Awel y Môr Offshore Wind Farm

Category 6: Environmental Statement

Volume 3, Chapter 1: Onshore Project Description

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Contents

Figures

Tables

Glossary of terms

TERM	DEFINITION
Ancient Woodland	Woodland listed within the Ancient Woodland Inventory which identifies woodlands that have had continuous woodland cover for some centuries
Array	The area where the wind turbines will be located.
AyM	The Awel y Môr Offshore Wind Farm Project.
Cable Works TCC	TCC associated with cable works
Development Consent Order	An order made under the Planning Act 2008 granting development consent for a Nationally Significant Infrastructure Project (NSIP) from the Secretary of State (SoS) for Business, Energy and Industrial Strategy (BEIS).
EIA	Environmental Impact Assessment
ES	Environmental Statement (the documents that collate the processes and results of the EIA).
Enabling Works	Works undertaken by National Grid to facilitate the 400kV connection to the existing National Grid Bodelwyddan substation
Export Cable Corridor (ECC)	The area(s) where the export cables will be located connecting Landfall to the OnSS and the OnSS to the existing National Grid Bodelwyddan substation

TERM	DEFINITION
Grid connection Point	The point at which the ECC connects to the National Grid (i.e. the existing National Grid Bodelwyddan substation)
HRA	Habitats Regulations Assessment. HRA is the process, not to be confused with the RIAA, which is the document setting out the HRA information.
Joint Pit	An underground structure where sections of cable are joined.
Landfall	The Landfall denotes the location where the offshore export cables are brought ashore and jointed to the onshore export cables in transition joint bays (TJBs).
Marine Licence	A licence required under the Marine and Coastal Access Act 2009 for marine works which is administered by the Natural Resources Wales (NRW) Marine Licensing Team (MLT) on behalf of the Welsh Ministers.
Maximum Design Scenario (MDS)	The maximum design parameters of the combined project assets that result in the greatest potential for change in relation to each impact assessed.
Mitigation	Mitigation measures are commitments made to reduce and/or eliminate the potential for significant effects to arise as a result of the project. Mitigation measures can be embedded (part of the project design) or secondarily added to reduce impacts through the assessment process.

TERM	DEFINITION
Onshore Export Cable Corridor (Onshore ECC)	The proposed cable route which represents a corridor, typically 40 m to 60 m wide, within which the cable trenching, haul road and stockpiling areas associated with cable construction, will be undertaken and the cables will be installed.
Onshore Substation (OnSS)	Where the power supplied from the wind farm is adjusted (including voltage, power quality and power factor as required) to meet the UK System-Operator Transmission-Owner Code (STC) for supply to the existing National Grid Bodelwyddan substation.
Order Limits	The area within which development will be carried out including all works, access routes, TCCs and visibility splays
PEIR	Preliminary Environmental Information Report. The PEIR was written in the style of a draft Environmental Statement (ES) and formed the basis of statutory consultation. Following that consultation, the PEIR documentation was updated into the final ES that accompanies the applications for the Development Consent Order (DCO) and Marine Licence.
Route Section	A defined section of the route
OnSS Access Zone	The area which will contain the final OnSS access route (s) (both construction and operational) – The route(s) of the construction and operational accesses within the OnSS Access Zone will be confirmed following detailed design (post consent)

TERM	DEFINITION
OnSS Construction Area	The area within which the OnSS construction would take place. This area incorporates both the Substation Footprint and areas of cut and fill required to construct the OnSS platform.
OnSS Footprint	The footprint for the OnSS which would incorporate either Air Insulated Switchgear or Gas Insulated Switchgear technology.
OnSS Cable Corridor Zone	The area within which the final cable connection into and out of the OnSS will be made. The route of the cable connections to the OnSS will be confirmed following detailed design (post consent). The cable route will be either east or west of the pond located immediately south of the OnSS.
OnSS Temporary Access Zone	The area between the OnSS TCC and the OnSS Construction Area, through which a number of access tracks will be routed to allow vehicles to move between the two areas.
The Applicant	Awel y Môr Offshore Wind Farm Limited.
Unlicensed Works	Works undertaken by The Applicant to connect to the existing National Grid Bodelwyddan substation .

Abbreviations and acronyms

TERM	DEFINITION
AOD	Above Ordnance Datum
AIL	Abnormal Indivisible Load
AIS	Air Insulated Switchgear
AyM	Awel y Môr Offshore Wind Farm
CBS	Cement Bound Sand
CoCP	Code of Construction Practice
DCC	Denbighshire County Council
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DOB	Depth of Burial
DOE	Depth of Excavation
OL	Order Limits
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ES	Environmental Statement
GIS	Gas Insulated Switchgear
HDD	Horizontal Directional Drilling
HDPE	High Density Polyethylene
HGV	Heavy Goods Vehicle
HVAC	High Voltage Alternating Current
IEMA	Institute of Environmental Management & Assessment

TERM	DEFINITION
LGV	Light Goods Vehicle
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MW	Megawatt
NGET	National Grid Electricity Transmission
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
NWP	North Wales Path
O&M	Operation and maintenance
OnSS	Onshore Substation
OnSS TCC	Onshore Substation Temporary Construction Compound
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PRoW	Public Rights of Way
SABP	St Asaph Business Park
SMP	Soil Management Plan
STC	System-Operator Transmission-Owner Code
TCC	Temporary Construction Compound
TJB	Transition Joint Bay

Units

UNIT	DEFINITION
hr	Hour
km	Kilometre
kV	Kilovolt
kg	Kilogram
m	Metre
m^2	Square Metre
m^3	Cubic Metre
mm	Millimetre
MW	Megawatt

1 Onshore project description

1.1 Introduction

1 This chapter of the Environmental Statement (ES) describes the onshore elements of the proposed Awel y Môr Offshore Wind Farm (AyM). It sets out the AyM design and components for the onshore infrastructure, as well as the main activities associated with the construction, operation and maintenance (O&M) and decommissioning of the onshore elements of AyM.

2 This chapter has been drafted by SLR Consulting on behalf of Awel y Môr Offshore Wind Farm Limited (hereafter referred to as 'the Applicant'), and sets out:

- The design envelope approach;
- Consultation relating to the onshore project design undertaken to date;
- An overview of the location of the onshore elements of AyM and proposed onshore site boundaries;
- The design envelope of the onshore project components and the techniques used to build, operate and decommission the onshore elements of AyM; and
- The indicative AyM construction programme.

3 This chapter details the above insofar as related to the onshore components of the proposed scheme, including the Landfall where the offshore export cables will meet the onshore export cables. The Landfall for the purpose of this chapter refers to the area between Mean Low Water and the point at which onshore and offshore cables are connected within Transition Joint Bays (TJBs). Full details of the offshore elements of the proposed development are provided in Volume 2, Chapter 1: Offshore Project Description (application ref: 6.2.1).

4 A detailed description of the site selection process that has resulted in the selection of the locations of project infrastructure and routes taken is also provided in Volume 1, Chapter 4: Site Selection and Consideration of Alternatives (application ref: 6.1.4).

1.2 Design envelope approach

1.2.1 Overview

5 At this stage in the AyM development process, decisions on exact locations of infrastructure and the precise technologies and construction methods that will be employed have not been made. These will be determined during detailed design that will take place between a decision on the application for development consent and the start of construction.

6 As a result, and as detailed within the EIA methodology chapter (Volume 1, Chapter 3: EIA Methodology (application ref: 6.1.3)), in some instances, the final design and or construction method cannot be defined at this stage. Where this is the case, a Maximum Design Scenario has been adopted (see Section 1.2.3).

7 Therefore, at this stage the AyM onshore description sets out the main components and parameters of the project. The maximum design envelope approach (often referred to as the 'Rochdale Envelope') has been used to provide certainty that the final project as built will not exceed the identified parameters, whilst providing the flexibility to accommodate necessary further project refinement during the detailed design phase post-consent.

8 For onshore aspects, this flexibility is required in terms of options for the number of export circuits, layout and technology requirements for the proposed onshore substation (OnSS), precise siting of onshore infrastructure and construction methods. The design envelope approach will ensure that anticipated changes in available technologies between now and the detailed design phase can be accommodated within the DCO, whilst retaining an Environmental Impact Assessment (EIA) that considers all options, with conclusions that are robust regardless of the final design eventually built out.

9 The final project design will be influenced by ground and environmental conditions identified through detailed pre-construction surveys, project economics and the approach to procurement of resources. This chapter therefore sets out a series of options, all of which are encompassed within the overall design envelope.

1.2.2 Policy and legislative context

10 The use of the design envelope approach has been recognised in the Overarching National Policy Statement (NPS) for Energy (EN-1) (DECC, 2011a) and the NPS for Renewable Energy Infrastructure (EN-3) (DECC, 2011b). The NPS for Electricity Networks Infrastructure (EN-5) does not contain policy on the design envelope approach. In addition to the current NPS, draft NPSs were consulted upon during September to November 2021. Where provisions in the draft NPS (as submitted for consultation) differ these are highlighted. This established approach has been used in the majority of offshore wind applications.

11 NPS EN-1 Paragraphs 4.2.7 and 4.2.8 (and paragraphs 4.2.5 and 4.2.6 of the Draft NPS EN-1), provides the following guidance:

> *'In some instances it may not be possible at the time of the application for development consent for all aspects of the proposal to have been settled in precise detail. Where this is the case, the applicant should explain in its application which elements of the proposal have yet to be finalised, and the reasons why this is the case.*
>
> *Where some details are still to be finalised the ES should set out, to the best of the applicant's knowledge, what the maximum extent of the proposed development may be in terms of site and plant specifications, and assess, on that basis, the effects which the project could have to ensure that the impacts of the project as it may be constructed have been properly assessed.'*

12 In the case of offshore wind, NPS EN-3 Paragraph 2.6.42 (and Draft NPS EN-3 paragraph 2.23.6) recognises that:

> *'Owing to the complex nature of offshore wind farm development, many details of a proposed scheme may be unknown to the applicant at the time of application, possibly including:*
>
> - *Precise location and configuration of turbines and associated development*;
> - *Foundation type*;
> - *Exact turbine tip height*;
> - *Cable type and cable route*; *and*
> - *Exact locations of offshore and/ or onshore substation*s.'

13 NPS EN-3 paragraph 2.6.43 (Draft NPS EN-3 paragraph 2.23.7) continues:

> *'The IPC [Secretary of State] should accept that wind farm operators are unlikely to know precisely which turbines will be procured for the site until sometime after any consent has been granted. Where some details have not been included in the application to the Secretary of State, the applicant should explain which elements of the scheme have yet to be finalised, and the reasons. Therefore, some flexibility may be required in the consent. Where this is sought and the precise details are not known, then the applicant should assess the effects the project could have to ensure that the project as it may be constructed has been properly assessed (the Rochdale [Design] Envelope)'.*

14 The corresponding footnote states that:

> *'The 'Rochdale [Design] Envelope' is a series of maximum extents of a project for which the significant effects are established. The detailed design of the project can then vary within this 'envelope' without rendering the ES [Environmental Statement] inadequate'.*

15 The design envelope approach is widely recognised and is consistent with the Planning Inspectorate (PINS) Advice Note Nine: Rochdale Envelope (PINS, 2018). Paragraph 1.2 of that note states that:

> *'The 'Rochdale Envelope' approach is employed where the nature of the Proposed Development means that some details of the whole project have not been confirmed (for instance the precise dimensions of structures) when the application is submitted, and flexibility is sought to address uncertainty. Such an approach has been used under other consenting regimes (the Town and Country Planning Act 1990 and the Electricity Act 1989) where an application has been made at a time when the details of a project have not been resolved.*

16 Throughout the EIA, the design envelope approach has been taken to allow meaningful assessments of AyM to proceed, whilst still allowing reasonable flexibility for future project design decisions.

1.2.3 Relationship to the maximum design scenario

17 This chapter sets out the full onshore design envelope for AyM, however individual impact assessments do not consider all options. Instead, for each impact, the assessment is based upon the scenario which results in the greatest potential for change, sometimes referred to as the 'realistic worst-case' scenario. In the context of AyM, this is referred to as the Maximum Design Scenario (MDS) approach.

18 The rationale for this approach is to ensure that the MDS for each impact is robustly considered, and therefore any other scenario as built would not result in impacts of greater significance of effect than those assessed in the EIA, whilst reducing the volume of assessment documentation required and avoiding dilution of outcomes in the interests of proportionality. The concept of proportionality is key in ensuring that the ES is maintained at an accessible level for technical and non-technical stakeholders and aligns with industry best practice as advised by the Institute of Environmental Management & Assessment (IEMA) Delivering Proportionate EIA guidance (IEMA, 2017).

19 To avoid excessive conservatism in the EIA, the parameters assessed throughout the EIA are not necessarily a combination of the MDS for each component, hence the MDS is chosen on an impact-receptor basis, on a range of eventual build-out scenarios. The details of the MDS for each impact assessed are described in detail within the topic-specific chapters of the ES.

20 In line with the design envelope approach, the eventual built-out scenario may well differ from these scenarios but in any event will not be permitted to exceed the MDS assessed. Therefore, confidence can be had that resulting environmental effects will not exceed the worst-case assumptions of the EIA.

1.2.4 Onshore Export Cable Corridor

21 As described above, the Applicant requires flexibility in onshore infrastructure routing to ensure that anticipated changes in available technology and project economics could be accommodated whilst remaining within the assessed design. The design envelope therefore sets a maximum realistic worst-case scenario against which environmental effects can be assessed.

22 With regard to onshore infrastructure, for the assessment presented in the ES, the Onshore Export Cable Corridor (ECC) is typically 40 m to 60 m wide. Approximations are necessary to account for the need at discrete locations to have a wider corridor for activities such as trenchless crossings, to accommodate temporary drainage arrangements or in one location to accommodate route options for either trenchless or open trenching installation methods.

1.2.5 Substation zones

23 Similarly, three zones have been used to create the design envelope for the OnSS. These zones have been assessed and will be further refined during detailed design (post consent). The zones are:

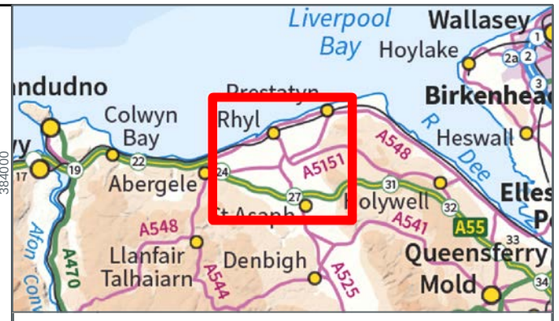
- OnSS Access Zone The area which will contain the final OnSS access route(s) (both construction and operational) linking the substation to Glascoed Road. The final route(s) of the construction and operational accesses will be confirmed post consent during detailed design.
- OnSS Cable Corridor Zone The area which will contain the final cable connection into and out of the OnSS. The final route of the cable connections to the OnSS will be confirmed following detailed design (post consent). The cable connection on the southern side of the OnSS will run either east or west of the pond located immediately south of the OnSS.
- OnSS Temporary Access Zone The area between the OnSS TCC and the OnSS Construction Area, through which a number of access tracks will be routed to allow vehicles to move between the two areas.

