network in England and Wales.

Term	Meaning
National Policy Statements	The current national policy statements published by the Department for Energy Security and Net Zero in 2023, and adopted in 2024.
Offshore Cable Corridor	The proposed corridor within which the offshore HVDC cables will be located, which is situated within the United Kingdom Exclusive Economic Zone.
Onshore HVAC Cable Corridor	The proposed corridor within which the onshore HVAC cables would be located.
Onshore HVDC Cable Corridor	The proposed corridor within which the onshore HVDC cables would be located.
Onshore Infrastructure Area	The proposed infrastructure area within the Order Limits landward of Mean High Water Springs. The Onshore Infrastructure Area comprises the transition joint bays, onshore HVDC Cables, converter stations, HVAC Cables, highways improvements, utility diversions and associated temporary and permanent infrastructure including temporary compound areas and permanent accesses.
Planning Inspectorate	The agency responsible for operating the planning process for applications for development consent under the Planning Act 2008.
Point of Connection	An offer in which a specific juncture that the Applicant and National Grid Electricity System Operator have agreed upon to where the electricity generation source connects to the national electricity grid infrastructure.
Preliminary Environmental Information Report (PEIR)	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
Proposed Development	The element of Xlinks' Morocco-UK Power Project within the UK. The Proposed Development covers all works required to construct and operate the offshore cables (from the UK Exclusive Economic Zone to Landfall), Landfall, onshore Direct Current and Alternating Current cables, converter stations, and highways improvements.
Proposed Development Draft Order Limits	The area within which all offshore and onshore components of the Proposed Development are proposed to be located, including areas required on a temporary basis during construction (such as construction compounds).
The national grid	The network of power transmission lines which connect substations and power stations across Great Britain to points of demand.
Xlinks' Morocco-UK Power Project	The overall scheme from Morocco to the national grid, including all onshore and offshore elements of the transmission network and the generation site in Morocco (referred to as the 'Project').

Acronyms

Acronym	Meaning
AC	Alternating Current
AOD	Above Ordnance Datum
CION	Connection and Infrastructure Options Note
DC	Direct Current
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ES	Environmental Statement
GB	Great Britain

Acronym	Meaning
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
NESO	National Electricity System Operator (new name for NGESO)
NGET	National Grid Electricity Transmission
NGESO	National Grid Electricity System Operator
OHL	Overhead Lines
OS	Ordnance Survey
PRoW	Public Right of Way
UK	United Kingdom
UXO	Unexploded Ordnance

Units

Acronym	Meaning
GW	Gigawatt
GWh	Gigawatt hour
GWp	Gigawatt peak
Ha	Hectares
kV	Kilovolt
m	Metre
m^2	Metre squared
m^3	Metre cubed
mm	Millimetre

4 NEED AND ALTERNATIVES

4.1 Introduction

4.1.1 This chapter of the Environmental Statement (ES) summarises the design alternatives considered within the EIA process and the main reasons for selecting or discounting alternative design options. A short chronology of the options selection process that led to the Proposed Development is provided together with a short justification of the need for the Project.

4.1.2 For ease of reference, the UK elements of the Xlinks' Morocco-UK Power Project (the 'Project') are referred to in this chapter as the 'Proposed Development'. The ES accompanies the application for development consent to the Secretary of State for Energy Security and Net Zero.

4.2 Relevant Guidance

4.2.1 Volume 1, Chapter 2: Policy and Legislation of the ES sets out the overarching policy relevant to the Proposed Development, comprising National Policy Statement (NPS) EN-1, NPS EN-3, and NPS EN-5 (2023). These have been considered during the options selection process for the Proposed Development. Regarding the consideration of alternatives, paragraph 4.3.15 of EN-1 states that:

"Applicants are obliged to include in their ES information about the reasonable alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility."

4.2.2 Whilst there is no statutory requirement to include alternatives within an ES, the Planning Inspectorate's Advice Note Seven (2020) recommends that an Environmental Statement (ES):

"explains the reasonable alternatives considered and the reasons for the chosen option taking into account the effects of the Proposed Development on the environment".

4.2.3 Regulation 14(d) of the EIA Regulations requires "a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment."

4.3 Need for the Proposed Development

4.3.1 Application Document 7.1 Statement of Need, concludes that the Proposed Development brings significant benefits to the national urgent need to reduce UK carbon emissions while ensuring a reliable, secure, and affordable supply of electricity.

4.3.2 Urgent and unprecedented actions are required on a global scale to halt climate change. A rapid increase in the supply of low carbon electricity is needed for the UK to meet its legally binding climate change targets. Increasing the supply of energy from renewable sources is a critical part of the UK's strategy to achieve net zero by 2050, a key step towards which is the government's national mission for 'Clean Power by 2030'.

4.3.3 However, the need for new clean power does not stop at 2030. The continued delivery of low-carbon generation facilities beyond 2030 is necessary to meet future electricity demand growth and achieve essential wider societal carbon savings. It is also important to continue to bring forward schemes in case 'Clean Power by 2030' is not achieved.

4.3.4 Government has concluded [NPS EN-1] that there is a Critical National Priority for low-carbon infrastructure to come forward urgently to achieve the UK's energy objectives of delivering a low-carbon, secure, and affordable energy system. The Applicant considers that the Proposed Development falls within the definition of Critical National Priority (CNP) Infrastructure set out in the National Policy Statements. The Statement of Need sets out further information on CNP Infrastructure (document reference 7.1).

4.3.5 Decarbonisation will increase demand for electricity. Policies are already in-flight which are increasing, or are set to increase, electricity demand. Therefore, a significant number of new low-carbon electricity schemes, including the Proposed Development, are required to meet that demand and enable an energy system which is consistent with the UK's objectives to reduce carbon emissions while ensuring a reliable, secure, and affordable supply.

4.3.6 Progress has been made in the development of different low-carbon electricity generation technologies in the UK and globally. However, many of the technologies with potential to play a role in the delivery of a net zero energy system currently have uncertain delivery timescales. All technological and commercial elements of the Proposed Development and the international generation assets to which it connects, are already proven in delivery at or approaching the scale proposed, in the UK or globally. Developments with the proven ability to achieve carbon savings comfortably within the next decade, such as the Proposed Development, are essential to keep the UK on its legally binding carbon reduction path.

4.3.7 Should consent be achieved for all parts of the Project, including the Proposed Development, the construction and commissioning phase of the project development process would be able to proceed at pace to support the urgent need to enable carbon emission reductions in the UK.

4.3.8 The Proposed Development allows for a maximum export of 3.6GW to the UK's electricity system and the Applicant's analysis indicates that through the course of a year, energy exported from the international generation assets will be equivalent to approximately 18 hours of full export a day (i.e. an annual load factor of approximately 75%).

4.3.9 The Proposed Development therefore presents a unique opportunity to connect a high capacity, high load factor low-carbon energy source to the UK electricity system through a single existing grid connection point at Alverdiscott Substation, with a proposed first connection date in 2031.

4.3.10 This is a material issue when considering how the UK is to meet the urgent need for low-carbon generation as is set out in the NPSs, given the current constraint in

configuring existing connections and delivering new connections for proposed low-carbon electricity generators in the UK.

4.3.11 The Proposed Development is needed so that the Project's international generation assets can enable an energy system that meets the Government's objectives to create a secure, reliable, and affordable energy supply for consumers to security of supply. Aggregated generation output from wind and solar, combined with battery storage, is more predictable, less variable, and more flexible than output from a single generation technology, providing security and reliability of supply benefits for consumers.

4.3.12 Reliable and flexible low-carbon electricity supplies are needed to support a high level of reliability and security of energy supply for consumers. Storage facilities also contribute to security of supply by storing energy when it is generated in abundance and releasing it to the grid when it is needed. Storage facilities also provide grid balancing services which are essential for the safe and secure operation of the UK's electricity system.

4.3.13 Solar and onshore wind facilities are already among the cheapest form of electricity generation in the UK and globally. By generating low carbon electricity from low-cost, large-scale renewable supplies, the more expensive and more carbon intensive forms of generation are displaced from the grid. Low-cost, large-scale renewable supplies therefore enable a reduction in carbon emissions from UK generated electricity, and lower the market price of electricity.

4.3.14 The generating facilities located in Morocco which are proposed to connect to the Proposed Development include co-located onshore wind, solar, and storage. The profile of low carbon energy generated at the Moroccan facilities would increase the diversity of supplies to the UK, complementing UK-based renewable supplies.

4.3.15 In combination, and at the capacities proposed, the facilities at Guelmim Oued Noun in Morocco would also provide a significant element of readily available (or quickly dispatchable) energy to the Proposed Development, meaning that it can be considered more as 'firm' generation rather than renewable generation. This will bring benefits to the UK by reducing the need for alternate back-up generation assets and displacing carbon-emitting thermal generation from the UK's energy system.

4.3.16 The location of the Proposed Development enables the Project to make use of existing and available grid infrastructure. Further, no adverse grid operability effects or curtailments are anticipated as a result of connecting the Project to the UK's electricity system through the Proposed Development. The location of the Proposed Development is away from areas of the electricity system which have already been identified as in need of network and capacity upgrades to support existing and new generation capacity connections.

4.3.17 In summary, a significant capacity of low-carbon generation is urgently needed to enable carbon emission reductions in the UK. The Proposed Development will, if consented, transmit low-cost, large-scale renewable supplies from an international generation facility to the UK's electricity system. By doing so, the Proposed Development will address the climate change emergency that affects everyone's lives and the environment, by playing an important role in enabling an energy system with secure, low-carbon, and affordable supplies.

4.4 Options Selection

4.4.1 Formulation of the Proposed Development has been the result of over 5 years' work in the consideration of:

- Substation Point of Connection options in the South West of England or South Wales culminating in the selection of Alverdiscott Substation, North Devon;
- Landfall options proximal to the preferred connection option of Alverdiscott;
- Offshore Cable Corridor route options leading towards the preferred Landfall;
- Converter Site location options within 2km of Alverdiscott Substation;
- Onshore Cable Corridor options from Landfall to preferred Converter Site.