24 Again, the design envelope therefore sets a maximum realistic worst-case scenario against which environmental effects can be assessed.

1.3 Project overview

25 AyM will comprise up to 50 Wind Turbine Generators (WTGs) and will include infrastructure that is required to transmit the power generated by the turbines to the offshore substation via inter-array cables, before being transmitted via export cables to the proposed OnSS located to the west of St Asaph Business Park (SABP) and then to the existing National Grid Bodelwyddan substation.

26 The onshore export cable configuration will include up to two cable circuits connecting to the proposed OnSS and existing National Grid Bodelwyddan substation via a Landfall to the east of Rhyl and underground cables within an onshore ECC. Figure 1 shows the location of the onshore infrastructure elements of AyM.



LEGEND

- Order Limits
- Proposed Onshore Export Cable Corridor
- Proposed Substation Cable Corridor Zone
- Proposed Transition Joint Bay Construction Compound
- Proposed Onshore Substation (OnSS) Footprint
- Unlicenced Work Zone

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

ONSHORE INFRASTRUCTURE (OVERVIEW)

VER	DATE	REMARKS	Drawn	Checked
1	26/02/2022	ES Issue	JRS	MF

FIGURE NUMBER:

FIGURE 1

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:50,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

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27 The area within which onshore project infrastructure will be located, is shown in Figure 1. For the onshore aspects of AyM, this area encompasses:

- The Landfall: the area from Mean Low Water to where the offshore export cables are connected to the onshore export cables within TJBs at a location to the east of Rhyl;
- The Onshore Export Cable Corridor (onshore ECC): where permanent infrastructure connects the offshore export cables at Landfall to the proposed OnSS and the onwards link to the existing National Grid Bodelwyddan substation; and
- The onshore substation (OnSS): where the power supplied from the wind farm is adjusted (including voltage, power quality and power factor as required) to meet the UK System-Operator Transmission-Owner Code (STC) for supply via 400kV cables to the existing National Grid Bodelwyddan substation.

28 Within these areas, AyM will be comprised of export cables and associated infrastructure required to transmit the electricity generated to the National Grid network via the existing grid connection at Bodelwyddan Substation, located to the south of SABP. The transmission voltage will be up to 400 kV, with a maximum of two circuits, and will use High Voltage Alternating Current (HVAC) technology.

29 The key permanent components of AyM will include:

- Infrastructure at Landfall where the offshore cables are brought ashore;
- Up to two TJBs connecting the offshore cables to the onshore cables;
- Underground cable ducts, joint pits and cables;
- The OnSS to the west of SABP; and
- Underground cable ducts, joint pits and cables for the grid connection from the OnSS to the existing National Grid Bodelwyddan substation located to the south of SABP.

30 The onshore cable corridor will be approximately 12 km in length from the TJBs to the existing National Grid Bodelwyddan substation.

31 It is likely that the components for AyM will be fabricated at manufacturing sites across the UK, Europe and further afield. A construction base (port facility) may be used to store some components before delivery to site for installation. Other components, such as prefabricated units and cables, may be delivered directly to site when required.

32 Table 1 summarises key onshore infrastructure information, with more detail on each component described in the subsequent sections of this Chapter.

Table 1: AyM onshore infrastructure information.

PROJECT PARAMETER	MAXIMUM DESIGN SCENARIO
TJB footprint area (area per TJB)	100 m^2
Number of TJBs	2
Total onshore ECC length	12 km
Number of onshore cable circuits	2
Number of power cables per circuit	3
Number of ducts per circuit	7 (3 x power cable, 3 x comms. Cable and 1 x earth cable)
Export Cable voltage	Up to 400 kV

1.4 Consultation

33 Consultation is a key part of the DCO application processes. Consultation regarding the AyM project description has been conducted through the Scoping Report (innogy, 2020), non-statutory consultation including via the Evidence Plan process, and bi-lateral stakeholder engagement, and through statutory consultation which ran from the 31st August to 10th October 2021.

34 Further statutory consultation was undertaken in February 2022 on areas where the Order Limits (OL) extend beyond those included in the PEIR that were consulted on in Autumn 2021.

35 A summary of the key issues raised during consultation specific to the onshore project description is outlined in Table 2, together with a description of how those issues have been considered and addressed.

36 As described in the Consultation Report (application ref: 5.1), as a result of statutory consultation, the project design was amended post-PEIR and/ or refined in a number of ways, which can be summarised as:

- The offshore array area has been further reduced in scale;
- The maximum number of WTGs has been further reduced; and
- The Landfall design has been amended to avoid above-ground permanent works within the Rhyl Golf Club

Table 2: Summary of consultation relating to the onshore project description.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
SoS Scoping Opinion (July 2020)	The Applicant should clearly specify which elements of the Proposed Development are integral to the NSIP, and which constitutes 'associated development' as described under the Planning Act 2008 or can be considered as an ancillary matter.	The draft Development Consent Order which accompanies this ES, and the associated Explanatory Memorandum, specifies those elements that are associated or ancillary development. This chapter describes the onshore elements of AyM for the purposes of defining the onshore MDS.
SoS Scoping Opinion (July 2020)	The Applicant should provide a clear description of export circuits and how this component relates to other elements of the Proposed Development (e.g., number of cables).	A description of the export circuits is provided in Section 1.7.3
SoS Scoping Opinion (July 2020)	The project description should explain whether alterations to the existing Bodelwyddan substation are included in the DCO. If it is not included in the DCO then the	A description of the works that are proposed at the existing National Grid Bodelwyddan substation is provided in Section 1.7.5 .

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	cumulative assessments must assess any significant effects resulting from the alterations even if the alterations do not require planning consent.	
SoS Scoping Opinion (July 2020)	The Applicant should provide a description of proposed access routes, types of vehicle and numbers of personnel required for survey, construction and operation/maintenance of onshore and offshore sites.	A description of proposed access routes, types of vehicle and numbers of personnel required for survey, construction and operation/maintenance is provided in Section 1.7.2, Section 1.7.3, and Paragraph 142.
SoS Scoping Opinion (July 2020)	The Applicant should provide information regarding the size and location of construction compounds.	Information on proposed construction compounds is provided in Section 1.7.3, and Paragraph 142.
SoS Scoping Opinion (July 2020)	The Inspectorate considers that information on construction including: phasing of program; construction methods and activities associated with each phase; siting of construction compounds (including on and	A description of construction activities is provided in Section 1.7.2, Section 1.7.3, and Paragraph 142. Information on Construction program is provided in Section 1.5

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	off site); lighting equipment/requirements; and number, movements and parking of construction vehicles (both Heavy Good Vehicles (HGVs) and staff) should be clearly indicated.	
SoS Scoping Opinion (July 2020)	The Applicant should provide a description, estimate of parameters and impact assessment of the temporary working corridor in the ES.	A description of the temporary works areas required during construction (TCCs, construction haul roads etc) is provided within this ES
SoS Scoping Opinion (July 2020)	Paragraph 3.6.1 of the Scoping Report states the Applicant may implement a management plan for the removal and storage of soil within the temporary working corridor. It is considered that the handling, storage and reinstatement of soil should be conducted in accordance with a Soil Management Plan (SMP) which sets out good practice mitigation to minimise adverse effects on the soil resource. The Applicant	Measures to manage impacts on Soil are provided in the outline Soil Management Plan (SMP), provided as Appendix 4 (application ref: 8.13.4), of the Outline Code of Construction Practice (CoCP) (application ref: 8.13).

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	may wish to refer to guidance set out in the Department for Environment, Food and Rural Affairs (DEFRA) 'Construction Code of Practice for the Sustainable Use of Soils on Construction Sites'.	
SoS Scoping Opinion (July 2020)	The ES should provide a description of the operation and maintenance of the Proposed Development including (but not limited to); the number of full/part- time jobs, the operational hours and shift patterns (if required), the number and types of vehicle movements generated during the operational stage.	A description of the operation and maintenance of the Proposed Development is provided in Section 1.8
SoS Scoping Opinion (July 2020)	Paragraph 3.9 of the Scoping Report states the operational lifetime of the Proposed Development is 'in the order of 25 years'. The Inspectorate recommends the maximum anticipated lifetime of the Proposed Development is clearly provided in the Project Description chapter of the ES so it is	For the purposes of assessment, the operational lifetime of AyM is assumed to be 25 years.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	clear what parameters have been used in the assessment of effects	
Denbighshire County Council response to Statutory Consultation, October 2021	The Council do not support the proposal to site a substation in this location and have significant concerns with the proposed location, which is located on agricultural land to the north of Glascoed Road, and to the west of St. Asaph Business Park and immediately west of Glascoed nature reserve.	The development of AyM has been shaped by early engagement with a wide range of stakeholders including DCC, landowners and people with interests in the land, together with a range of technical disciplines, including but not limited to electrical, engineering, heritage, human environment, ecological and socio-economic appraisal studies. The site selection process for the OnSS is provided in Volume 1, Chapter 4, Site Selection and Alternatives (application ref: 6.1.4)
DCC	Should the final design be subject to change, this needs to be clearly explained in the application documents and the maximum	The design principles for the OnSS, that will ultimately guide the detailed design, are set out in the

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	parameters for the substation must be clearly defined and upper limits for the substation site should be embedded in the requirement. I.e. maximum area, maximum height of external infrastructure and buildings, maximum number of buildings etc. Details of landscaping, appearance of buildings, boundary treatments, vehicular access, roads, parking and turning should also be clearly defined.	Design Principles Document (application ref: 8.8) along with the proposed DCO Requirements that will afford DCC the power to review and approved details prior to construction. The EIA has been undertaken using a Maximum Design Scenario (MDS) (often referred to as the 'Rochdale Envelope') in order to provide certainty that the final project as built will not exceed the identified parameters and associated environmental impact, whilst providing the flexibility to accommodate further project refinement during the detailed design phase post-consent.

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
Denbighshire County Council response to Statutory Consultation, October 2021	The substation design has not been defined at this stage and it is proposed to be either a GIS or AIS. The Council consider the type of substation needs to be confirmed at application stage, and full details of siting, scale, layout and design should be included in the application to ensure the impacts can be fully assessed.	As noted in Section 1.7.4, the choice of AIS or GIS will be part of the detailed design process and a decision will be made post-consent prior to construction commencing. The use of the design envelope approach has been recognised in the Overarching National Policy Statement (NPS) for Energy (EN-1) and the NPS for Renewable Energy Infrastructure (EN-3). This established approach has been used in the majority of offshore wind applications.
Denbighshire County Council response to Statutory Consultation, October 2021	However, should the final design be subject to change, this needs to be clearly explained in the application documents and the maximum parameters for the substation must be clearly defined and upper limits for the substation site should be embedded in the requirement. I.e. maximum area, maximum	The design principles for the OnSS, that will ultimately guide the detailed design, are set out in the Design Principles Document (application ref: 8.8), along with the proposed DCO Requirements that will afford DCC the power to review

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	height of external infrastructure and buildings, maximum number of buildings etc. Details of landscaping, appearance of buildings, boundary treatments, vehicular access, roads, parking and turning should also be clearly defined.	and approve details prior to construction. The EIA has been undertaken using a Maximum Design Scenario (MDS) (often referred to as the 'Rochdale Envelope') in order to provide certainty that the final project as built will not exceed the identified parameters and associated environmental impact, whilst providing the flexibility to accommodate further project refinement during the detailed design phase post-consent.
Denbighshire County Council response to Statutory Consultation, October 2021	It is also not clear if operation lighting has been factored into the LVIA assessment of effect.	The OnSS will not be manned, and lighting will only be required during O&M activities.
Denbighshire County Council response to Statutory Consultation, October 2021	In terms of operational noise from the substation, the noise levels at the closest noise sensitive receptors need to be clearly	The noise levels that are predicted to arise from the OnSS are provided in Volume 3, Chapter 10, Airborne

DATE AND CONSULTATION PHASE/ TYPE	CONSULTATION AND KEY ISSUES RAISED	SECTION WHERE COMMENT ADDRESSED
	assessed, and maximum noise levels needs to be clearly defined and embedded in requirements.	Noise and Vibration (application ref: 6.3.10)

1.5 Project programme

1.5.1 Overview

37 The following section duplicates information presented in the Offshore Project Description (Volume 2, Chapter 1) and is presented here for completeness and to aid the reader.

38 Determination of the application for development consent for AyM is anticipated between Q3 and Q4 2023 . Post-consent, the detailed design phase would commence with a view to beginning construction in 2026. The Applicant's objective is for AyM to be fully operational and commissioned by 2030 in order to help meet UK and Welsh Government renewable energy targets (see Volume 1, Chapter 2: Policy and Legislation (application ref: 6.1.2) for further information on energy targets).

39 The construction programme for AyM is dependent on a number of factors which may be subject to change, including:

- Grid connection dates provided by National Grid;
- The date that the other necessary consents are granted;
- Should it be required, obtaining a Contract for Difference (CfD) from the UK Government within the anticipated programme; and
- The availability and lead in times associated with procurement and installation of project components.

1.5.2 Onshore programme

40 As stated above, construction is anticipated to commence in 2026, through to final commissioning in 2030. Although not likely to be required for all works, 24-hour onshore working could be required at appropriate locations, and for essential works such as at the Landfall, the A55 and River Clwyd for trenchless crossing works. Figure 2 illustrates the indicative durations and windows for each activity across both the offshore and onshore components of the proposed project, and the order in which they may occur in the construction campaign.

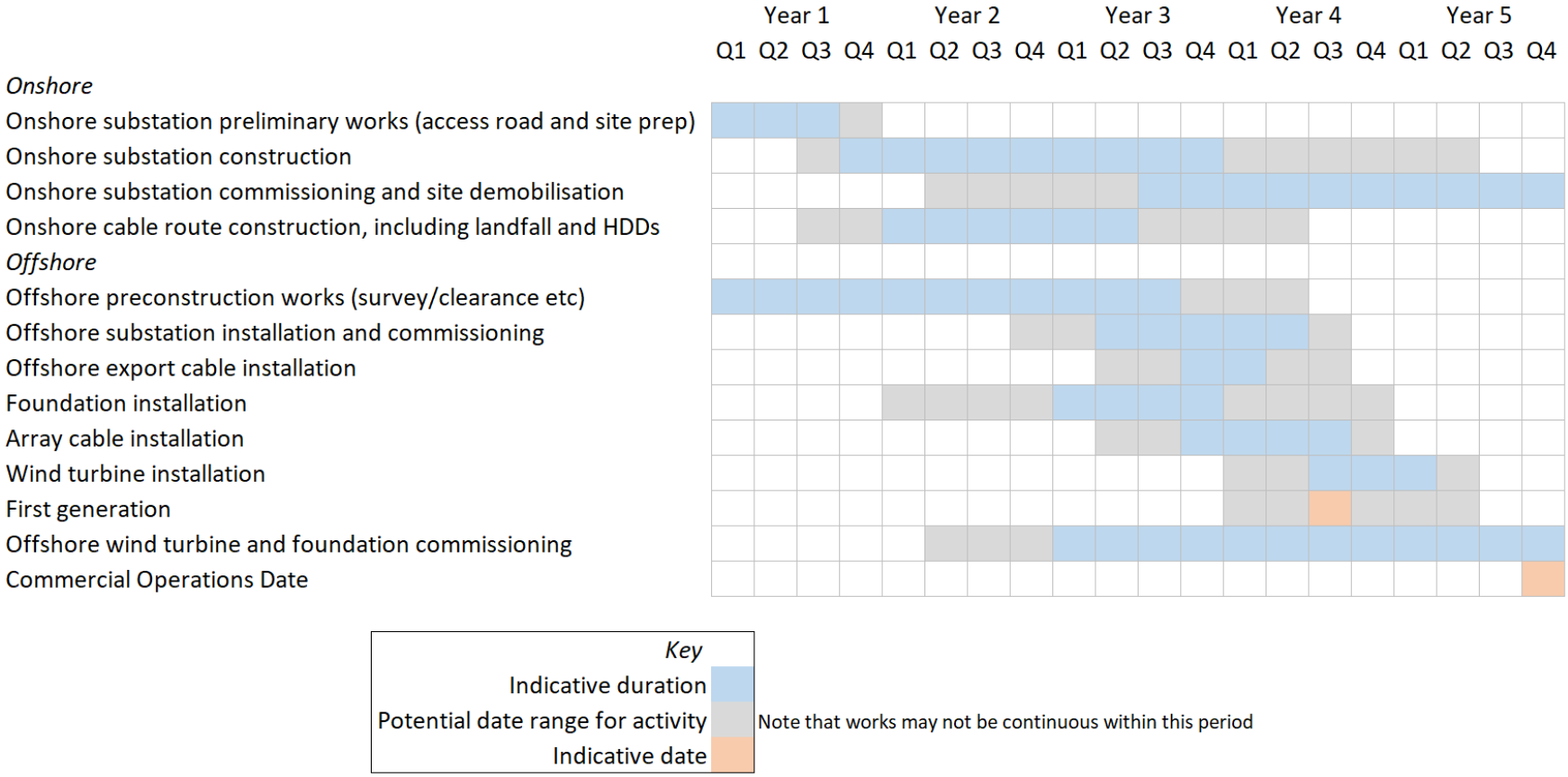


Figure 2: Indicative construction programme.

1.6 Description of onshore location

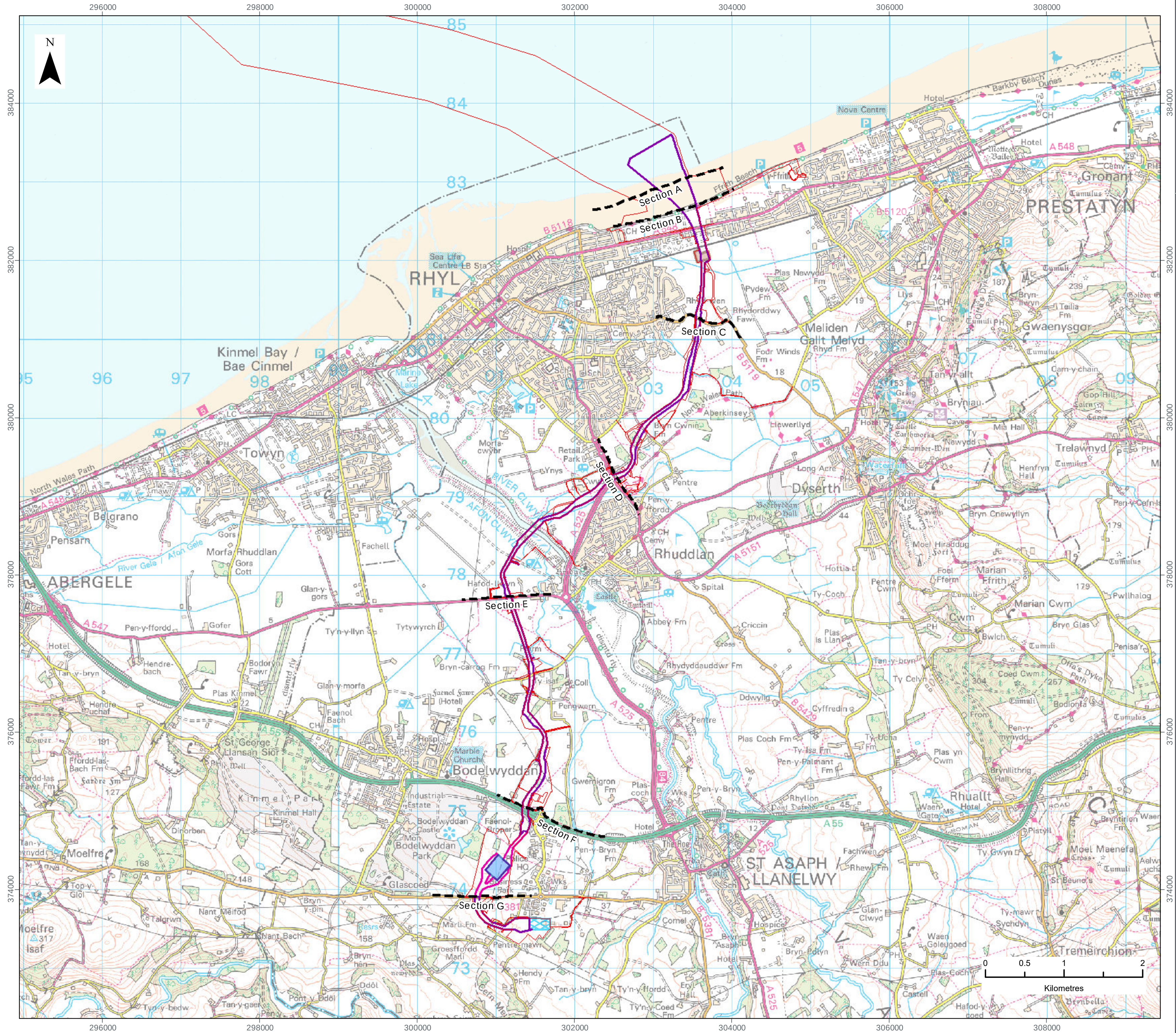
41 This section provides a summary description of the area within which the onshore elements of AyM will be constructed. It does not provide a description of the environmental baseline which is set out in more detail in the relevant environmental topic chapters.

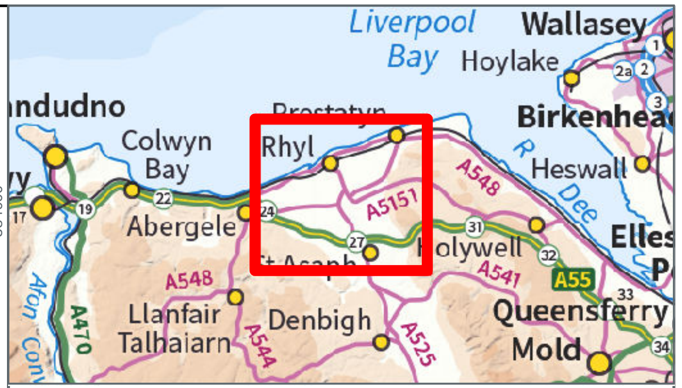
42 The onshore elements of AyM, comprising Landfall, onshore ECC and proposed OnSS, are located entirely within the administrative boundary of Denbighshire County Council (DCC), in North Wales.

43 Given the length of the ECC is approximately 12 km running generally in a north-south direction, it has been sub-divided into the following Route Sections. Route Sections have been defined to assist in describing the onshore elements of AyM and reporting its potential environmental effects, but do not reflect any proposed phasing of works.

- Route Section A: Intertidal Area;
- Route Section B: Intertidal to B5119;
- Route Section C: B5119 to A525;
- Route Section D: A525 to A547;
- Route Section E: A547 to A55;
- Route Section F: A55 to B5381 including OnSS; and
- Route Section G: B5381 to National Grid Connection.

44 Figure 3 shows the Route Sections listed above and the following sections provide a description of each Route Section.





LEGEND

- Order Limits
- Onshore Cable Route Section Breaks
- Proposed Onshore Export Cable Corridor
- Proposed Substation Cable Corridor Zone
- Proposed Transition Joint Bay Construction Compound
- Proposed Onshore Substation (OnSS) Footprint
- Unlicenced Work Zone

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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

ROUTE SECTIONS

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FIGURE NUMBER:

FIGURE 3

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1.6.1 Route Section A – intertidal area

45 This Route Section encompasses an area of Ffrith Beach between Rhyl and Prestatyn and extends from Mean Low Water Springs (MLWS) to Mean High Water Springs (MHWS). This Route Section contains the Landfall.

1.6.2 Route Section B – intertidal to B5119

46 This Route Section contains the Landfall and onshore ECC, TJBs, TCCs and access arrangement for accessing the intertidal area. This Route Section encompasses the area between MHWS on Ffrith beach extending southwards to include areas of Rhyl Golf Course, the A548, Robin Hood Holiday Park and the North Wales Coast Line railway. The cables will be installed using trenchless techniques beneath the Robin Hood Holiday Park and Rhyl Golf Course, between Route Section A and the area south of the railway. To the south of the railway, the Route Section extends through agricultural land to the B5119 (Dyserth Road). This Route Section includes 'The Cut' (Rhyl Cut) watercourse as well as a number of other minor drainage channels that are crossed by the onshore ECC.

1.6.3 Route Section C – B5119 to A525

47 This Route Section contains the onshore ECC and associated TCCs and access arrangements as it continues southwards from the B5119 for approximately 2.6 km through predominantly agricultural land to the south east of Rhyl. The onshore ECC crosses a number of minor watercourses including Aberkinsey Drain as well as an area of wet ground and scrub called 'The Flash'. The onshore ECC passes near to, but does not contain, a number of dispersed properties and is routed to the west of Bryn Cwnin Farm before ending at the A525 between Rhyl and Rhuddlan. The cable will be installed using trenchless techniques beneath the area of Ancient Woodland that is north west of Bryn Cwnin Farm and the associated haul road would be routed around the north of the woodland.

1.6.4 Route Section D: A525 to A547

48 This section contains the onshore ECC and associated TCCs and access arrangements. From the A525 Route Section D extends to the south west passing through agricultural fields to the south of farm buildings. The onshore ECC crosses the Afon Ffyddion, and associated PRoW on the embankment next to the watercourse. The onshore ECC is routed to the north of a sewage works before passing beneath the Clwyd Estuary via Horizontal Directional Drilling (HDD) (or other trenchless crossing technique).

49 Once on the western side of the Clwyd Estuary the onshore ECC continues through agricultural land to the A547.

1.6.5 Route Section E: A547 to A55

50 This section contains the onshore ECC and associated TCCs and access arrangements. This Route Section runs approximately 3 km in a southerly direction through predominantly agricultural land from the A547 to the A55. Within Route Section E the onshore ECC crosses a number of minor watercourses and PRoW and it is proposed to use HDD (or other trenchless crossing technique) to pass beneath Erw'r Gaseg woodland to the west of Pengwern College. The haul road would pass round the south west extents of Erw'r Gaseg woodland and potentially utilise an existing bridge in order to cross a watercourse in this area. Trenchless techniques will be used to install cables beneath the A55.

1.6.6 Route Section F: A55 to B5381 including OnSS

51 This section contains the onshore ECC and OnSS and associated TCCs and access arrangements. Route Section F encompasses the area to the south of the A55 and includes the area of the proposed OnSS which is located to the west of SABP and to the east of Bodelwyddan Park. The onshore ECC will pass beneath the A55 and continue through agricultural fields, crossing a bridleway and then southwards to the OnSS construction area. The OnSS (footprint and construction area occupies agricultural fields that are adjacent to an area of ecological mitigation associated with SABP containing numerous ponds.

52 Construction and operational accesses for the OnSS works will be via Glascoed Road to the south of the OnSS. The OnSS Access Zone denotes the area through which the access tracks will be constructed for operation and construction activities.

53 The OnSS TCC is located to the north west and west of the OnSS footprint.

54 The onshore ECC continues from the OnSS Zone to the B5381 (Glascoed Road).

1.6.7 Route Section G: B5381 to National Grid connection

55 From the B5381 (Glascoed Road), the onshore ECC is routed south and then eastwards through agricultural fields to the south of SABP and crossing a minor road before connecting with the existing National Grid Bodelwyddan Substation.

1.7 Onshore Construction

1.7.1 General site preparation, establishment and restoration measures

56 Details of the following onshore infrastructure associated with AyM are shown in Figure 4 to Figure 16:

- Order Limits
- Onshore ECC (see Section 1.7.3)
- TCCs (see Section 1.7.3)
- OnSS Footprint (see Section 1.7.4)
- OnSS TCC (see Section 1.7.4)
- OnSS access zone (see Section 1.7.4)
- OnSS cable corridor (see Section 1.7.4)
- Crossing Points (see Section 1.7.3)
- Construction access points (see Section 1.7.3)

57 Detailed pre-commencement surveys (such as geophysical, geotechnical, ecological or archaeological surveys) will be carried out before works commence at the Landfall, onshore ECC and OnSS works areas. An analysis of the results of these surveys will then inform the final locations of Joint Pits and the onshore export cable route. Micrositing of cable circuits, within the onshore ECC, is intended to provide flexibility to make minor adjustments to onshore project layouts to accommodate unexpected on-site conditions (such as ground conditions) identified in the pre-construction surveys.

58 Construction of all onshore components of AyM will commence with the preparation and installation of temporary access roads, working areas and TCCs for a particular working area. Where necessary, works to the existing highway network will be undertaken to facilitate construction access and activities. Within the OL AyM will undertake any necessary preparatory works to existing infrastructure, utilities and services (where required) to enable access and construction activities to be undertaken.

59 The working areas will be established to allow the onshore infrastructure for the Landfall, onshore ECC and OnSS to commence construction. Methods of construction of working areas will typically involve the removal and appropriate storage of topsoil (for later reinstatement) and, where required, the creation of TCCs and/or temporary access roads typically using crushed stone potentially overlain on a reinforcing geotextile membrane.