4.4.2 The culmination of the above work in selecting the preferred options that comprise the Proposed Development is described separately in the document entitled Planning Statement (including NPS Compliance Tracker, and Alternative Sites Assessment) (document reference 7.2, Appendix 2).

Strategic Proposal

4.4.3 The Project design reflects a range of key criteria that ultimately impact the design of the Proposed Development's application in the UK. Specifically, the below boundary conditions, among others, have influenced the overall Project design.

- Selection of a generation site in Morocco that enables renewable generation technologies to deliver a generation profile that cannot be economically achieved with similar technologies located in the UK.
- Selection of a generation site that is not a priority location to provide power for Morocco's decarbonisation strategy.
- Limiting the maximum depth of the offshore cable route such that existing installation engineering techniques can be used.
- Locating the landing point in the UK in an area to allow proven engineering techniques to be utilised within an acceptable construction and operational risk envelope while minimising the impact on local stakeholders.
- NGESO's site selection process for the grid connection point, i.e., the Connection and Infrastructure Options Note (CION).

Principal Project Requirements

4.4.4 Factors such as land availability, proximity to the NGET substation, vehicular access, planning and environmental constraints led to the selection of the preferred options that comprise the Proposed Development.

4.4.5 The principal project requirements which were determined overall to be most consistent with the Project's efficiency and cost requirements are as follows.

- Two physically and electrically separate High Voltage Direct Current (HVDC) Bipoles capable of transmitting 1,800MW each between Morocco and UK.
- Connection of each Bipole to the NGET substation in 2030 and 2032 respectively.

- The Converter Site would contain two converter stations (known as Bipole 1 and Bipole 2). Each Bipole will convert High Voltage Alternating Current (HVAC) to High Voltage Direct Current (HVDC), one in Britain and one in Morocco) each linked together by 2 HVDC cables.
- An Offshore Cable Corridor of at least 500 m width within which the four HVDC cables would be installed. The Offshore Cable Corridor width would be extended where the Proposed Development needs to cross over the top of existing assets in order that the crossing can be facilitated as close to 90º as reasonably practicable.
- An Offshore Cable Corridor routing to minimise potential impacts on environmental receptors, existing users and other planned and consented activities.
- An Offshore Cable Corridor accommodating the reasonably foreseeable technology constraints with respect to depth, seabed morphology while considering as direct a choice of overall route and installation methodology.
- A Landfall zone to minimise the change in vertical height from the seabed to the onshore cable considering the cables are buried underground in order to maximise energy transfer efficiency.
- A Landfall zone to minimise directional drilling length and depth.
- An Onshore HVDC Cable Corridor minimising the width and impacts from a combination of engineering, stakeholder, environmental, access and direct routing.
- An Onshore HVDC Cable Corridor width minimised to account for engineering parameters between cables, relation to the landscape and environmental impacts, considering the undergrounding of the cables.
- An Onshore HVAC Cable Corridor length minimised between converter station and NGET substation and comprising 4 HVAC circuits each consisting of 3 HVAC cables.

Options Considered and Selection of Preferred Options

4.4.6 The approach to identifying and selecting sites and routes has ensured integrated and iterative consideration of potential impacts on the environment and local communities alongside technical and engineering factors. The Proposed Development has also been considered against National and Local planning policies (refer to Volume 1, Chapter 2: Policy and Legislation of the ES). The overall aim of this approach has been to identify sites or routes that best balance these factors to establish the preferred strategic options for the Substation Point of Connection, Landfall and Converter Site.

Site Selection Methodology

4.4.7 The site selection process has considered numerous factors that have influenced the site selection and design of the Proposed Development. The specific factors considered by the Applicant include:

- Environmental – Considering the relative sensitivity of different options in terms of National Designations, landscape, ecology, historic environment,

hydrology and flood risk, noise, traffic, recreational value, land use and other environmental factors.

- Social and Economic—Utilising the available capacity within the existing network, the social-economic impacts and benefits by considering the generation of low-carbon electricity, security of supply, and cost of development to manage the affordability of electricity for consumers.
- Electrical – Considering the effect of the additional power input into the existing National Grid Electricity Transmission system to identify available capacity and existing assets. This includes the amount of existing and planned capacity on the regional transmission circuits and the extent of the upgrades likely required.
- Engineering – Considering the technical constraints arising from constructing and maintaining different options, such as those associated with using cable drilling techniques.

4.4.8 The selection process has been an iterative one that has occurred over a number of years.

Point of Connection Selection

4.4.9 The Project's point of connection would require connecting to the UK electricity system by connecting to the national grid operated by National Grid Electricity Transmission (NGET).

4.4.10 In May 2020, the Applicant submitted an application to National Grid Energy System Operator (NGESO)[1] to connect electricity generated by a large amount of wind, solar, and battery storage plant installed in Morocco to the national grid via 2 x 1800MW HVDC links. In order to make a connection offer, NGESO carried out an initial options appraisal to identify and evaluate potential connection options within an agreed geographical range of the UK, spanning both South Wales and the South West of England. As part of the CION process, the approach involved the following steps:

- Identifying potential connection options – Potential substation locations were identified based on existing connection points regarding technical and environmental feasibility.
- Evaluation of connection options – This involved evaluating the options, considering the complexity of construction, land issues, technology, costs, and environmental constraints.
- Detailed appraisal – This involves a more detailed appraisal of the options taken forward during the previous step to identify the preferred option.

4.4.11 The two main areas assessed in the CION process were South Wales and the South West peninsula of England. North Wales is much further geographically and potentially clashes with Round 4 Wind projects in the area, and connections further east along the south coast would likely have contributed to the existing physical landform stability issues in the area. Electrically, any connection in the

[1] The connection application was made prior to National Energy System Operator Limited (NESO) taking over the electricity system operation from National Grid Electricity System Operator Limited (NGESO).

South West Peninsula would likely cause similar issues, as would any location in South Wales.

4.4.12 NGESO considered existing substation sites with the potential to be expanded rather than zones for potential new substations anywhere along the line where available capacity can be sourced. Although a new substation could be designed and constructed, connecting to existing sites would entail fewer constraints.

4.4.13 The potential connection options that were investigated comprised the following:

- Alverdiscott;
- Pembroke;
- Seabank;
- Indian Queens; and
- Exeter.

4.4.14 These substation sites were each evaluated against a range of criteria including offshore cable route length, development risk, environmental constraints, and interactions with other infrastructure. Due to the cost of offshore cable, the length required was also a leading factor for site selection.

4.4.15 Seabank Substation was also briefly considered due to its strengthened position after the new Hinkley - Seabank circuit is complete. However, this was ruled out due to its additional offshore route length and a lack of benefit over other options. In addition, there was a complicated access to the potential substation site which would provide difficulty in constructing the Proposed Development.

4.4.16 Highly sensitive environmental areas were identified surrounding the Indian Queens site and an appropriate and acceptable landing point and onshore route for the Indian Queens' point of connection was not identified. For this reason, the Indian Queens site was not taken forward for further consideration.

4.4.17 The Exeter point of connection showed potentially challenging interactions with other HVDC and telecom cables in the vicinity of the Proposed Development route. It was also not clear what mitigation strategies existed to minimise the cost of these interactions, therefore resulting in a high development risk. For this reason, the Exeter site was not taken forward for further consideration.

4.4.18 This left Pembroke Substation and the Alverdiscott Substation sites as the two preferred points of connection to take forward for consideration.

4.4.19 Pembroke Substation was identified as a suitable connection point in South Wales as it has a 400kV connection and is located close to the coastline, therefore reducing onshore cabling. The original options appraisal resulted in an offer from NGESO for a 1.8 GW connection at Pembroke and another 1.8 GW at Alverdiscott which was accepted by the Applicant at that stage.

4.4.20 Following this, NGESO identified that there were further technical and environmental considerations that limited the potential for a second connection at Pembroke Substation and so they carried out an update to the CION assessment. This was principally related to the potential for significant impacts along the onshore cable route and difficultly managing cumulative impacts associated with other projects already proposed to connect to Pembroke Substation.

4.4.21 The Alverdiscott Substation site was identified as the feasible and preferable option. This option of a single point of connection at the Alverdiscott substation was considered a better choice for the Project as it would only require one

onshore cable route which would be less impactful on the environment and less disruptive to local communities from a construction perspective.

4.4.22 An economic cost-benefit analysis (CBA) of the Pembroke and Alverdiscott Substations was also undertaken to establish the most economically efficient point of connection. This demonstrated the significant advantages of having two connections in the South West of England. Given the findings of the CBA and fewer environmental constraints compared with other options, two 1800 MW connections at Alverdiscott were offered to the Applicant by NGESO to take forward as part of the DCO application.

Offshore Cable Corridor Selection

4.4.23 The Project offshore cable route runs from the west coast of Morocco to Cornborough Range in the UK and is approximately 4,000 km long. The preferred route passes through the waters of Morocco, Portugal, Spain, France and the UK at an average depth of 140 m and up to 800 m at the deepest point along the route.

4.4.24 The offshore infrastructure within the Proposed Development is approximately 370km long and includes the Offshore HVDC cables and fibre optic cables. Whilst the route for the Offshore HVDC cables relevant to the Proposed Development lies within the UK EEZ, decision making about the whole route has influenced the UK section. The route was developed in three main stages described below.

Stage One

4.4.25 Global Marine was commissioned in 2019/20 to conduct a desktop options analysis of the entire offshore cable route and to identify a preferred subsea cable route based on existing data. The study identified three potential route options from Morocco to the UK, as shown in **Figure 4.1**.

- Option 1 - Cable route in water depths less than 700 m, keeping on the continental shelf, and relatively close to coasts of Portugal and Spain (red route) 'the Preferred Route';
- Option 2 - Cable route in water depths less than 3,000 m, taking a deeper route across the Straits of Gibraltar and the Bay of Biscay (purple route); and
- Option 3 - A more direct route from Morocco to the UK (green route).

4.4.26 The more direct route between Morocco and the UK is significantly shorter (c.25%) than the other two options but has a maximum depth of over 5,000 m in the Bay of Biscay. The number of cable systems operating in water depths beyond 700m is extremely limited. There are some HVDC cables that have been installed and are in operation up to depths of 1,640 m in the Mediterranean. In addition, the EuroAsia interconnector is currently under development with a maximum depth of 3,000 m however this has no operational track record. As such the direct route was not taken forward for consultation.

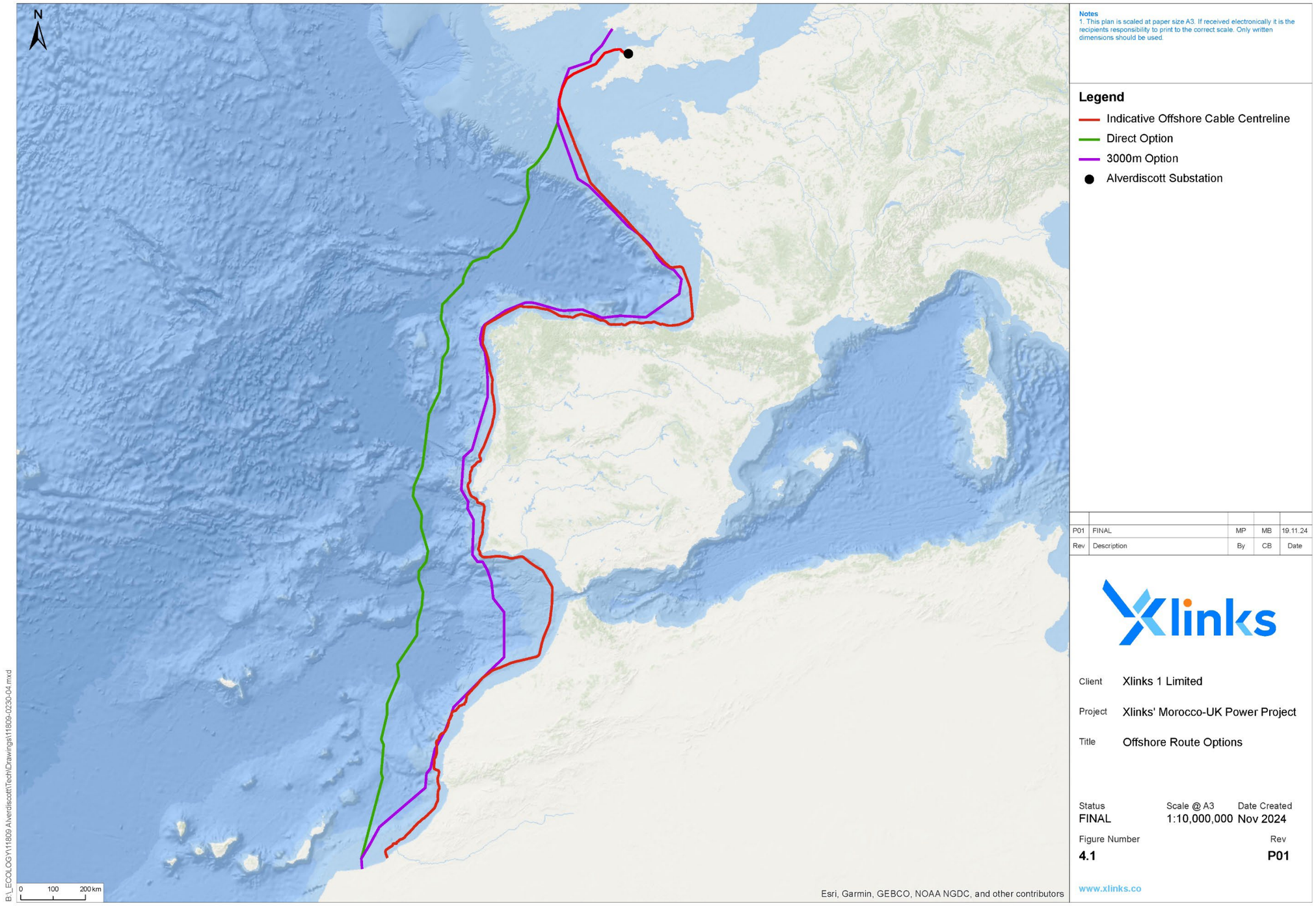

Figure 4.1: Offshore route options

Stage Two

4.4.27 Intertek conducted a feasibility assessment in 2022 to select the optimum route that balanced natural hazards and conservation areas, technological feasibility, and ease of installation, protection, and operation. The 700m deep cable route (red) option followed a route close enough to the continental shelf to be deemed technically feasible and was selected as the preferred option for further optimisation.

Stage Three

4.4.28 The Preferred Route (red) was further refined by a Routing Workshop that considered water depth, seabed features and geohazards, metocean influences, external stakeholders (e.g. seabed leaseholders, general fishing activities, shipping, etc.) and environmental constraints such as marine protected areas, including Special Areas of Conservation (SAC), Special Protection Areas (SPA), and Marine Conservation Zones (MCZ).

Further refinement of Preferred Route

4.4.29 Following the initial route option analysis and the confirmation that Cornborough Range would be the preferred entry point for the proposed Landfall HDD, a more precise corridor was defined through a series of further workshops with the marine survey contractors (GEOxyz), 4C Offshore and Global Marine. These workshops provided the definition of a survey corridor using the following process:

- The centreline of the preferred route from the landfall out to the limit of the UK EEZ was used as the base case Route Position List (RPL).
- A 500 m wide survey corridor was determined to provide sufficient flexibility for detailed cable route engineering within the survey corridor.
- Geographic Information System (GIS) was used to conduct a detailed review of the most up-to-date information regarding seabed conditions and possible challenges to cable installation within the base case survey corridor.
- The Offshore Cable Corridor was then modified through an iterative process to optimise the survey corridor further considering the following factors:
  - Sensitive habitats and designated sites:
    - Sensitive environmental sites were excluded from the survey corridor wherever reasonably practicable. For example, the preferred RPL was modified to avoid the East of Haig Fras Marine Conservation Area.
  - Existing and proposed seabed infrastructure and other marine users:
    - Existing and planned offshore installations (oil, gas and renewables) were excluded from the survey corridor by at least 500 m where reasonably practicable.
    - In-service and out-of-service submarine assets required the Offshore Cable Corridor to be extended to up to 1,500 m width at some crossing locations where the Offshore HVDC cables would need to cross existing power and telecoms cables. This provides the HVDC cables sufficient installation space to cross existing assets as close to

90 degrees as possible and thereby reducing the crossing footprint and environmental impact.

- The Offshore Cable Corridor width was also extended to 1,500 m width at the western edge of The Crown Estate's Project Development Area 3 (Offshore Leasing Round 5) to provide flexibility in this area to endure sufficient separation from the wind farm and the edge of the Marine Conversation Zone (MCZ).
- Navigation and Traffic Separation Schemes (TSS) present a continuous risk of planned and unplanned anchoring. The survey corridor was adjusted to avoid areas of significant shipping activity as far as reasonably practicable.
- Dredging and dumping operations have a direct impact on the seabed and, therefore, are a potential threat to the cable, installation and future security. Therefore, designated areas for dredging and dumping were avoided as far as reasonably practicable.
- Coastal firing ranges crossed by the route pose a UXO risk to marine operations. Military Exercises can clash with the installation programme or schedules. Preference was therefore given to avoid areas where concentrations of UXO may exist).

– Seabed morphology:
  - Seabeds of the hardest clay-based soil type, with boulder fields and outcrops that go deep into the seabed would make cable burial more challenging and could introduce greater environmental impacts. The chosen route therefore avoids the largest of the zones of this morphology.
  - Seabed sediment distribution and transportation post construction could affect the burial depth of the cable for example in sands and gravels resulting in potential exposure after burial. Consequently, the route avoids these areas where practicable.
  - Sandwaves which are highly mobile, pockmarks, rock outcrops and reefs were avoided for example near Whitecross as they can damage equipment or cause abrasion, suspension and/or exposure.

– Wrecks
  - The RPL was modified to exclude all known wrecks from the survey corridor by at least 500m. If uncharted wrecks were found during the subsequent surveys, separation of 1x water depth within the surveyed corridor was achieved.

– Cable engineering design
  - Utilisation of best-in-class, proven cable technology and crossing methodologies, with cable burial as the preferred method for protection
  - Straight route for at least 1,000 m from the UK landfall (for the HDD)
  - The minimum bending radius of the cable system (bundled) was considered to ensure the RPL would not damage the cable system during installation.

4.4.30 The output of this process provided the Offshore Cable Corridor and associated survey corridor which has been used as the basis for all of the Proposed Development's marine surveys.

4.4.31 Detailed geophysical, geotechnical and environmental surveys were carried out in UK waters during 2022 and 2023 to further inform cable routing, confirm the location of the Offshore HVDC cable RPL and develop the impact predictions and mitigation strategies issued for statutory consultation in May-July 2024.

4.4.32 As no further changes to the Offshore Cable Corridor boundaries have been requested through the statutory consultation process, and the design and engineering process has optimised the route to minimise, as far as reasonably practicable, the environmental impacts, the Offshore Cable Corridor at application is therefore consistent with that presented within the PEIR.

Converter Site Selection

4.4.33 A 2 km radius study area was utilised around the NGET Alverdiscott Substation to identify potential converter site options as shown in **Figure 4.2** The radius was determined by the need to minimise transmission losses along the HVAC cable route between the proposed Converter Site and the existing Alverdiscott Substation. Transmission losses increase with distance along a HVAC cable.

4.4.34 The following factors were used to determine potential converter site locations:

- Area of land available to house two converter buildings with a maximum design scenario of 130 ha;
- Land ownership and willingness of landowners to participate in the Project;
- Topography of available land;
- Landscaping and screening opportunities;
- Environmental constraints including flood risk, ecological habitats and archaeology;
- Proximity of sensitive receptors;
- Existing road access to and from the site;
- Avoidance of Public Rights of Way (PRoW); and
- Distance from the substation and corresponding potential impact of the HVAC cable corridor.