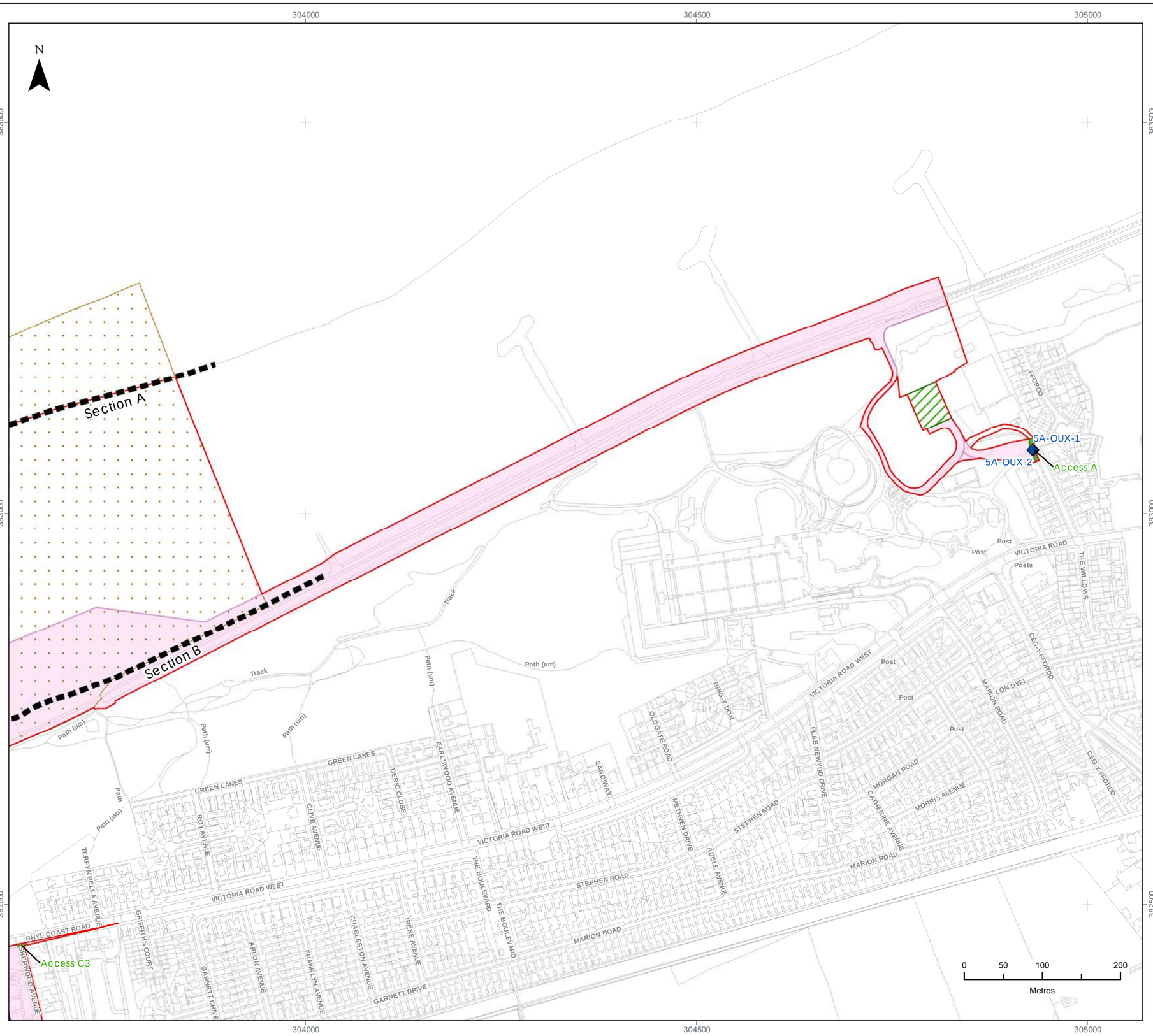
60 In many cases there is no direct access currently available to the working areas from the local highway network; therefore, a temporary haul road for the onshore ECC route and construction access arrangements for Landfall and OnSS are proposed to provide suitable access to the working areas. Temporary access tracks and haul roads will be constructed and will typically be approximately 10 m wide, including verges and drainage channels, although these could be wider in places depending upon topography and access requirements. The method of construction will also depend on ground conditions and topography.

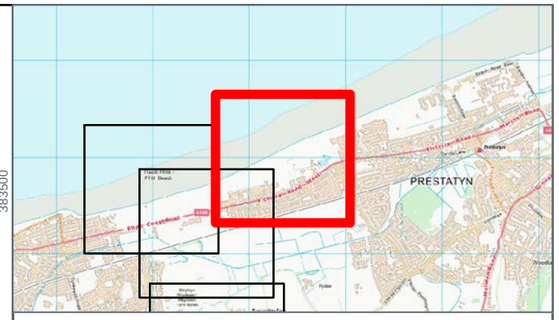
61 The removal (or height reduction) of trees, hedgerows and ground vegetation will be kept to a minimum but where necessary will be completed in accordance with the prevailing best practice and controlled via the final CoCP (an outline CoCP is provided in application ref: 8.13). Hedgerows will be replaced wherever possible although trees cannot be planted within 3m of any sections of underground cable that have been installed.

62 Any topsoil and subsoil excavated during site preparation will be stored separately alongside the working area in accordance with best practice so that it can be reinstated as appropriate once construction activities are complete. An outline SMP (application ref: 8.13.4) has been provided as an appendix to the outline CoCP.

63 Standard practice will be for areas of temporary land take to be restored to agriculture, or other original use where practicable. The level of restoration works will be assessed on the basis of the ongoing land use where the tracks and working areas are constructed.

64 The preliminary works associated with the ECC are anticipated to last approximately 5 months per Route Section. The preliminary works associated with the OnSS works are anticipated to last approximately 9 months.





LEGEND

- Order Limits
- Onshore Cable Route Section Breaks
- Proposed Onshore Export Cable Corridor
- Crossing Schedule (Excluding Utilities Crossings)
- Proposed Temporary Construction Compound
- Proposed Construction Access Area
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- Proposed Access Location

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

ONSHORE INFRASTRUCTURE (DETAIL)

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FIGURE NUMBER:

FIGURE 4

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
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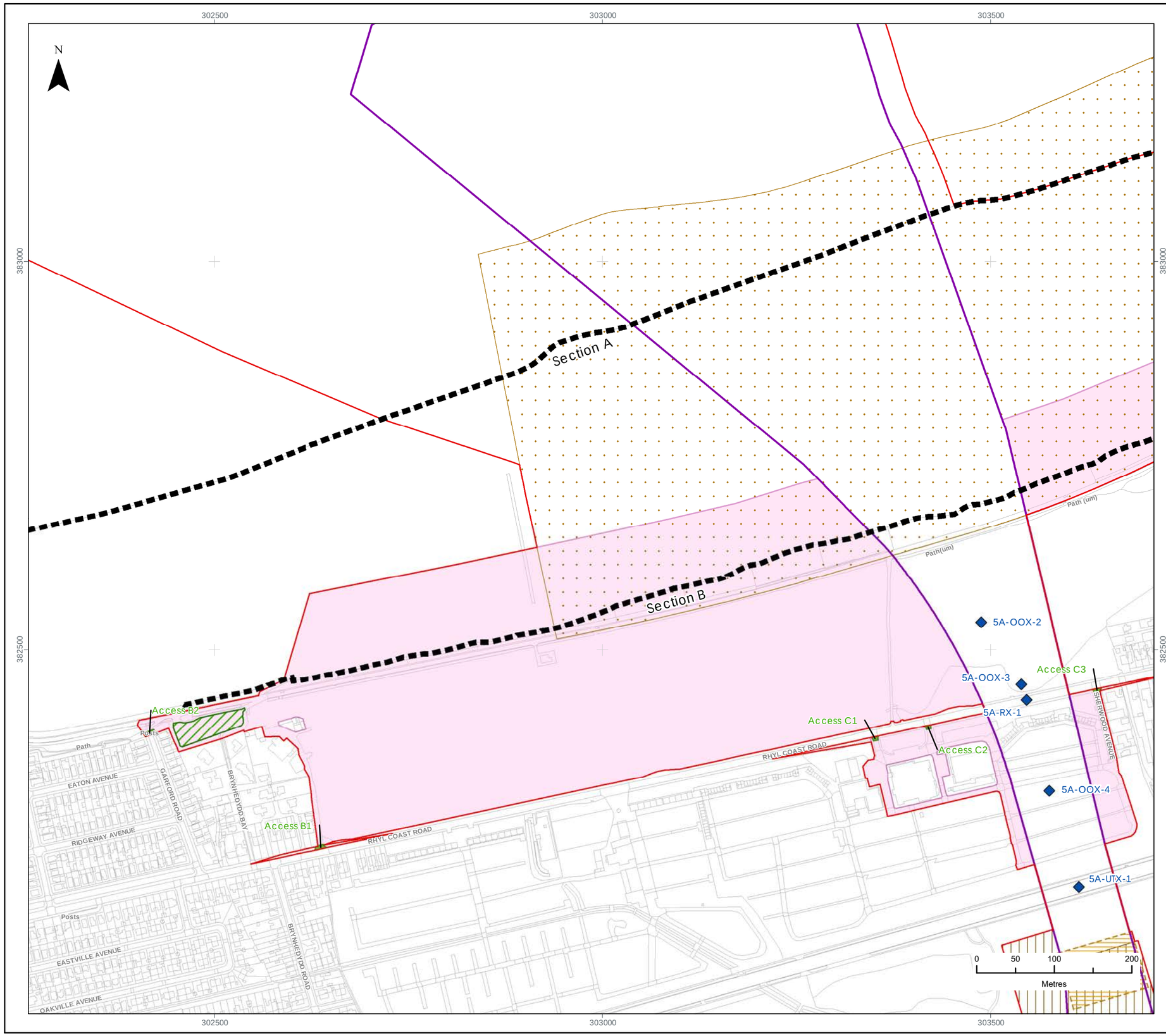

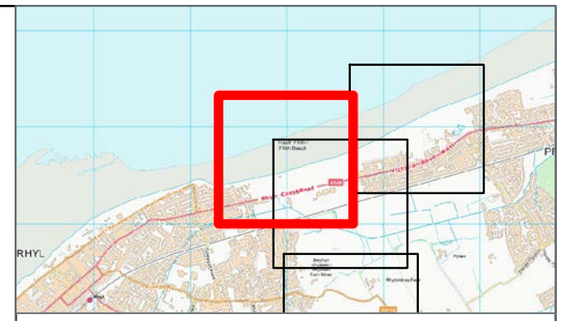

LEGEND

- Order Limits
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FIGURE 5

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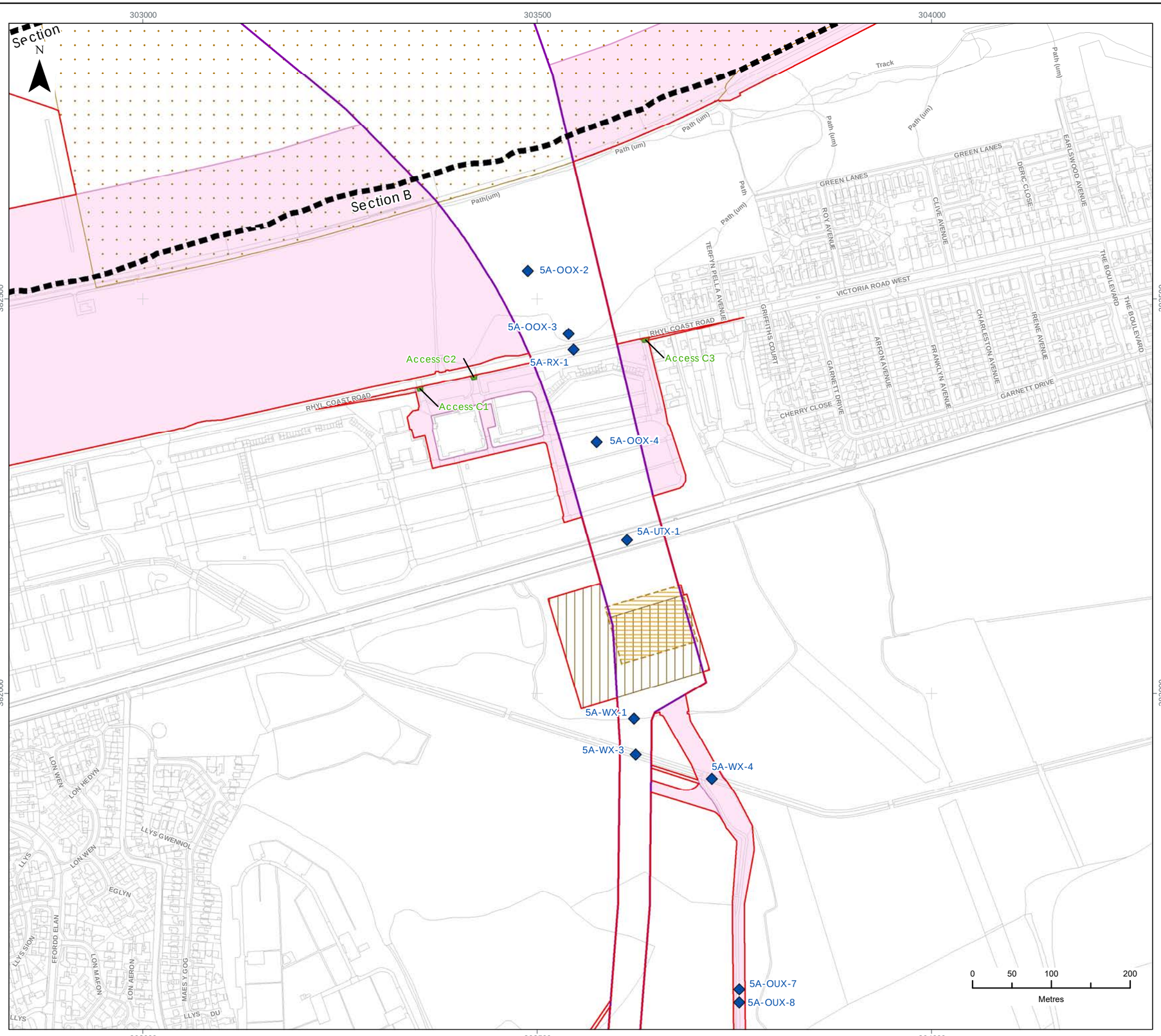