4.4.35 Following a review of the factors above, two potential locations were identified within the study area at Huntshaw and the old Webbery showground.

4.4.36 The Huntshaw Converter Site was proposed during the first non-statutory consultation in November 2022. The proposed Huntshaw Converter Site was located near Great Huxhill, approximately 0.7km south of Gammaton Cross.

4.4.37 Feedback from the non-statutory consultation and a special Town Hall meeting in December 2022 at the Alverdiscott Village Hall indicated strong opposition to the proposed Converter Site at Huntshaw. Concerns about the proposed Huntshaw location included:

- Proximity to and associated construction phase impacts on residential dwellings, including listed buildings within 300 m of the proposed Converter Site;

- Visual impacts created by the proximity of Converter Site to residential dwellings and scale of landscaping mitigation required within close proximity;
- Steep topography with a steep drop in ground levels towards the south east of the proposed site;
- The need for a widening of existing roads and construction of a new temporary road for construction access to the proposed site; and
- Potential impacts on ecology.

4.4.38 As a result of the community opposition to the proposed Huntshaw Converter Site, the Applicant brought forward a proposed site at the old Webbery showground for the second non-statutory consultation event. This proposed site at the old Webbery showground was supported during the second non-statutory consultation. When the Proposed Development was accepted into the DCO process, the same site was presented as the preferred Converter Site location for statutory consultation May to July 2024 albeit that maximum design parameters had been revised. This included mitigation measures to reduce the visual impact of the building on the landscape which is more fully described in The Design Approach Document (document reference 7.3) and the Outline Landscape and Ecology Management Plan (oLEMP) (document reference 7.10).

4.4.39 The benefits of the proposed Converter Site in comparison with the Huntshaw site include:

- The site is large enough to accommodate the maximum design scenario for the Converter Station.
- Flatter topography compared to the proposed Huntshaw site, noting that the proposed old Webbery showground is still located on a rolling hillside. The old Webbery showground site falls away from the road with the proposed converter buildings sitting further down the slope, with a backdrop of existing electricity pylons, the Alverdiscott Substation and a portion of land within the Converter Site which includes permitted solar farm development, which is under construction at the time of writing.
- The topography of the site allows the implementation of screening and landscape mitigation measures through the creation of extensive earthworks to form bunds around the proposed buildings, balancing cut and fill onsite. The profile of the bunds has been designed to have a more naturalistic gradient that will help to assimilate into the wider landscape. Mixed native woodland planting will be used to provide further screening, soften the bunds, provide habitat creation and assist in soil stabilisation.
- The site has no negative impacts on ecological designations, existing PRoW or the potential risk of flooding. Access to an existing road network, noting a proposed haul road will mitigate impacts of construction traffic between the proposed Converter Site and proposed construction compound on Gammaton Road.
- The short HVAC cable route between the proposed Converter Station Site and the existing Alverdiscott substation resulting in less disruption to the environment during construction.

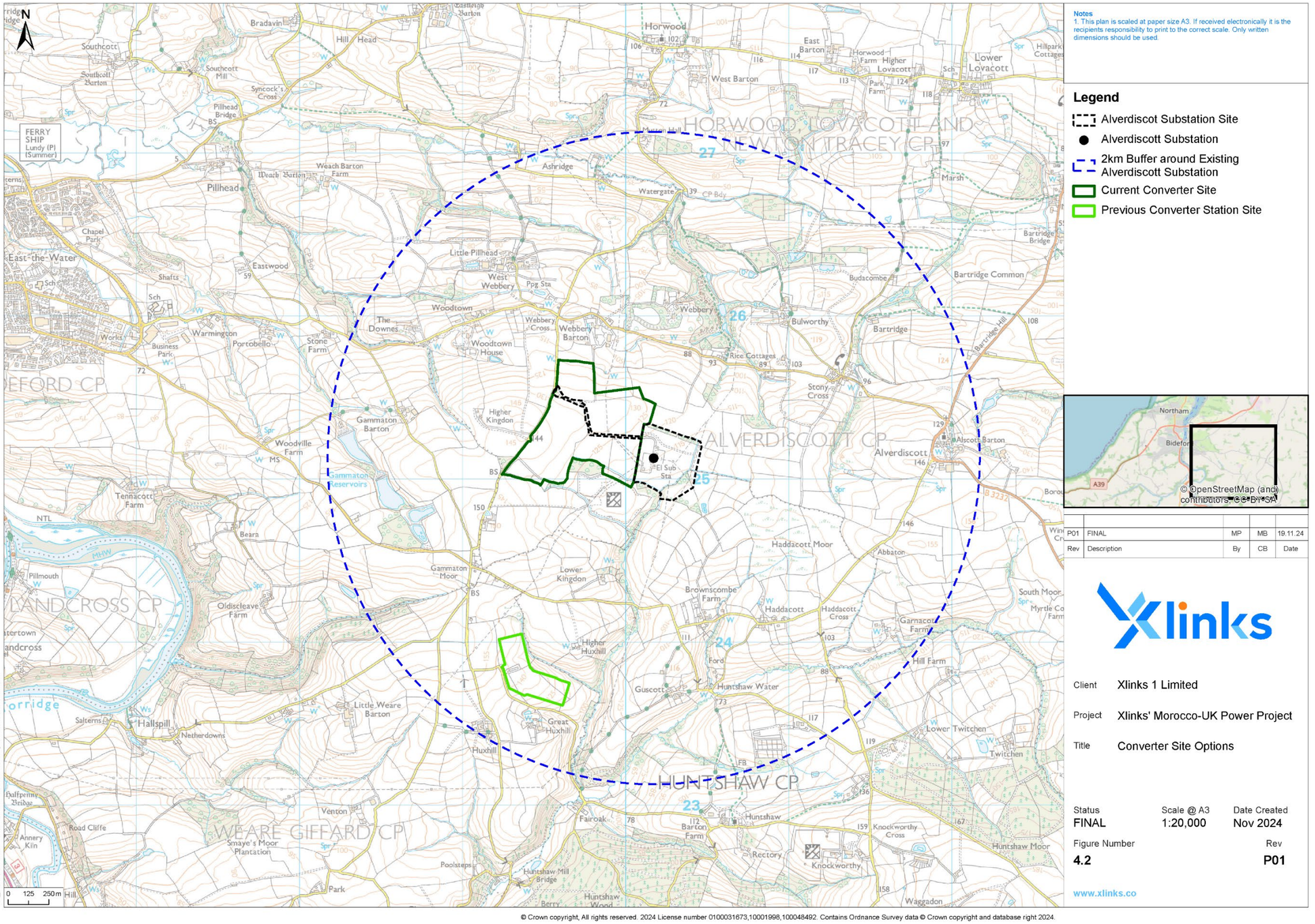

Figure 4.2: Converter site options

Landfall Selection

4.4.40 Following the identification of the Point of Connection into the Alverdiscott Substation, potential landfall options were considered to take through to consultation.

4.4.41 The North Devon and South Devon coastlines were initially considered; however the South Devon coastline was immediately disregarded due to the required length of onshore cable route required to connect into the Alverdiscott Substation – onshore cable routes from South Devon could have been in excess of 80km.

4.4.42 A preliminary desk study was carried out along the North Devon coastline to identify the potential landfall locations: north of Bideford, South of Bideford and the Taw-Torridge Estuary. Factors considered in determining a potential landfall location included:

- Suitable geological conditions for Horizontal Directional Drilling (HDD) and ground conditions in general for construction;
- Topography (height difference) between the seabed and the landfall HDD site;
- Avoiding a large number of land holding crossings;
- Avoiding key utility infrastructure;
- Potential environmental constraints;
- Onshore cable route distance (from Landfall to the Alverdiscott Substation);
- Availability of access to and from the coast for workers and vehicles; and
- Proximity to sensitive receptors.

4.4.43 As part of the initial consideration of potential landfall sites, a longlist of 15 locations was created. Reasons for rejecting potential landfall locations included insufficient access or space for the HDD operations, unsuitable geology or topography for drilling, environmental and socio-economic constraints, and excessive disruption to other marine users. The initial longlist was reduced to two locations both at Cornborough Range shown in **Figure 4.3.** Cornborough Range was identified as one of the few topographic depressions in the cliffs between Hartland Point and Westwood Ho!. An existing sewerage outfall at the site was installed using HDD in 2001, indicating suitable geological conditions for HDD installation.

4.4.44 The two sub options at Cornborough Range were assessed against geology, topography and HDD conceptual design, duct stringing approach (laying the cable out behind the HDD machine to feed into the drilling area) and vehicle access.

4.4.45 Of the two options considered, the southerly site was rejected due to significant height differential between the top of the cliff and the sea bed as well as poor vehicle access. That site also had a more constrained cable route eastwards for the first 1km.

4.4.46 Cornborough Range north was identified as the preferred option to take forward in the DCO application because it was a lower risk HDD and presented good duct stringing alignment behind the beach. A proven access used for the sewerage HDD works was available from suitable roads leading from the A39.

4.4.47 Following the identification of the Cornborough Range as the preferred landfall location, further desk-based assessment work and a site visit was carried out to confirm that it is feasible to achieve HDD and deliver the landfall site. An HDD

suitability assessment was undertaken of two conceptual HDD designs, HDD Design Option 1, which is shorter (at approximately 800 m) and the other HDD Design Option 2, which is longer (at approximately 1,600 m).

4.4.48 Both options are considered feasible based on the information available at the time of writing, however, the construction challenges and risks present with the longer HDDs would be significantly higher due to the increased length of the HDDs and increased scope of the marine works. Therefore, HDD Design Option 1 comprises the preferred methodology from an HDD perspective,

4.4.49 Following the outcomes of the 4-stage assessment process, the proposed landfall site, located approximately 2.5 km south of Westward Ho! and 4km west of Bideford, was selected as the preferred option to take to consultation.

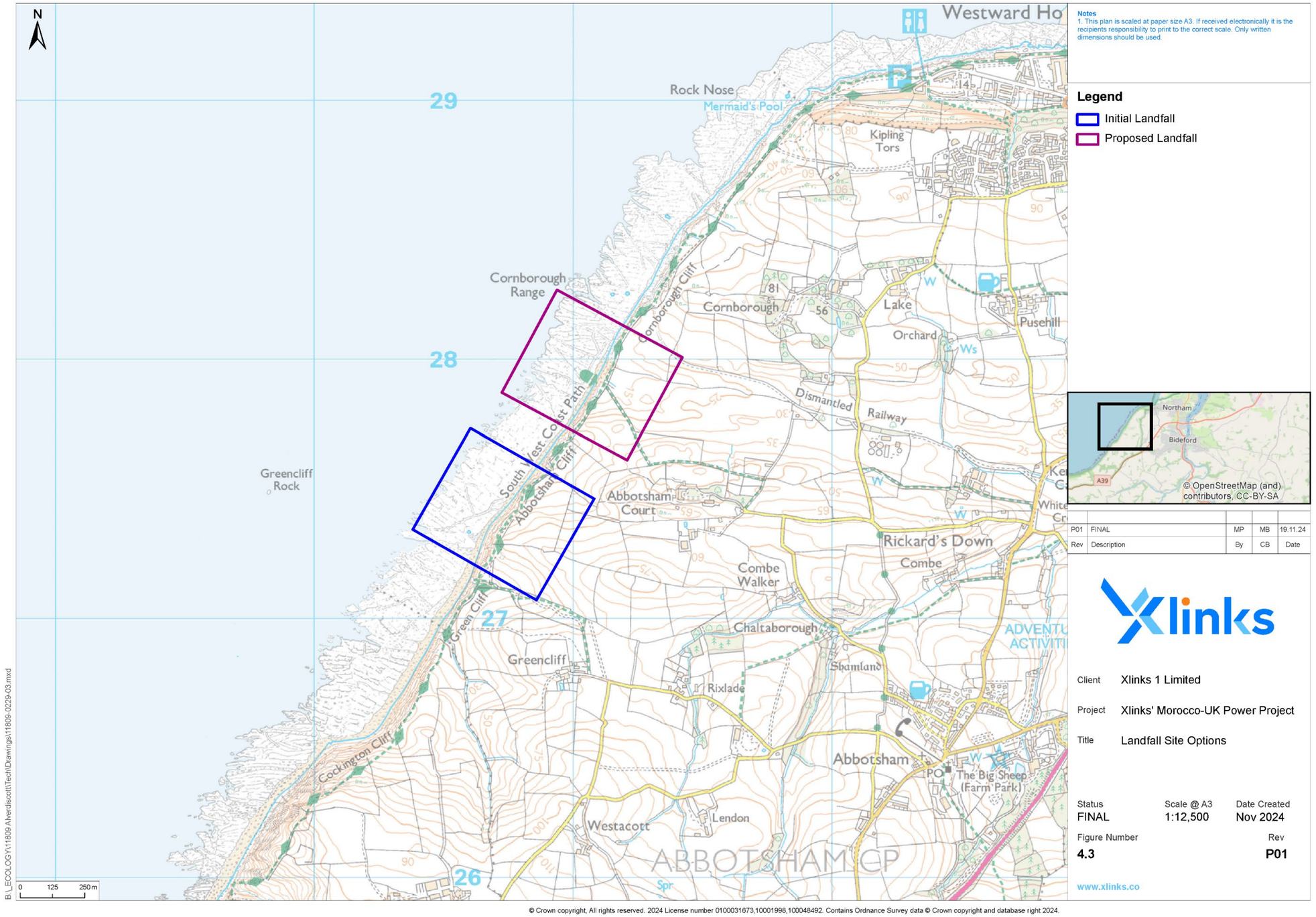

Figure 4.3: Landfall site options

Onshore Cable Corridor Selection

4.4.50 The identification and assessment of the Onshore HVDC cable route options included the assessment of the key environmental constraints that would provide obstacles and constraints between the point of landfall at Cornborough Range and the grid connection at Alverdiscott Substation. The key constraints to routing are shown in **Figure 4.4**. A constraints analysis was undertaken to understand potential challenges for Onshore HVDC cable routing from Landfall to the connection point. This focused on the environmental, planning, engineering and cost constraints.

4.4.51 Environmental and planning features that were considered during the design of the onshore cable route to reduce the associated impacts included the following:

- Locations of settlements, including Abbotsham Village (see **Figure 4.4**), including residential dwellings and farms;
- Existing infrastructure, including roads and pipelines (e.g., gas pipelines);
- Statutory designated sites, such as National Landscapes (formerly AONB), Sites of Special Scientific Interest (SSSI) and Local Nature Reserves (LNR);
- Historically designated sites, such as Scheduled Monuments and Listed Buildings;
- High flood risk areas and watercourses; and
- Areas of Ancient Woodland.

4.4.52 Engineering and cost considerations during the design of the cable route included the following:

- Major crossings:
  - the A39;
  - the River Torridge and A386;
  - existing utility infrastructure, including cables and pipelines;
- Accessibility from main roads for construction;
- Cost associated with the overall length of cable required;
- Areas of steep or variable terrain or unstable ground; and
- Avoidance of multiple small and sharp bends in the cable route.

4.4.53 As part of the initial route selection, the Applicant met with landowners and undertook a walkover of the route, following which the route was refined, taking into account local knowledge from the landowners. This included existing residential property access to natural water sources, farming activities including seasonal activities, land drainage and flooding, minimisation of farm business impact, and reduced impact on farm access.

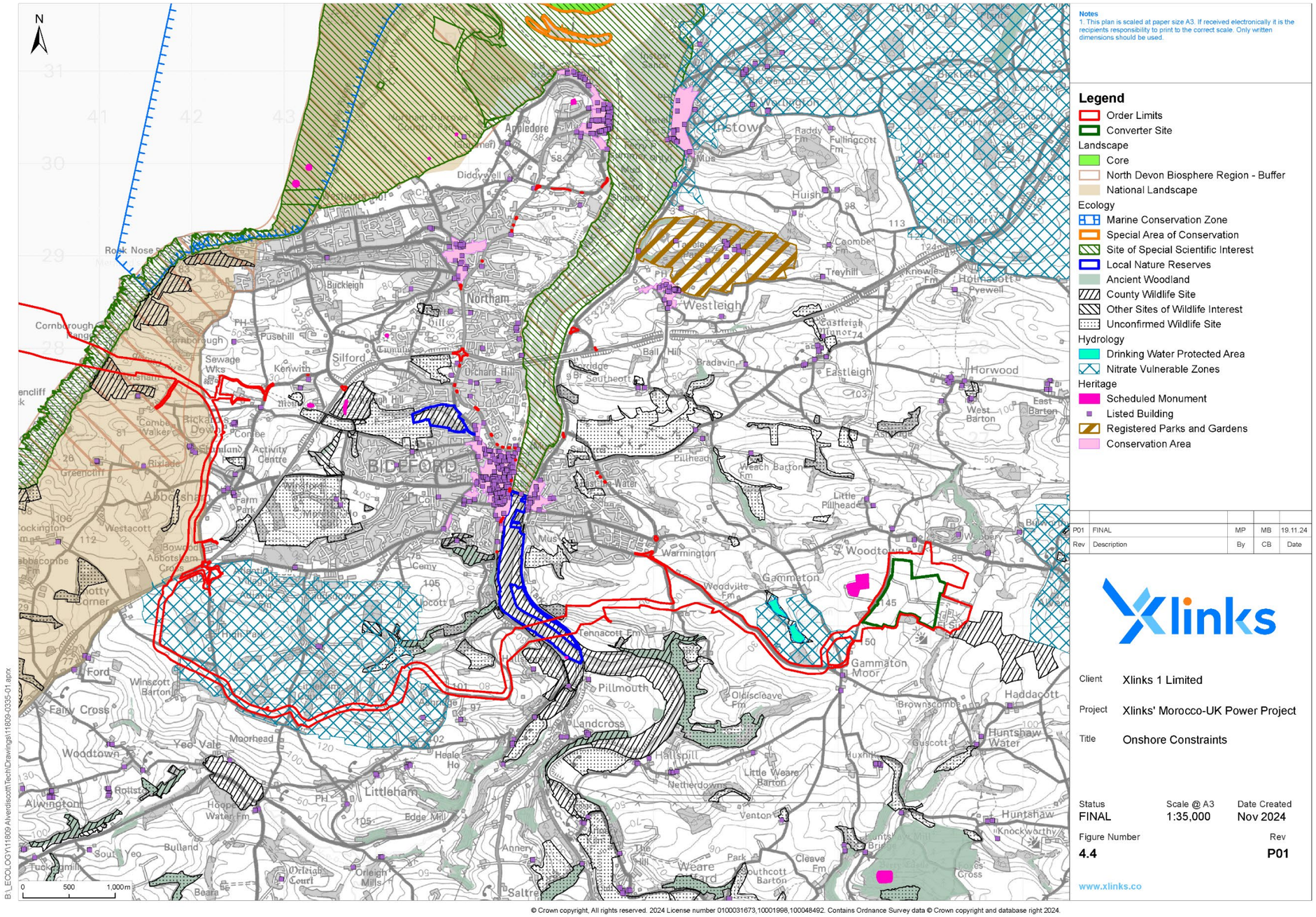

Figure 4.4: Onshore constraints

4.5 Alternative Design Development

Overview

4.5.1 The following sections summarise the main alternatives considered within the EIA process for each element of the Proposed Development to date.

4.5.2 Alternatives considered in the EIA are described in the following section. They are the iterations of the environmental decision making process which has sought to improve the preferred options' environmental performance.

4.5.3 Alternatives have been considered for each element of the Proposed Development. This process has been informed by:

- Project requirements;
- Other engineering and technical criteria;
- Land use and land ownership constraints; and
- The ongoing environmental appraisal process.