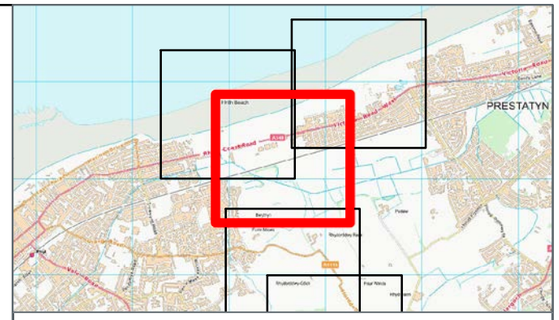

LEGEND

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FIGURE 6

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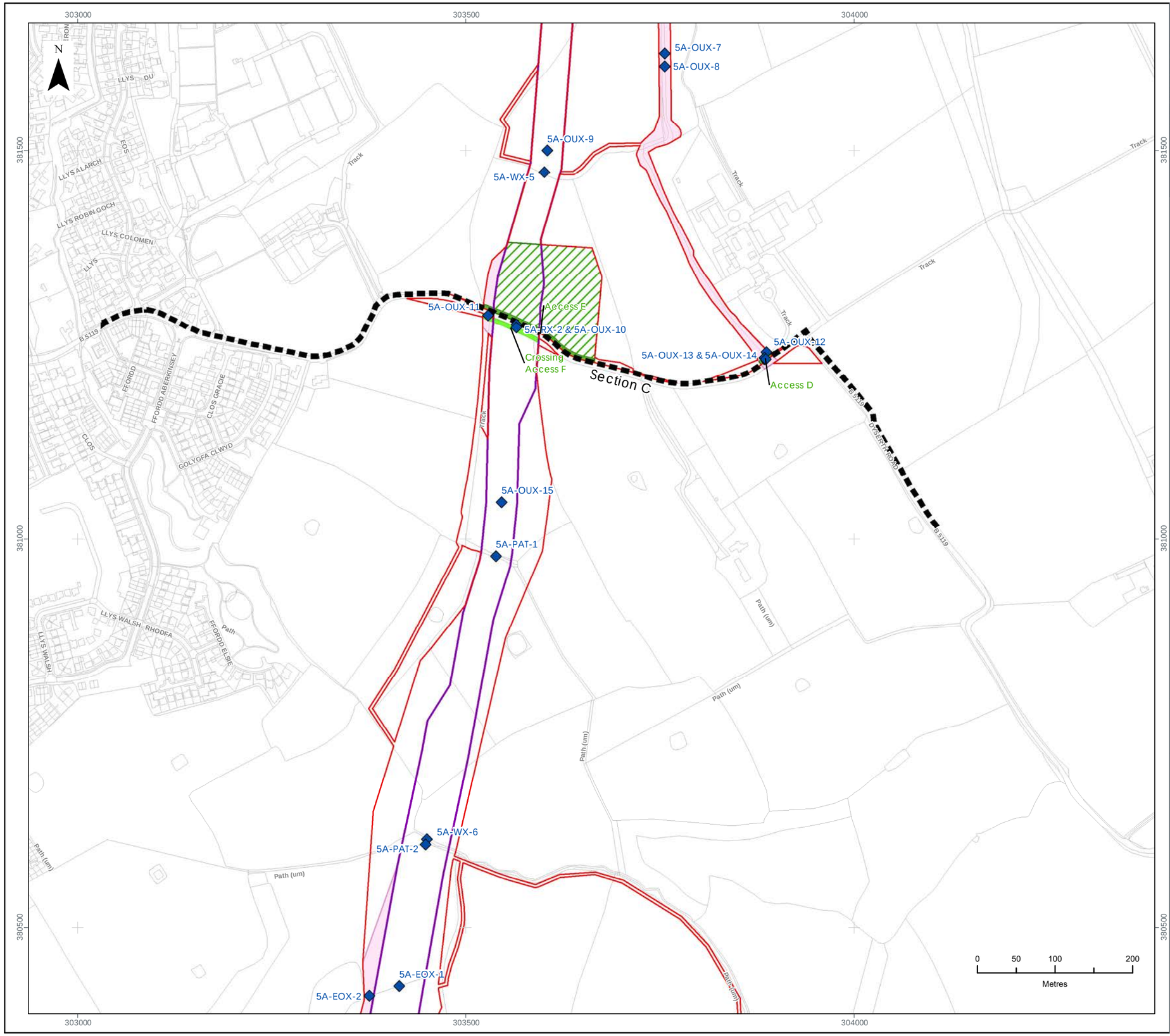

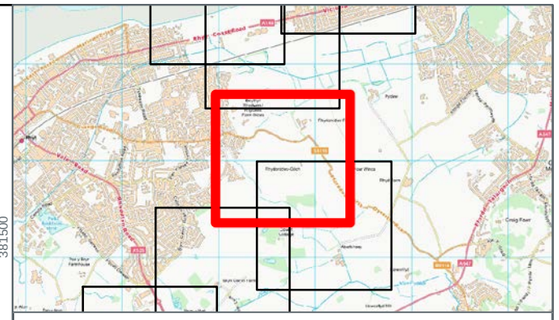

LEGEND

- Order Limits
- Onshore Cable Route Section Breaks
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- Proposed Construction Access Area
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

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FIGURE 7

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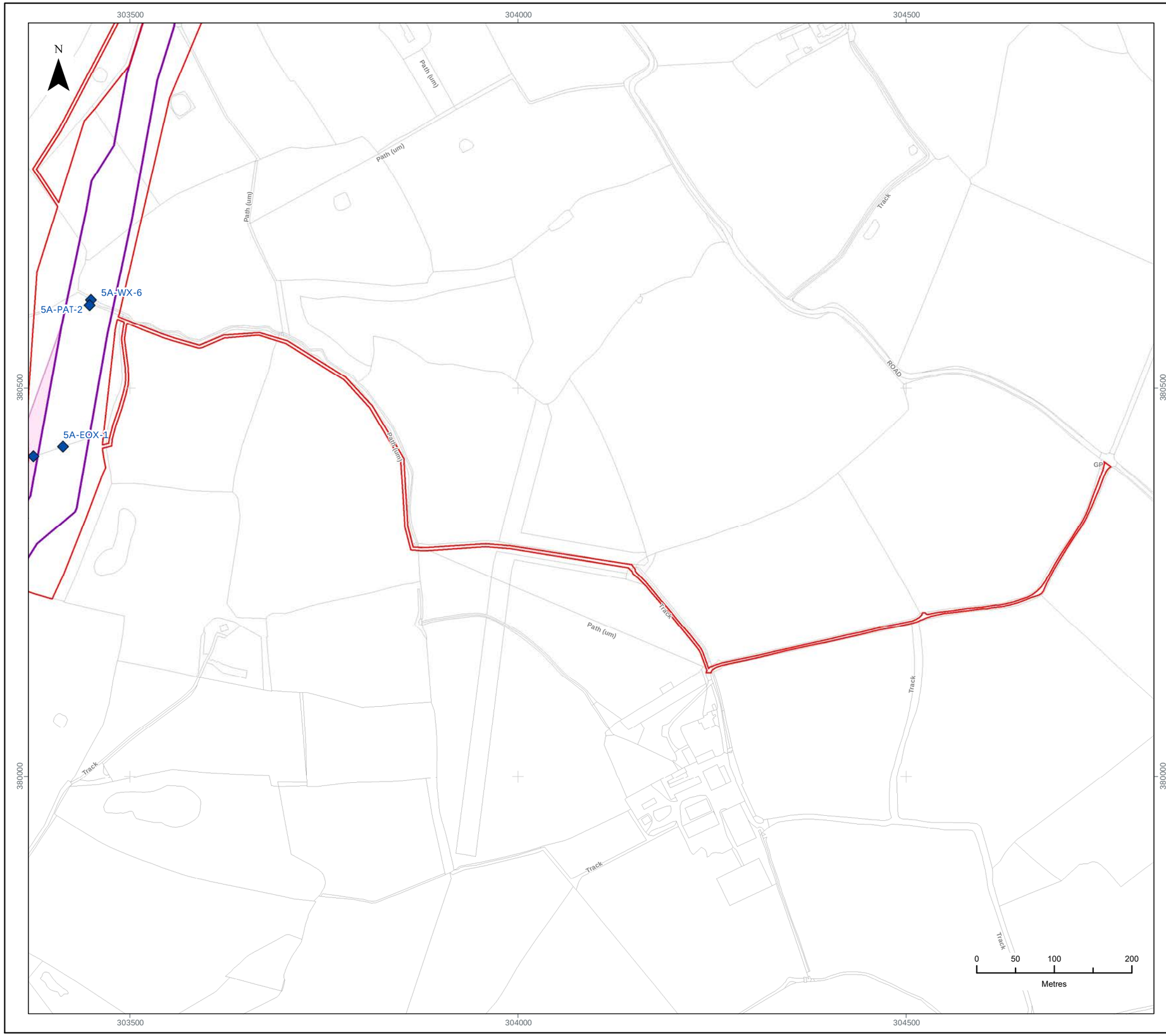

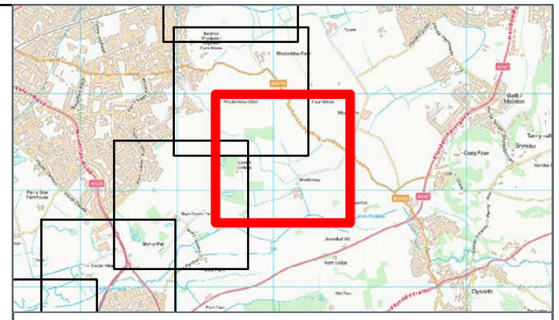

LEGEND

- Order Limits
- Proposed Onshore Export Cable Corridor
- Crossing Schedule (Excluding Utilities Crossings)
- Proposed Construction Access Area

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FIGURE 8

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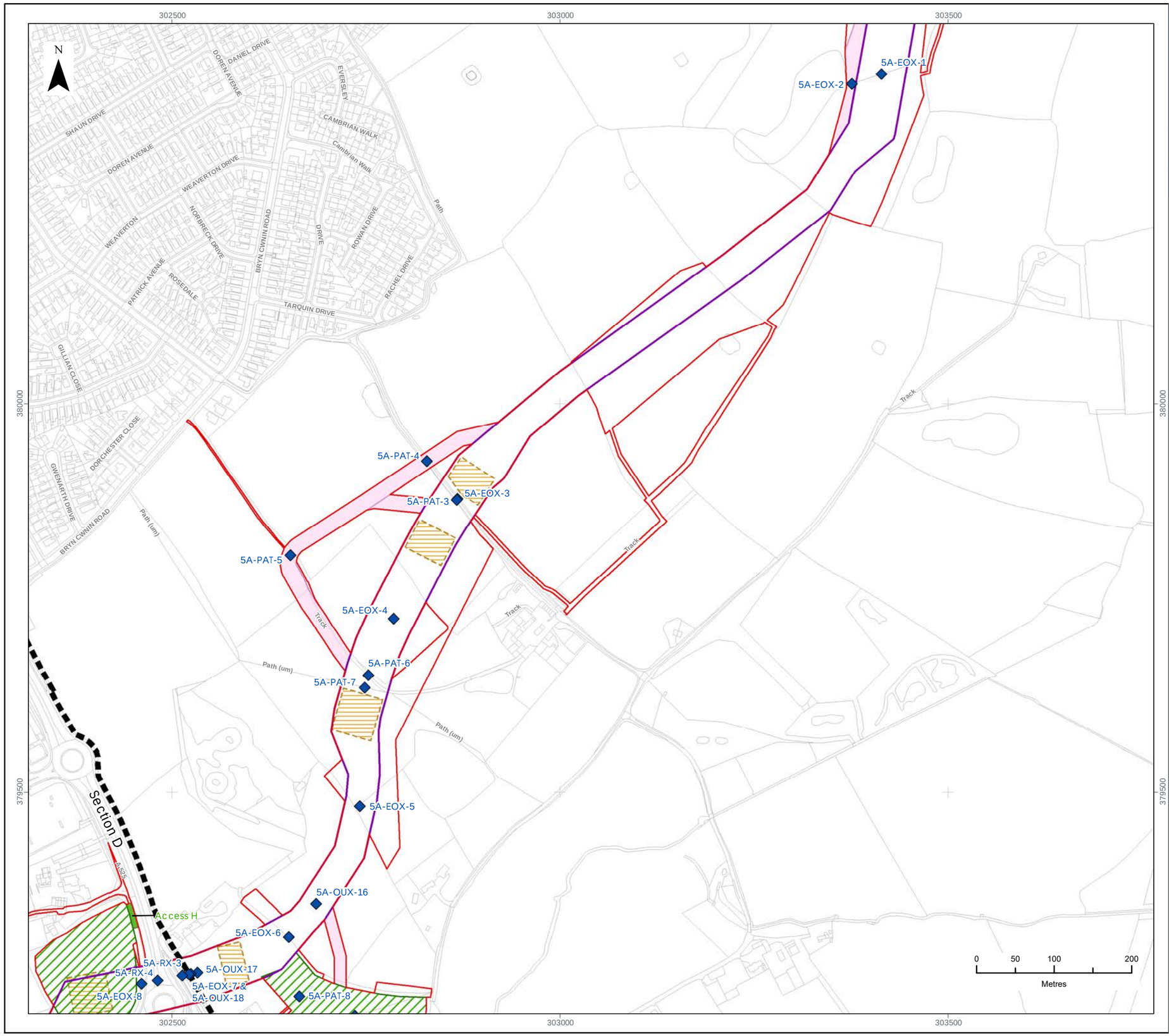

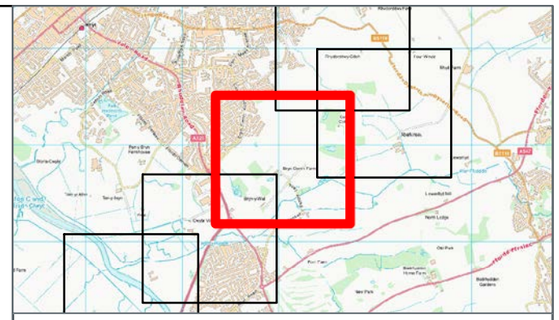

LEGEND

- Order Limits
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PROJECT TITLE:

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FIGURE 9

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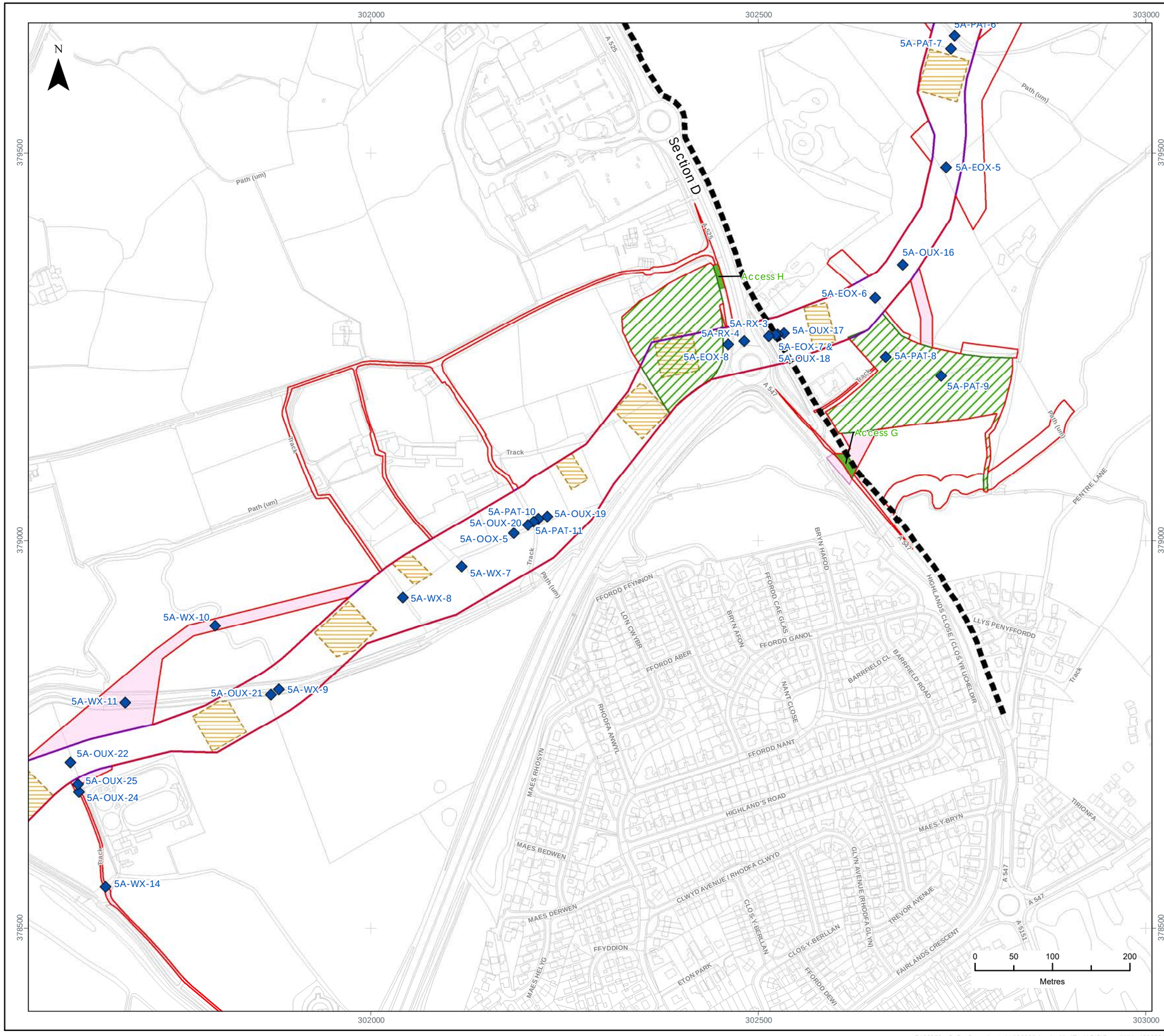