4.5.4 The above considerations are described in more detail in The Design Approach Document (document reference 7.3).

4.5.5 The Applicant's overarching requirements for the Project and the Project Design Envelope has controlled the Maximum Design Scenario and need for a proportionate EIA. Taken together, these are the limits that have controlled the way within which alternatives have been considered. Certain elements of the Proposed Development we the subject of community consultation, and in some cases, local knowledge helped the design process. Statutory Consultation feedback has further informed the design of the development as proposed.

4.5.6 The consideration of alternatives throughout the EIA process has been reported at the following milestones:

- As a draft proposal for a local planning application under the Town and Country Planning Act 1990
  - Torridge District Council Pre-Application Consultation May to October 2021 – TDC made helpful suggestions for the use of excavation and copse planting to obscure the Converter buildings from longer views.
  - 1st Community Consultation November 2022 – The Onshore HVDC Cable Corridor included a short section close to the school and church in Abbotsham. The proposed Converter Site was at Great Huxhil near Huntshaw.
  - 2nd Community Consultation April & May 2023 – Responding to concerns raised, the Onshore HVDC Cable Corridor was proposed to bypass Abbotsham. The proposed Converter Site was moved to the old Webbery Showground site.
- Following acceptance into the DCO regime (via s.35 of the Planning Act 2008)
  - EIA Scoping Report January 2024
  - Preliminary Environmental Information Report (PEIR) May 2024

- Final design for DCO application - refinement of the project design following review of statutory consultation responses and further EIA studies

4.5.7 The environmental appraisal process has informed the optimisation of:

- Cable Corridors both onshore and offshore;
- the Landfall;
- Converter Site layout and arrangement;
- Highways Improvements; and
- Construction methodologies and construction logistics planning for the above.

4.5.8 The Consultation Report (document reference 5.1) contains the full details of the feedback received throughout the evolution of the Proposed Development. Each topic chapter of the ES contains a short summary table setting out how consultation relevant to that specialism was considered in the refinement of the application design.

4.5.9 The stages of the design development are discussed further below.

Stage 1 Design – First public Non-Statutory Consultation

4.5.10 An appraisal of the proposed option to locate the conceptual converter station design and connect to the Alverdiscott Substation was presented at public consultation events at Huntshaw Parish Hall and in Bideford (Caddsdown Business Support Centre) in November 2022.

4.5.11 The selected Converter Site location would have necessitated HVAC cables travelling north towards the Alverdiscott Substation, and given the steeper gradient of the land, substantial cut-and-fill earthworks. The conceptual earthworks proposed to create a two-tier platform, with the two converter stations arranged north to south.

4.5.12 The location's advantage included being sited lower topographically with respect to important views of the site from the North and West, for example, the National Landscape (formally AONB), beaches at Westward Ho!, the ridgeline at Horwood and the elevated viewpoint at Codden Hill.

4.5.13 The disadvantages of the location included:

- Long HVAC Cable Corridor (which has a wider footprint than HVDC) that would pass through species rich habitats towards Alverdiscott Substation (approximately 1.7km).
- The available land was a smaller land parcel which would limit the ability to build bunds around the stations and makes the site highly visible to local views from neighbouring properties to the immediate South and West.
- Extreme east sloping topography which would cause issues in construction feasibility.
- Proximity to numerous residential properties (within 300m) which could not be screened.
- The need for substantial access improvements due to existing narrow roads.

4.5.14 Consequently, the conceptual design included a series of architectural features, including a curved roof line on the main converter building to try to minimise some of the visual impacts.

4.5.15 Based on local community feedback from the November 2022 non-statutory consultation (which was a general dislike of the proposed location) and the disadvantages of the location as listed above, an alternative location was then considered in the next stage of the design.

Stage 2 Design – Second public Non-Statutory Consultation

4.5.16 The proposed Onshore HVDC cable corridor was amended following consultation feedback from the first non-statutory consultation that the proposed route came too close to residential properties in Abbotsham and the local primary school. An amended route was consulted upon at the second non-statutory consultation. **Figure 4.5** shows the options considered.

4.5.17 As detailed in Design Stage 1, the Applicant developed an alternative Converter Site location at a site further north to the proposed Huntshaw site, locally known as the old Webbery Showground, immediately to the West of the Alverdiscott Substation.

4.5.18 The proposed alternate location at the old Webbery Showground was presented at non-statutory public consultation events at Huntshaw Parish Hall and Alverdiscott Community Hall in April 2023. Consultation events at Pollyfield Community Centre and Caddsdown Business Support Centre were held in May 2023.

4.5.19 The proposed Converter Site was located immediately to the west of the Alverdiscott Substation. Other land surrounding the Alverdiscott Substation is constrained by solar farm development, utilities and sites designated for nature conservation and heritage. The constraints around Alverdiscott Substation are shown in **Figure 4.6**.

4.5.20 Making use of unconstrained and unoccupied land to the west of Alverdiscott Substation resulted in the West (Bipole 2) converter station oriented roughly North-South and the East (Bipole 1) converter station oriented roughly East-West. The orientation of the converter stations proposed at the second non-statutory consultation avoided the consented but not implemented solar farm (ref: 1/1057/2021/FULM—Land At Webbery Barton And Cleave Farm Bideford Devon), which makes use of the field adjacent to the Alverdiscott Substation.

4.5.21 The proposed design required substantial cut and fill to create a sufficient level development platforms for both bipoles as well as to create bunds to screen the Site from north and west viewpoints. A potential landscape feature was also considered within the northern field to help mitigate potential visual impacts north of the proposed Converter Site. A curved roof for the main converter building was maintained as a further mitigation measure.

4.5.22 Locating the Converter Site immediately west of the Alverdiscott Substation significantly reduced the length of the HVAC cables between the Converter Site and the existing Alverdiscott Substation. This resulted in a reduction in potential impacts associated with the HVAC Cable Corridor.

4.5.23 Due to the proposed Converter Site at the old Webbery Showground being located at a higher elevation (closer to the local ridge line) compared to the

proposed Huntshaw location, there was a potential for increased visual impacts associated with the converter buildings being visible over the ridgeline. This was proposed to be mitigated by: a) 'cutting-in' the development platforms such that approx. 50% of the building could be below current ground levels and; b) constructing appropriately sized landscaped bunds to 'screen' the majority of the building structure from these viewpoints.

4.5.24 Potential impacts on views from the south and east of the proposed convertor site at old Webbery Showground would be mitigated by landscaped planting, noting that this screening would not be as high as the bunding to the north and west.

4.5.25 The proposed Converter Site at the old Webbery Showground would require a longer Onshore HVDC Cable Corridor than the proposed Huntshaw Converter Site, however the Applicant anticipated that the additional length in Onshore HVDC Cable Corridor did not introduce any additional environmental impacts beyond those associated with the proposed Huntshaw Converter Site inclusive of its HVAC connection.