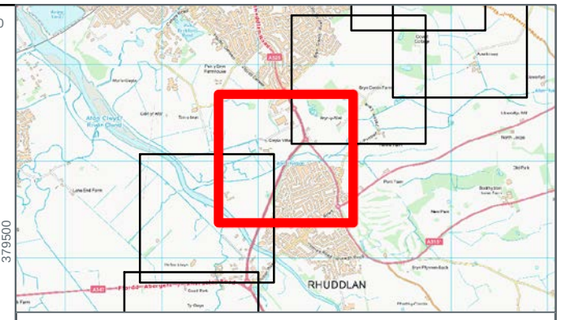

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AWEL Y MÔR OFFSHORE WINDFARM

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FIGURE 10

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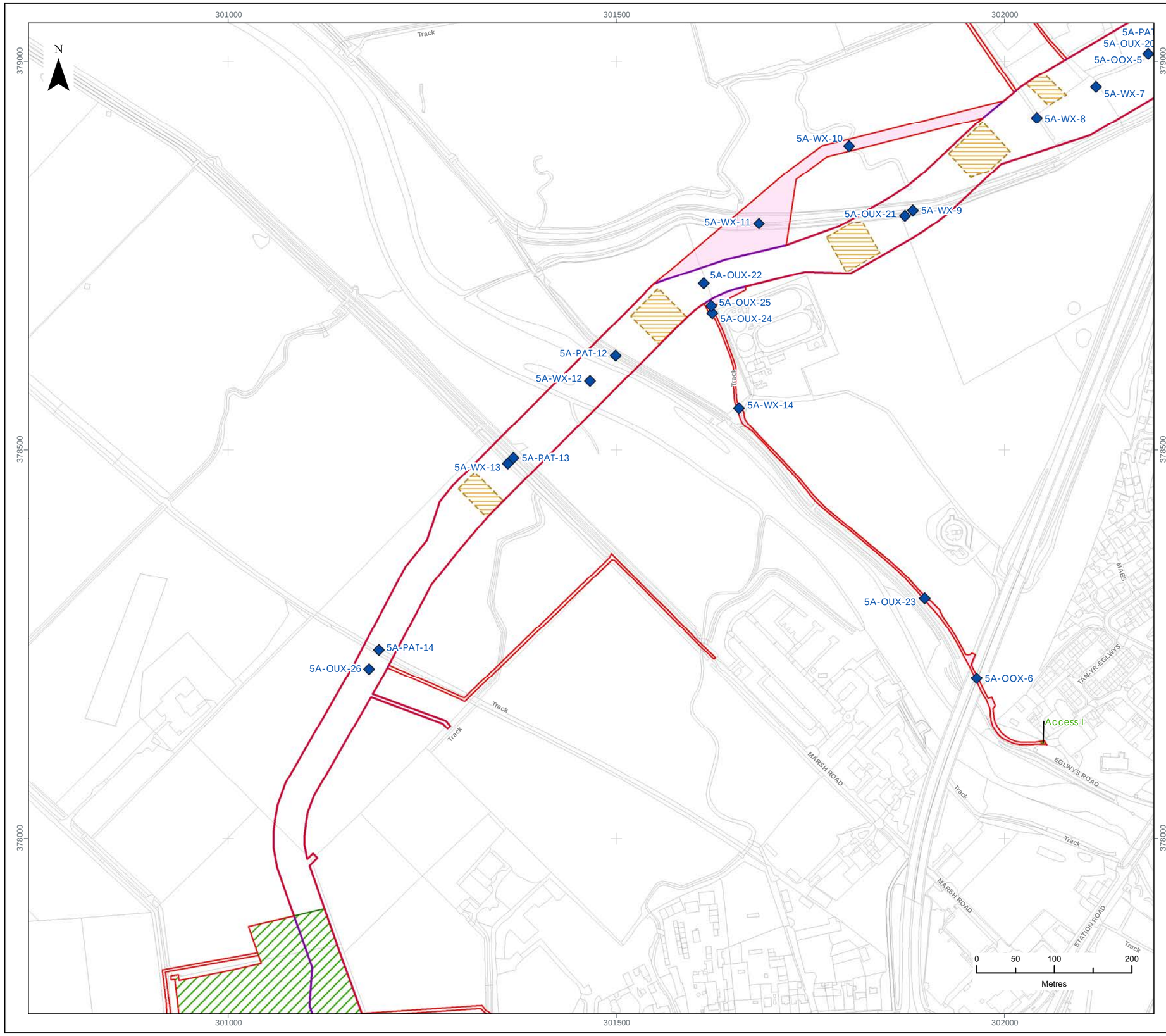

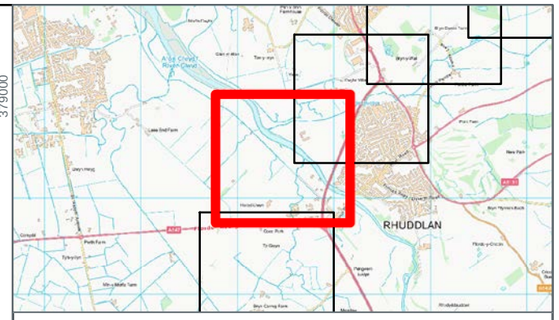

LEGEND

- Order Limits
- Proposed Onshore Export Cable Corridor
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- Proposed Indicative Trenchless Crossing Compound
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PROJECT TITLE:

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FIGURE TITLE:

ONSHORE INFRASTRUCTURE (DETAIL)

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FIGURE NUMBER:

FIGURE 11

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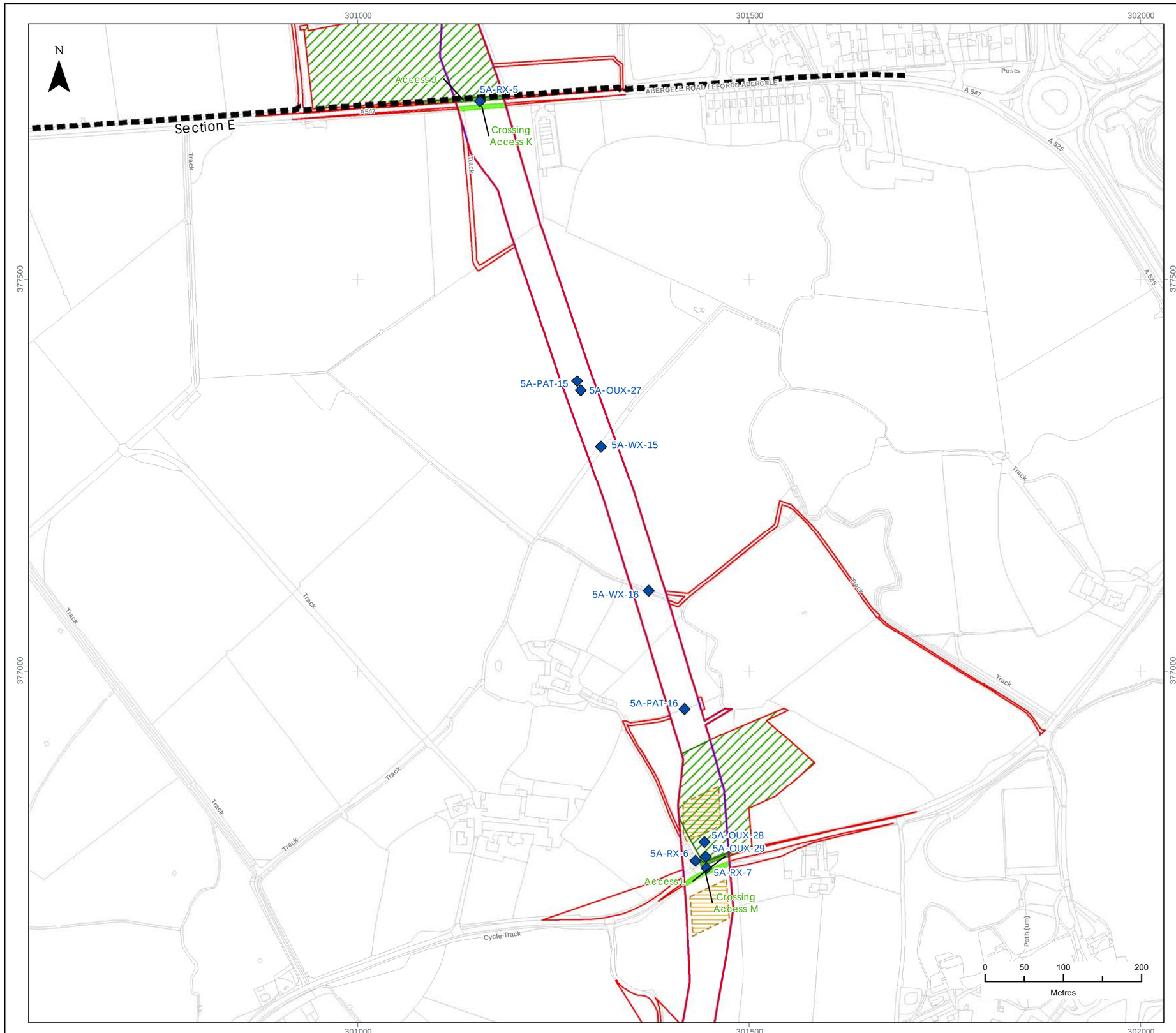

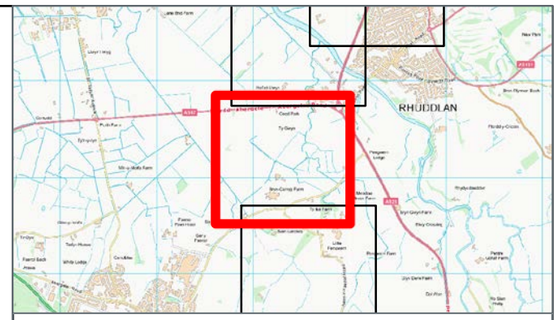

LEGEND

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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

ONSHORE INFRASTRUCTURE (DETAIL)

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FIGURE NUMBER:

FIGURE 12

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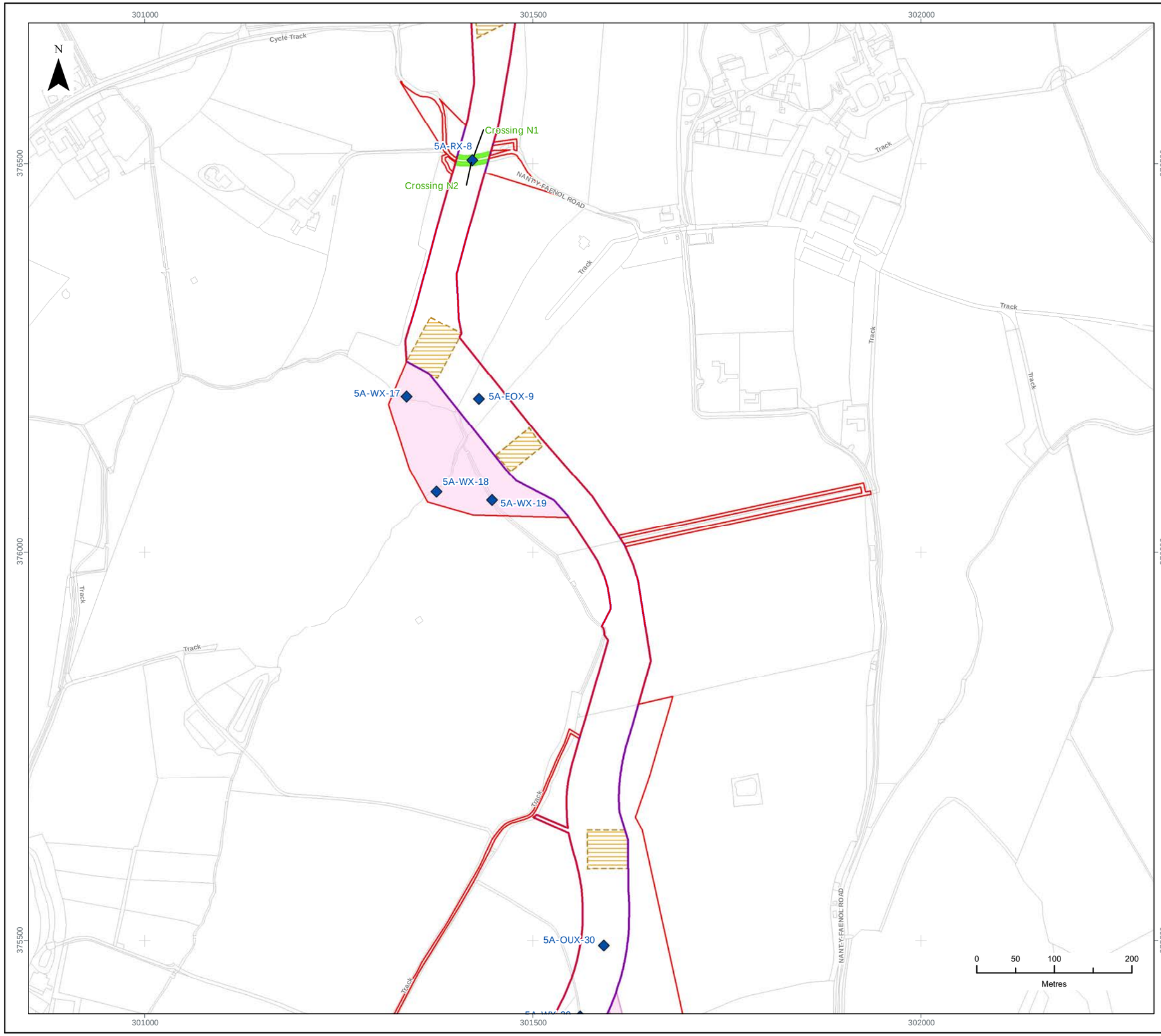