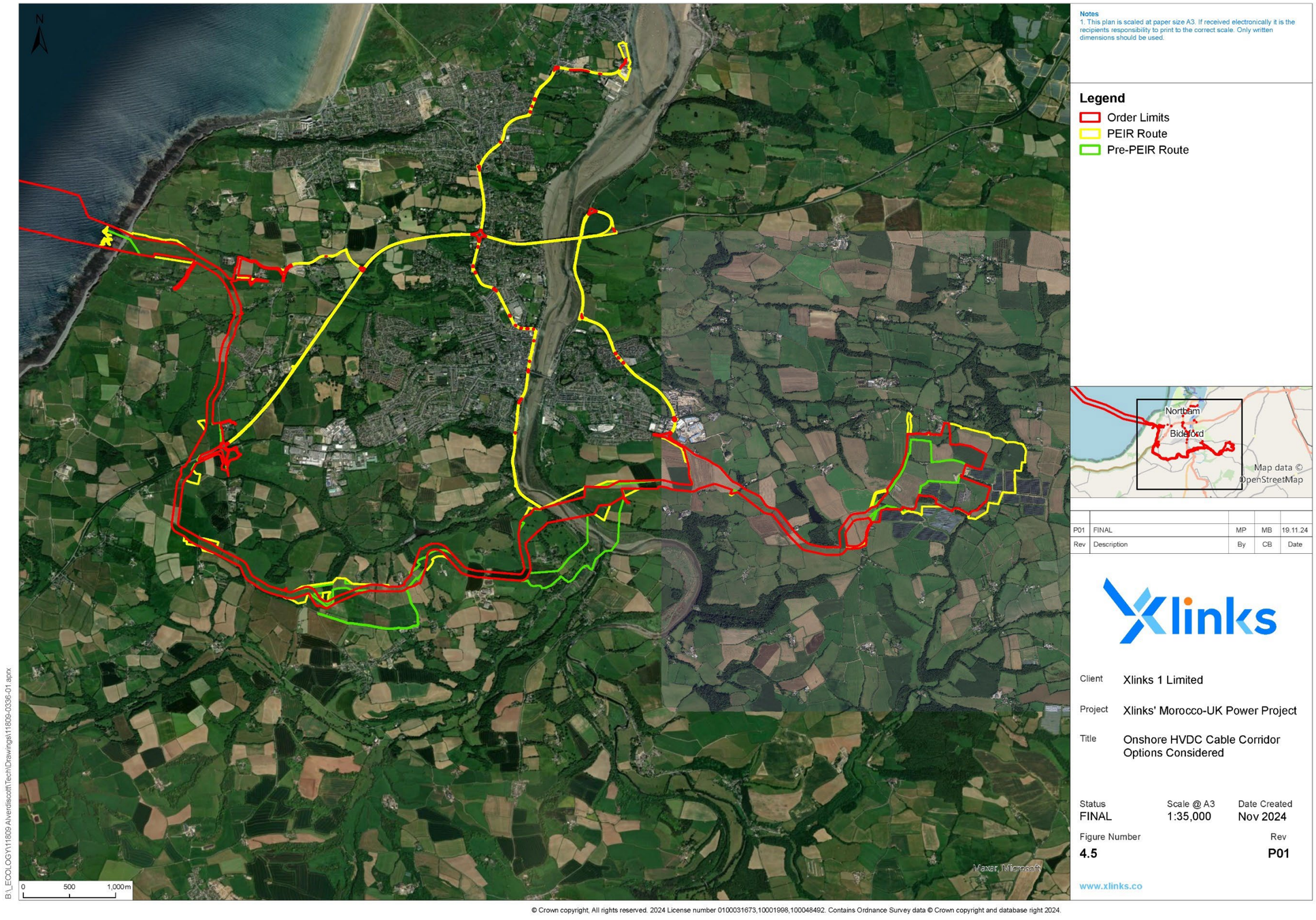

Figure 4.5: Onshore HVDC cable corridor options considered

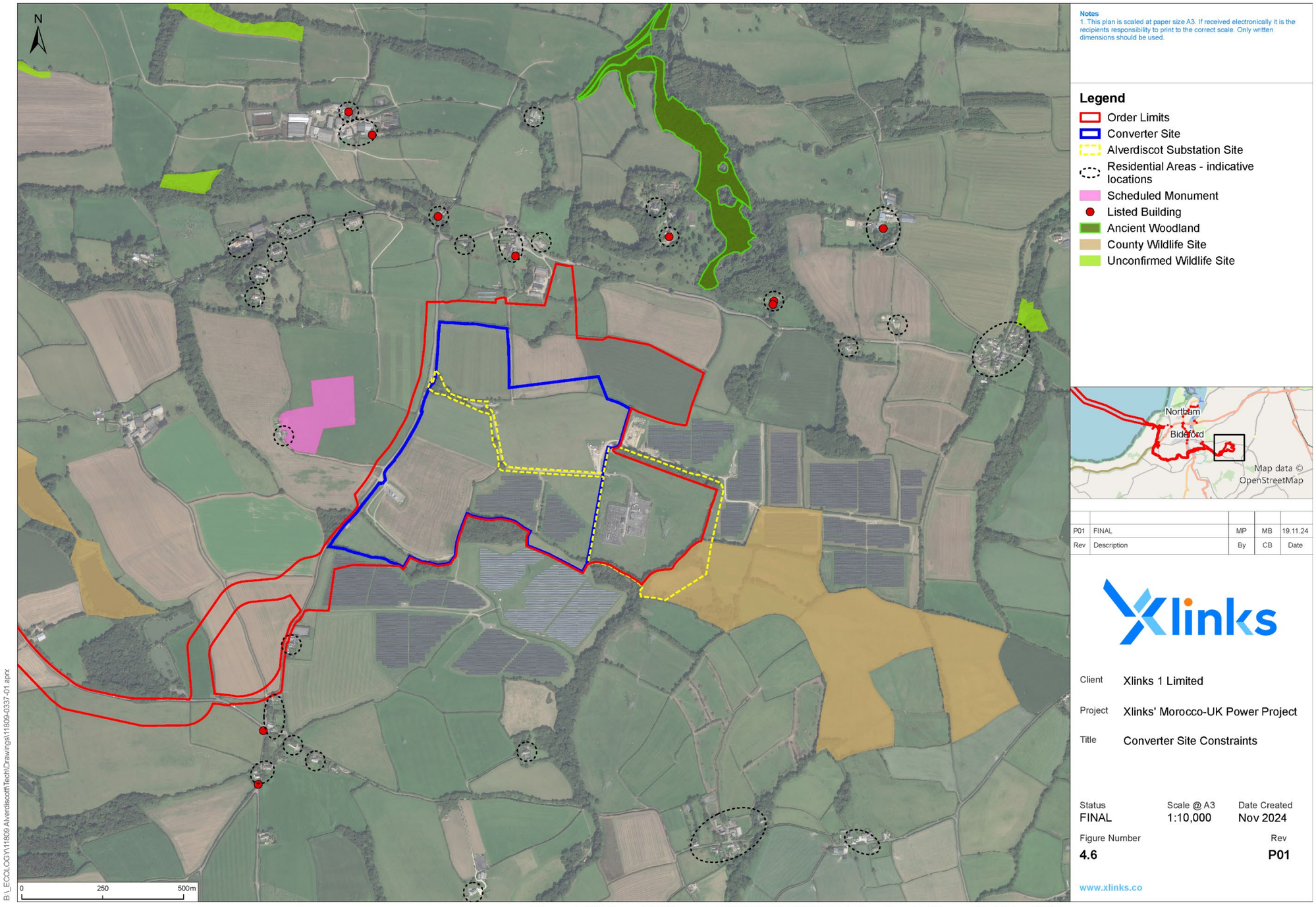

Figure 4.6: Converter site constraints

Stage 3 – Design for Statutory Consultation and PEIR

4.5.26 Following Design Stage 2, the Applicant further developed the conceptual layouts of the proposed Converter Site at the old Webbery Showground location and made minor amendments to the proposed HVDC HDD locations along the route. The output of this process was presented within the PEIR and that was the subject of statutory consultation between May and July 2024.

4.5.27 The location of proposed HDD compounds for the Onshore HVDC Cable Corridor was reviewed during Stage 3, resulting in minor amendments to the locations proposed during Stage 2. The amendments largely affected the proposed HDD compounds at Buckland Road and West Ashridge where the proposed cable route was amended to mitigate potential impacts on an existing groundwater well at Buckland Road and to move the northern HDD compound at West Ashridge to a flatter peace of agricultural land, reducing the need for substantial cut into the existing ground levels for the compound.

4.5.28 The Stage 3 Converter Site design has incorporated further detail from early engagement with the potential supply chain for the high-voltage converter equipment, resulting in an increase in the dimensions of the main converter building and its surrounding equipment (the platform) and necessitating the removal of the curved roof to meet internal design requirements of the supply chain.

4.5.29 Initial consideration of the construction environmental impacts, in particular potential traffic impacts associated with cut and fill operations required re-orientation of the convertor stations so that both are roughly oriented north to south. The reorientation of the converter stations reduces the extent of cut required into the hillside to site the converter buildings, thereby reducing the volume of materials generated during excavation. A review of the size and volume of proposed landscaped bunds has also helped to balance the cut and fill operations, resulting in an overall reduction in the anticipated number of construction vehicle (HGV) movements required to and from the proposed Gammaton Road compound during the construction phase.

4.5.30 Detailed evaluation of various methods for reducing the visual impact of Converter Site buildings was conducted using 3D models and photomontages. This resulted in increasing the indicative visual mitigation using landscaping bunds on all sides of the converter station. This alteration to include additional bunds while accommodating supply chain feedback for a larger platform has necessitated the use of steeper, near-vertical internal bund construction to allow sufficient space for the converter stations inside the bunds. The Applicant anticipates that the proposed vertical internal facing of the bunds will be constructed using a combination a shotcrete with appropriate stabilisation fixings (e.g. rock bolts) and gabion baskets (rock filled basket).

4.5.31 The advantages of a proposed indicative design with bunding surrounding the converter buildings are:

- A reduction in the potential for surplus materials from cut operations requiring export from site, thereby reducing the project's potential construction traffic impacts.

- A reduction in visual impacts from views from the south and east (in addition to views from the north and west) associated with a greater volume of landscape bunding.

4.5.32 The design requires the removal of a portion of a consented solar farm currently in the construction phase (planning reference: 1/1057/2021/FULM - Land At Webbery Barton And Cleave Farm Bideford Devon) in the field immediately west of the existing Alverdiscott Substation. This equates to an estimated loss of circa 2.5MW of the solar farm's overall proposed installed capacity. The Applicant will continue to engage with the solar farm owner to confirm the impacts on their development and how the decommissioning of the constructed solar panels would be managed.

4.5.33 Internal volumetric criteria has prompted reconsideration the indicative roof shape of the Converter Hall buildings which will be more angular than that proposed in Stages 1 and 2 of the design. However, architectural treatments will be proposed through design principles included in the DCO application to mitigate potential visual impacts associated with the form of the buildings. The proposed increase in landscaping bunding and planting will largely mitigate visual impacts associated with the change in the proposed roof shape. The size of the building and platform is required to ensure that the construction and operation of the site are fully feasible.

4.5.34 Overall, the design for PEIR and statutory consultation represents a series of beneficial trade-offs between the technical, supply chain, landscaping, and land constraints and requirements and represents an approach to minimising the developer's impact on the environment.

Stage 4 – Design for DCO Application

4.5.35 Following the close of Statutory Consultation in July 2024, and a further Targeted Consultation, the evaluation of feedback and continued design work resulted in a large number of improvements that are listed at Volume 1 Chapter 3 Project Description at section 3.5.

4.5.36 At the Converter Site, further masterplanning work has resulted in an indicative layout with improved land use efficiency, refined proposals for an outline drainage strategy and landscaping scheme.

4.5.37 The below is a short summary of those changes with commentary on the environmental or other advantages that were achieved.

Onshore

Converter Site

- Reduction in the Onshore Infrastructure Area by approx. 62Ha:
  - Removal of the Alverdiscott Substation development from the Proposed Development which will be taken forward by NGET;
  - Clarification on the space required for utility diversions around the Converter Site;
- Optimisation of the operational areas bringing them closer together to improve:
  - land use efficiency;

  - site access;
  - HVDC cable entry routes;
  - HVAC cable exit routes; and
  - cut and fill balance.
- Re-modelling of the proposed earth bunds to reduce their overall height and slope angle to a more natural repose;
- Landscape planting and habitat strategy for the Converter Site which was updated after additional engagement with TDC.

Onshore HVDC Cable Corridor

- Reduction in major HDD crossings from 8 to 6 through removal of the Littleham Wood HDD altogether and discounting the requirement for an optional HDD under solar panels to the south of the Converter Site; and
- Optimisation of the Torridge HDD crossing alignment making it shorter and narrower;
- Realignment of the trenchless crossings at West Ashridge.