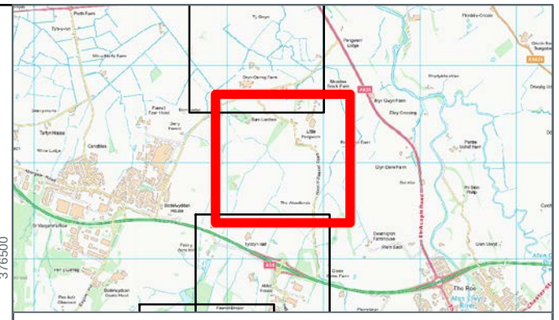

LEGEND

- Order Limits
- Proposed Onshore Export Cable Corridor
- Crossing Schedule (Excluding Utilities Crossings)
- Proposed Indicative Trenchless Crossing Compound
- Proposed Construction Access Area
- Proposed Crossing Location

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

ONSHORE INFRASTRUCTURE (DETAIL)

VER	DATE	REMARKS	Drawn	Checked
1	08/04/2022	ES Issue	JRS	MF

FIGURE NUMBER:

FIGURE 13

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:5,000	A3	ODN	British National Grid

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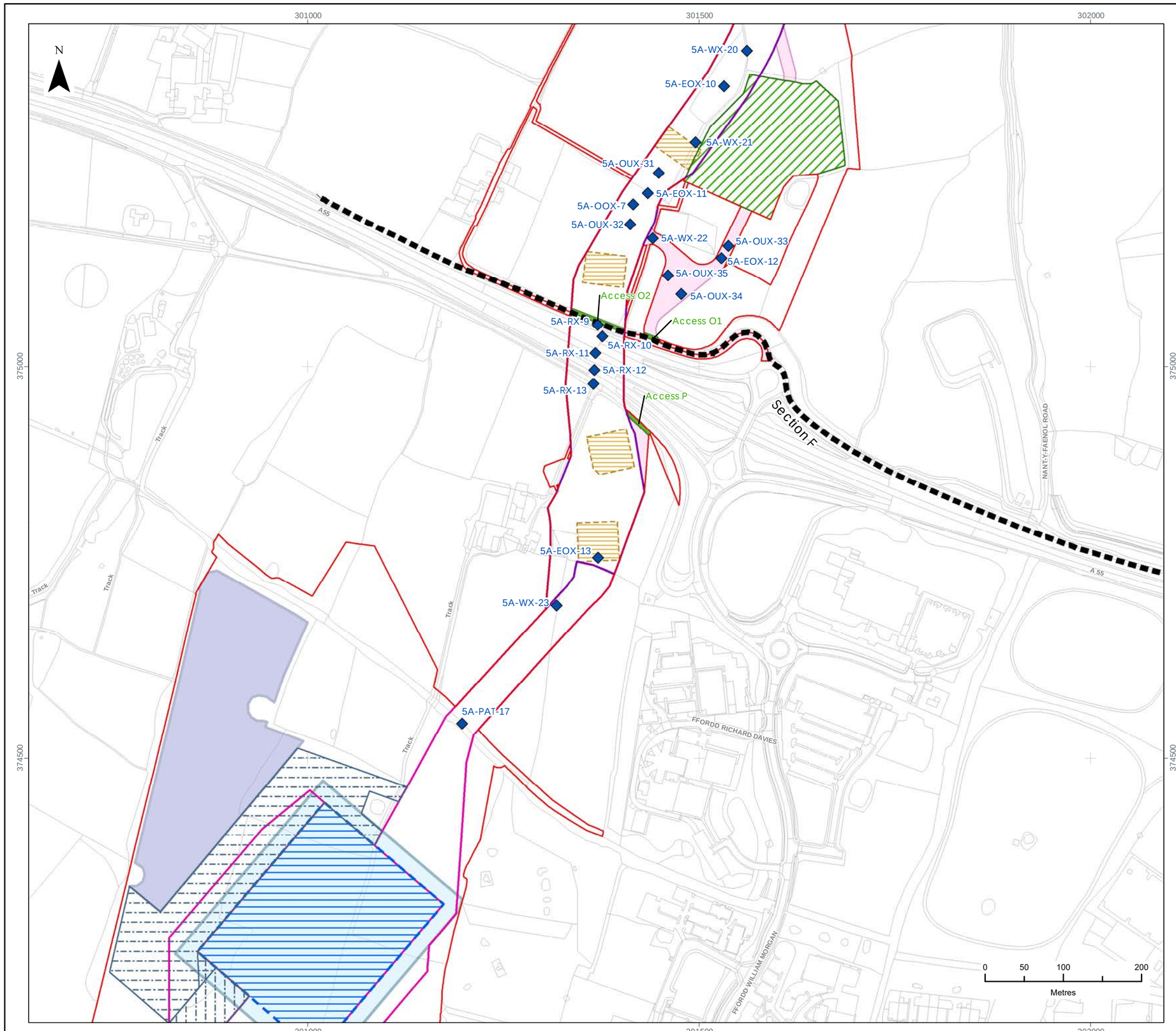

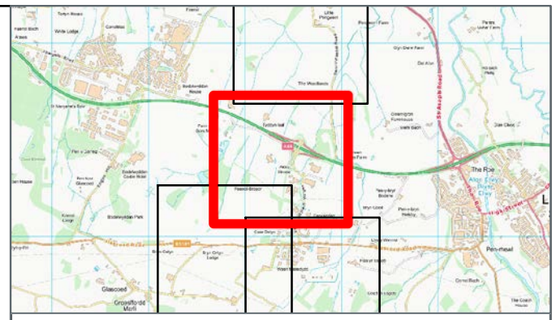

LEGEND

- Order Limits
- Onshore Cable Route Section Breaks
- Proposed Onshore Export Cable Corridor
- Proposed Substation Cable Corridor Zone
- Crossing Schedule (Excluding Utilities Crossings)
- Proposed Indicative Trenchless Crossing Compound
- Proposed Temporary Construction Compound
- Proposed Construction Access Area
- Proposed Access Location
- Proposed Onshore Substation (OnSS) Footprint
- Proposed Substation Construction Area
- Substation Access Zone
- Substation Temporary Construction Access Zone
- Proposed Substation Indicative Temporary Construction Compound Area

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

ONSHORE INFRASTRUCTURE (DETAIL)

VER	DATE	REMARKS	Drawn	Checked
1	08/04/2022	ES Issue	JRS	MF

FIGURE NUMBER:

FIGURE 14

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:5,000	A3	ODN	British National Grid

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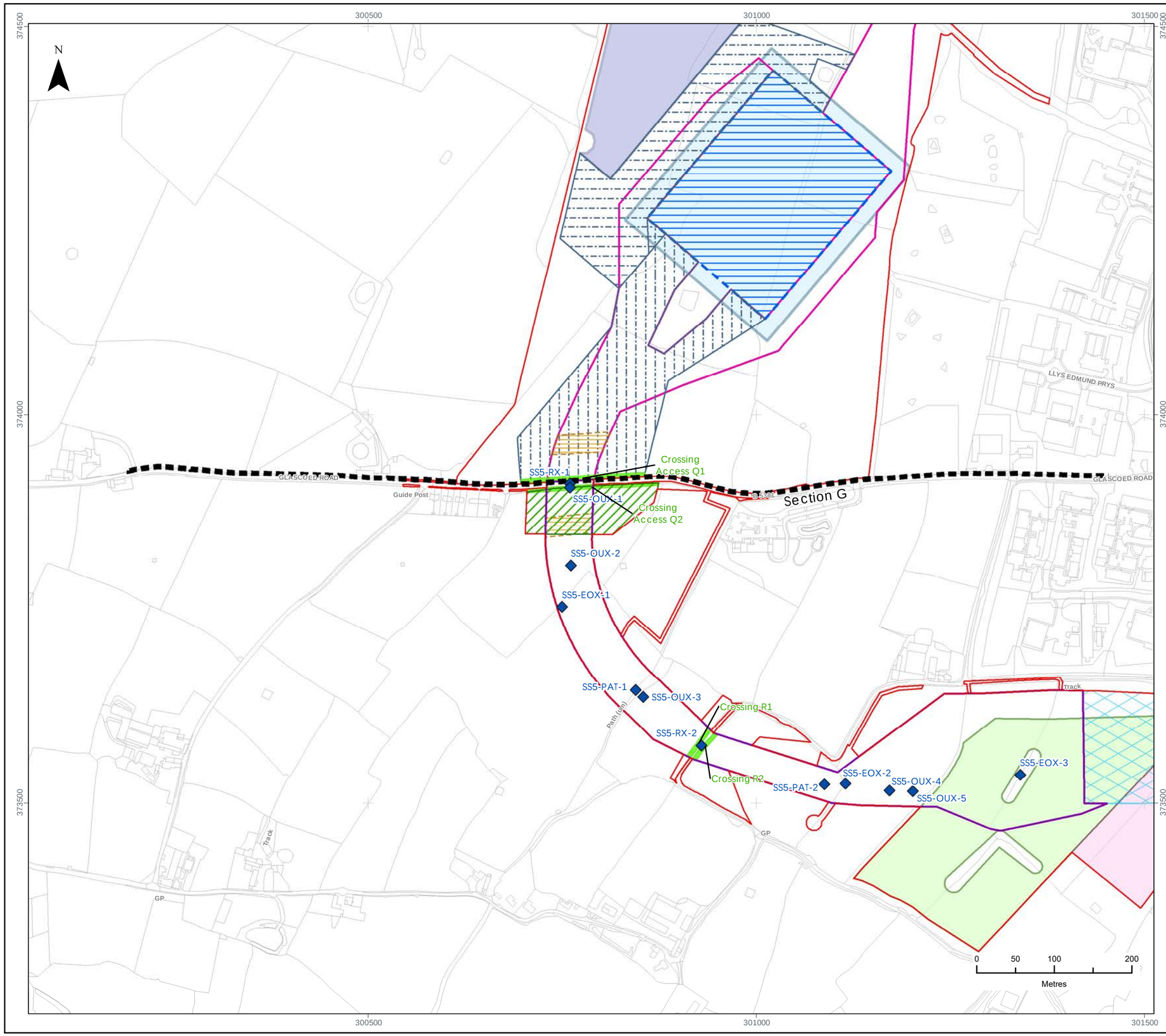

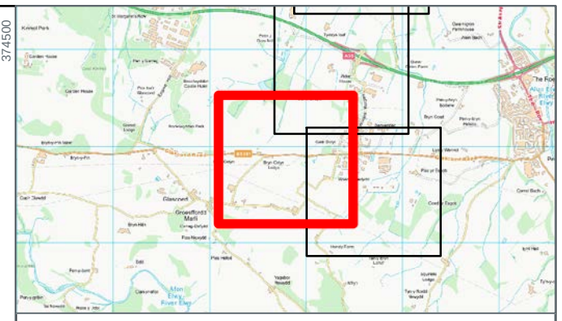

LEGEND

- Order Limits
- Onshore Cable Route Section Breaks
- Proposed Onshore Export Cable Corridor
- Proposed Substation Cable Corridor Zone
- Crossing Schedule (Excluding Utilities Crossings)
- Proposed Indicative Trenchless Crossing Compound
- Proposed Temporary Construction Compound
- Proposed Temporary Construction Compound Zone
- Proposed Construction Access Area
- Unlicenced Work Zone
- Proposed Crossing Location
- Proposed Onshore Substation (OnSS) Footprint
- Proposed Substation Construction Area
- Substation Access Zone
- Substation Temporary Construction Access Zone
- Proposed Substation Indicative Temporary Construction Compound Area

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

ONSHORE INFRASTRUCTURE (DETAIL)

VER	DATE	REMARKS	Drawn	Checked
1	08/04/2022	ES Issue	JRS	MF

FIGURE NUMBER:

FIGURE 15

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
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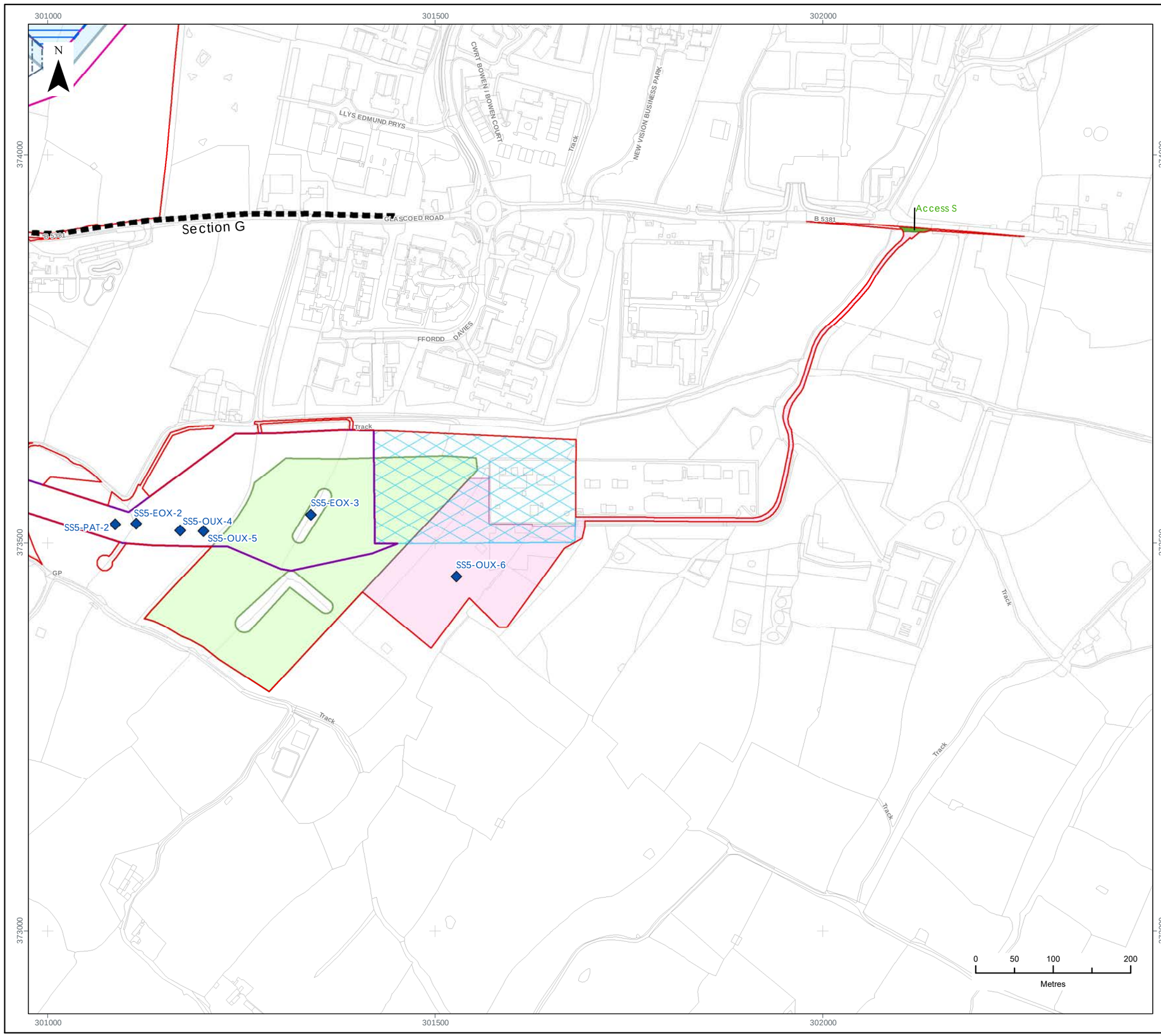