Construction Logistics and Abnormal Loads

- Refinement of the expected extent of land affected by the Abnormal Indivisible Loads (AIL).
- Refinement of the areas of public road subject to either temporary or permanent widening works.
- Progression of site access designs.
- Adaptation of cable construction logistics strategy to optimise the use of the A39 west compound.

Offshore

4.5.38 There have been no changes to the offshore elements of the Proposed Development between PEIR and ES affecting the Order Limits. However, there have been a number of updates to assumptions used in the impact assessment derived from refinements in detail of construction methodology as follows:

- **Construction parameters:**
  - At PEIR stage the rate of trenching progress for cable burial was presented as ranging from c.50 to 400 m per hour. For ES stage this has been refined to approximately 150 m per hour.
- **Crossings:**
  - We have revised our assumptions on the number of Out of Service (OOS) cables requiring a constructed crossing. Of the 28 OOS cables that will be encountered, we have used a precautionary assessment (worst case) that 5 of these OOS cables will require crossings to be constructed rather than the cables being removed.
- **Dredging and sea bed preparation:**

- At PEIR stage the potential for localised dredging and removal of dredge arisings was being considered at the HDD exit points (using e.g. Trailer Suction Hopper Dredging (TSHD)). These methods have been discounted prior to the ES assessment. The HDD exit pits will be temporarily cleared of superficial sediments (mainly sands), most likely using long-reach back-hoe from the jack-up barge(s). Following completion of the HDD and installation of the associated cable protection (concrete mattresses at the exit points) the cleared sediments will be refilled – via a combination of further back-hoe work and through natural infilling.
- The PEIR assessment considered the potential for broadscale removal of mobile sediment features (e.g. sandwaves and large sand ripples) during preparatory seabed flattening, where these features could not be avoided through micro-routing within the offshore route corridor. For the ES assessment, following completion and review of the Cable Burial Risk Assessment (CBRA) it is now confirmed that there are no known sandwaves or large sand ripples in UK waters that would require pre-sweeping / large-scale flattening. The scale of sandwaves and ripples is such that cable burial below mobile sediment layers is expected to be achieved during normal installation procedures i.e. using mass flow excavation (MFE) and/or 'surface plough'/leveller only.

4.5.39 In parallel with the above design work, direct engagement has been ongoing with key consultees such as Devon County Council, Torridge District Council, Natural England, Joint Nature Conservation Committee (JNCC), Historic England, the Marine Management Organisation (MMO) and the Centre for Environment, Fisheries and Aquaculture Science (CEFAS). In particular, consultation has centred on the following key issues:

- Cable Burial Risk Assessment outcomes have been shared with MMO, NE and JNCC;
- Onshore outline management plans such as the draft outline Landscape and Ecology Management Plan (LEMP) have been shared with TDC;
- Ongoing discussion with DCC Highways over proposed temporary road works and permanent road improvements; and
- Continued pursuit of ecological enhancements and further benefits on site (at the Converter Site) has resulted in improvements to the indicative proposals including additional land for landscape strategy to the south of the Converter Site.

Consideration of construction logistics

4.5.40 Volume 1, Chapter 3: Project Description of the ES at section sets out the site access strategy for the Proposed Development.

4.5.41 The majority of local roads in the vicinity of the Onshore Infrastructure area are generally too narrow for two-way construction HGV traffic and the Applicant has sought ways to minimise construction traffic impacts.

4.5.42 A construction logistics strategy has been developed that uses wider and therefore more suitable roads as principal points of access to off-road haul routes, which in turn would allow HGV and construction traffic access to all other areas of the Onshore Infrastructure Area.

4.5.43 It is expected the majority of construction plant and materials will enter the locality via the A39. Therefore, site access locations were found as near as possible to either the A39 or a suitable main road that connects to it. The principal site access points are:

1. Cornborough Sewage Treatment Works (STW) (routed from A39 into B3236 and Abbotsham Rd)
2. A39 West (routed from A39 Abbotsham Cross roundabout and Abbotsham Rd)
3. A39 East (routed from A39 Abbotsham Cross roundabout, Clovelly Road and Littleham Rd)
4. A386 (routed from A39 Heywood Road roundabout)
5. Gammaton Road (routed from A39, A3233 and Manteo Way)

4.5.44 The operational Converter Site will have an access constructed on the unnamed road that runs from Gammaton Cross to Webbery Cross which will be suitable for all vehicle types. It was recognised at the earliest stages of the project that this road was not capable of supporting construction traffic in its current geometry as it is single track and severely constrained at its southern end by the layout of Gammaton Crossroads. It was also recognised that residential receptors fronting the road would be severely disrupted by passing traffic.

4.5.45 It was therefore decided that construction traffic to the Converter Site would utilise the haul road (required in any case) for the section of the Onshore HVDC Cable Corridor between Gammaton Road and the Converter Site. This embeds mitigation for Converter Site construction traffic.

4.5.46 Temporary construction compounds will be established at the principal site access points to receive materials and plant for distribution along the cable construction haul roads.

4.5.47 The main compounds are as follows:

- Landfall –via the Cornborough STW access;
- A39 –via the A39 West access;
- Torridge River West – via the A386 access;
- Gammaton Road – via Manteo Way; and
- Converter Site – via Gammaton Road compound.

4.5.48 In the consideration of alternative compound locations and points of access the following criteria were used:

- Readily accessible from the A39 and close to public transport
- Suitable, or easily capable of being made suitable, to accept all vehicle types including HGV's and abnormal loads
- Land area of a suitable size for the compound purpose
- Avoiding areas of high sensitivity to traffic such as schools, hospitals and care homes
- Avoiding areas of known planning constraints and local plan site allocations

4.5.49 The Gammaton Road compound being a satellite compound supporting the Converter Site construction also considered the following requirements and benefits:

- Close proximity to the A39 - minimises the distance travelled by HGVs and AILs on narrow country lanes.
- Dual use for both the Onshore HVDC Cable Corridor and the Converter Site – further minimises the environmental impacts during construction.
- Suitably sized to support both cable and converter construction.
- Reduce the need for storage, vehicle parking and worker facilities at the Converter Site, thereby reducing the overall size of the Converter Site construction site area.
- Minimise the distance HGV and AILs need to travel between a main compound and the Converter Site.
- Establishment of appropriate mitigation measures on the boundary of the site to minimise potential noise and visual impacts associated with the temporary compound.
- Reduce the number of residential properties located within close proximity to the proposed site.
- Supported of use by the landowner, mitigating the need to use CPO powers for the use of the land.

4.5.50 The Applicant considered other areas on the eastern side of the River Torridge, connected to the Onshore HVDC Cable Corridor although these areas would still require access via Manteo Way. Compounds in these areas would also be closer to a larger number of residential properties on the fringes of East-the-Water and the allocated local plan development BID04 which would further extend East-the-Water.

4.5.51 Feedback received during Statutory Consultation included concerns about the total number of private vehicles marshalled at the Gammaton Road compound. Adaptation of the construction logistics strategy post Statutory Consultation has sought to optimise the use of the A39 west compound for cable contractors thereby reducing construction traffic at Gammaton Road related to those tasks.

4.5.52 Having carefully reviewed the construction logistics strategy pre and post Statutory Consultation, the Applicant is not aware of other suitably sized compound locations that meet the above requirements.

4.6 Conclusion

4.6.1 The site selection process undertaken for the Proposed Development has concluded in the application for development consent for the areas and works assessed throughout this Environmental Statement. Wherever possible and practicable, the Applicant has sought to accommodate preferences and concerns raised by stakeholders through the site selection process whether by adjustments to the development boundary, areas of works, or designs being considered.

4.6.2 As detailed in Volume 1, Chapter 5: Environmental Impact Assessment Methodology of the Environmental Statement, the project has employed a Maximum Design Envelope approach. Therefore, it is recognised that whilst the site selection process undertaken to date has included a number of refinements to the project envelope so far as practical, there remain some necessary areas of flexibility in the final project design.

4.6.3 Whilst the detailed design has not yet been undertaken and is dependent on a number of factors including pre-construction baseline surveys, site investigation data, and further engineering studies, various documents within the application that require subsequent agreement with the relevant authorities constrain how these project components could be built out in future.

4.6.4 These include:

- The Draft DCO (document reference 3.1) and related Schedules – particularly Schedule 1 setting out the parameters of the project that will be fixed by the grant of consent;
- Volume 1, Chapter 3: Project Description of the Environmental Statement – setting out the Project Design Envelope (PDE) which must be complied with for each component;
- The outline Landscape and Ecology Management Plan (document reference 7.10) which describes the aims and objectives of the landscape scheme at the Converter Site;
- The Design Principles Statement (document reference 7.4) – provides commitments on the detailed design of key components, namely the principles that will guide the design of the Converter Site and associated drainage, lighting and landscaping
- The Works Plans – for works in both the onshore and offshore realms (document references 2.3.1 and 2.3.2 respectively) detail the areas within which works associated with each component can take place.

4.7 References

Department for Energy Security & Net Zero (2023a) Overarching National Policy Statement for Energy (NPS EN-1). Available at: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf Accessed: November 2024).

Department for Energy Security & Net Zero (2023b) National Policy Statement for Renewable Energy Infrastructure (NPS EN-3). Available at: https://assets.publishing.service.gov.uk/media/65a7889996a5ec000d731aba/nps-renewable-energy-infrastructure-en3a.pdf (Accessed: November 2024).

Department for Energy Security & Net Zero (2023c) National Policy Statements for Electricity Networks Infrastructure (NPS EN-5). Available at: https://assets.publishing.service.gov.uk/media/65a78a5496a5ec000d731abb/nps-electricity-networks-infrastructure-en5.pdf (Accessed: November 2024).

Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework. Available at: https://www.gov.uk/guidance/national-planning-policy-framework (Accessed: November 2024).

Planning Inspectorate (2020) Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements. Available at: Nationally Significant Infrastructure Projects - Advice Note Seven: Environmental Impact Assessment: process, preliminary environmental information and environmental statements - GOV.UK (Accessed: November 2024)