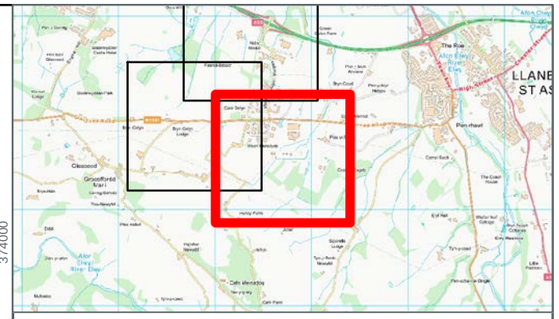

LEGEND

- Order Limits
- Onshore Cable Route Section Breaks
- Proposed Onshore Export Cable Corridor
- Proposed Substation Cable Corridor Zone
- Crossing Schedule (Excluding Utilities Crossings)
- Proposed Temporary Construction Compound Zone
- Proposed Construction Access Area
- Unlicenced Work Zone
- Proposed Access Location
- Proposed Onshore Substation (OnSS) Footprint
- Proposed Substation Construction Area
- Substation Access Zone

Data Source:

PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE:

ONSHORE INFRASTRUCTURE (DETAIL)

VER	DATE	REMARKS	Drawn	Checked
1	08/04/2022	ES Issue	JRS	MF

FIGURE NUMBER:

FIGURE 16

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
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1.7.2 Landfall

65 The Landfall denotes the location where the offshore export cables are brought ashore and jointed to the onshore export cables in TJBs. There is a clear overlap in the offshore and onshore study area at the intertidal area of the Landfall and therefore this Section replicates information provided in the Offshore Project Description (Volume 2, Chapter 1).

66 The AyM Landfall location is within Ffrith beach, located to the east of Rhyl and adjacent to Rhyl Golf Club, extending to an area to the south of the railway.

67 The works at the Landfall include the following:

- Construction of the Landfall temporary construction compound;
- HDD works (or other suitable alternative trenchless techniques such as micro- tunnelling) including temporary construction of HDD exit pits in the intertidal or shallow subtidal;
- Intertidal trenching;
- Construction of TJBs;
- Installation of offshore export cables (cable pulling);
- Installation of and jointing to onshore export cables; and
- Backfilling and re-instatement works.

68 Landfall construction activity is anticipated to take approximately 7 months (HDD drilling will take approximately 4 months including site setup and demobilisation. Cable pulling will take approximately 3 months including site setup and demobilisation and reinstatement). The two activities will not be immediately sequential.

69 Access to the Landfall area that is within the beach will either be:

- from the east via the A548 Rhyl coast road and Ferguson Avenue to access a new TCC and temporary access track located to the south and west of North Wales Bowling Centre to then access an existing track onto the promenade and existing slipway onto Ffrith beach; or

- from the west via Garford Road to access a new TCC and an existing access onto the promenade where there is an existing slipway onto the beach. This access option will require the temporary removal of an existing flood defence gate and some limited cutting into an existing embankment that form part of the current sea defences in order to provide sufficient vehicle turning space. These works would only take place after works for the East Rhyl Flood Defence scheme have been completed whereby the affected defence gate and embankment would no longer form part of the sea defences in this area.

70 Potential Landfall access locations are shown on Figure 4, Figure 5 and Figure 6.

Transition joint bays

71 The TJBs for AyM will be located to the south of the North Coast railway line.

72 TJBs are required to join the offshore cables to the onshore cables and provide a stable, clean and safe working environment for cable joining. Typically, TJBs are located immediately behind the beach area such that the offshore export cables are not installed on land over any significant distance. This is to minimise the pulling tension on the submarine cable once it has been brought onto land. Since the risk of mechanical damage to onshore cables is lower than that for offshore cables, and as such require less armouring, the onshore sections utilise single core, unarmoured cable that is more flexible to install and more easily transportable.

73 It is assumed that each circuit will require a TJB with a permanent footprint of no greater than 100 m^2 in area, and a maximum of two circuits will be required, assuming 5 m width by 20 m length by 2.5 m depth. Each TJB will typically be constructed of a reinforced concrete base with concrete walls and may have a removable roof. Each TJB will also have a link box (See Paragraph 119 for a description of a link box). . Once constructed, planned inspection and maintenance activities will be via link box manholes, typically located adjacent to the TJBs. The TJBs are typically backfilled with a suitable material such as Cement Bound Sand (CBS) and selected subsoils.

74 Once the joint is completed the TJBs are covered and the land above reinstated. It is not expected that the TJBs will require access for planned maintenance activities during the O&M phase, however, unplanned works such as unforeseen repair may be required.

75 An example of a single TJB is shown in Figure 17 and photos of a typical TJB are provided in Figure 18.

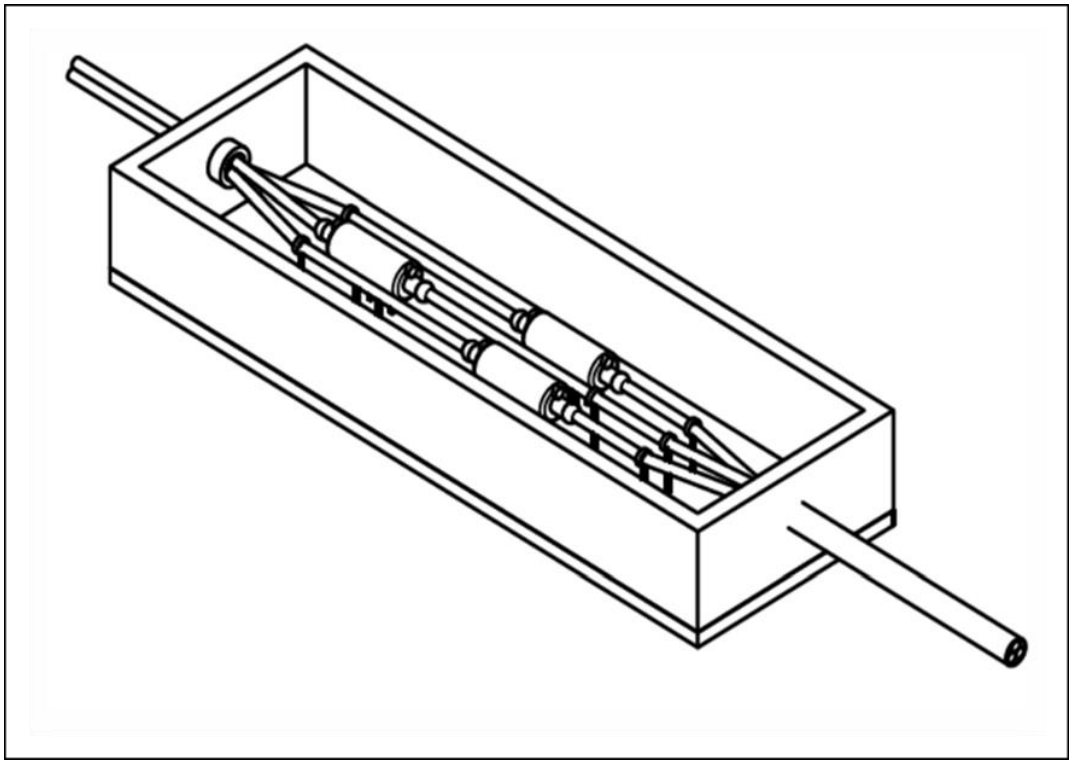


Figure 17: Indicative TJB.

Figure 18: Typical Transition Joint Bay during construction (left) and two link boxes, each with manholes for electrical and optical cable joints, after reinstatement (right) (courtesy of RWE renewables UK Ltd).

76 The design envelope for the TJB is described in Table 3. The trenchless and open-cut options for cable installation used to bring the offshore cables ashore to this area are described in the subsequent paragraphs. Trenchless techniques will be used to install cables beneath any existing and proposed sea defences, Rhyl Golf Club course, the Robin Hood Bay Caravan Park and Railway in the Landfall location.

Table 3: Design envelope for the TJB.

PARAMETER	DESIGN ENVELOPE
Number of export cable circuits	2
Number of TJBs	2
TJB footprint area (indicative per TJB)	100 m^2 (typically 20 m x 5 m)
Land take for TJBs TCC during construction	20,000 m^2
Permanent land take for TJBs during O&M	1,200 m^2 (60 m x 20 m)

Techniques used for Landfall cable installation.

77 The cable installation techniques used to carry out the Landfall works within the intertidal area broadly fall into two categories: trenchless techniques (such as HDD), and open-cut installation (such as trenching). It may be possible to carry out trenchless techniques to beyond the intertidal area and install the rest of the cable using an offshore installation technique (such as simultaneous lay and burial, or a trench may be opened and the cable subsequently installed within). The technical feasibility of this approach will require confirmation via intrusive geophysical and geotechnical survey. However, it may also be the case that this is not possible or preferred (due to ground conditions, cable design, or other factors), in which case open cut techniques will be used to install the cable; or a combination of these two methodologies. Open cut techniques will not be used to install cables beneath the sea defences at Ffrith Beach.

Trenchless installation

78 HDD is the established solution for trenchless installation, however it should be noted that other technologies exist, such as micro-tunnelling, and may be employed. HDD involves the use of mechanical drill to bore a long hole underground using a drilling rig located within the Landfall TCC. These techniques avoid interaction with surface features and is used to install ducts through which cables can be pulled.

79 As the drill is carried out between a start and end point, entry and exit pits must be excavated at either end of the bore. HDDs can vary in length depending on the ground conditions but can typically be achieved up to 1,500 m in length.

80 The process uses a drilling head controlled from the rig to drill a pilot hole along a predetermined profile to the exit point. The pilot hole is then widened using larger drilling heads until the hole is wide enough to accommodate the cable ducts. Drilling fluid (typically containing bentonite) is pumped to the drilling head to stabilise the borehole, recover drill cuttings and ensure it does not collapse. Figure 19 and Figure 20 provide illustrations of a typical HDD installation and an illustration of a landfall HDD installation.

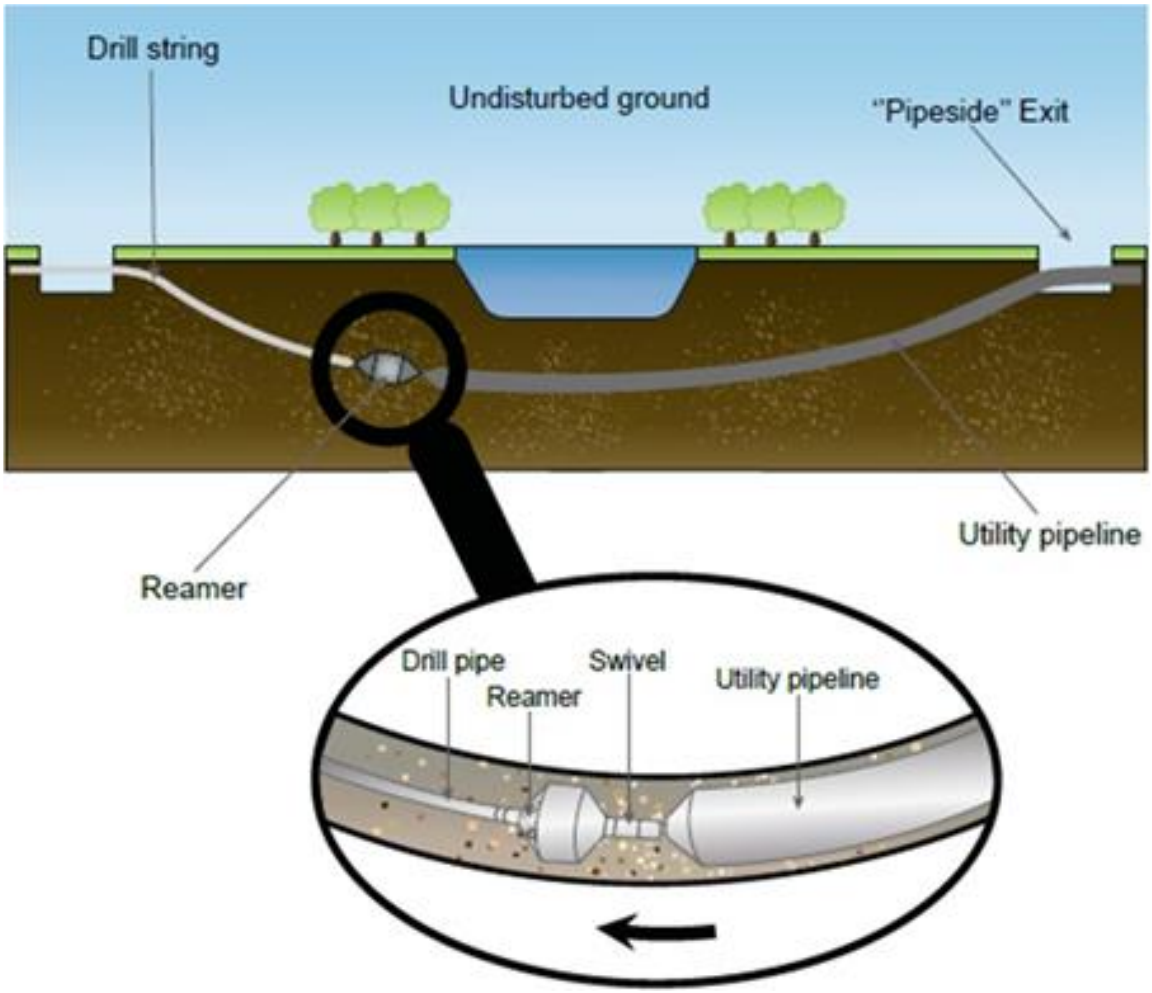


Figure 19: Illustrative visualisation of a HDD Installation.

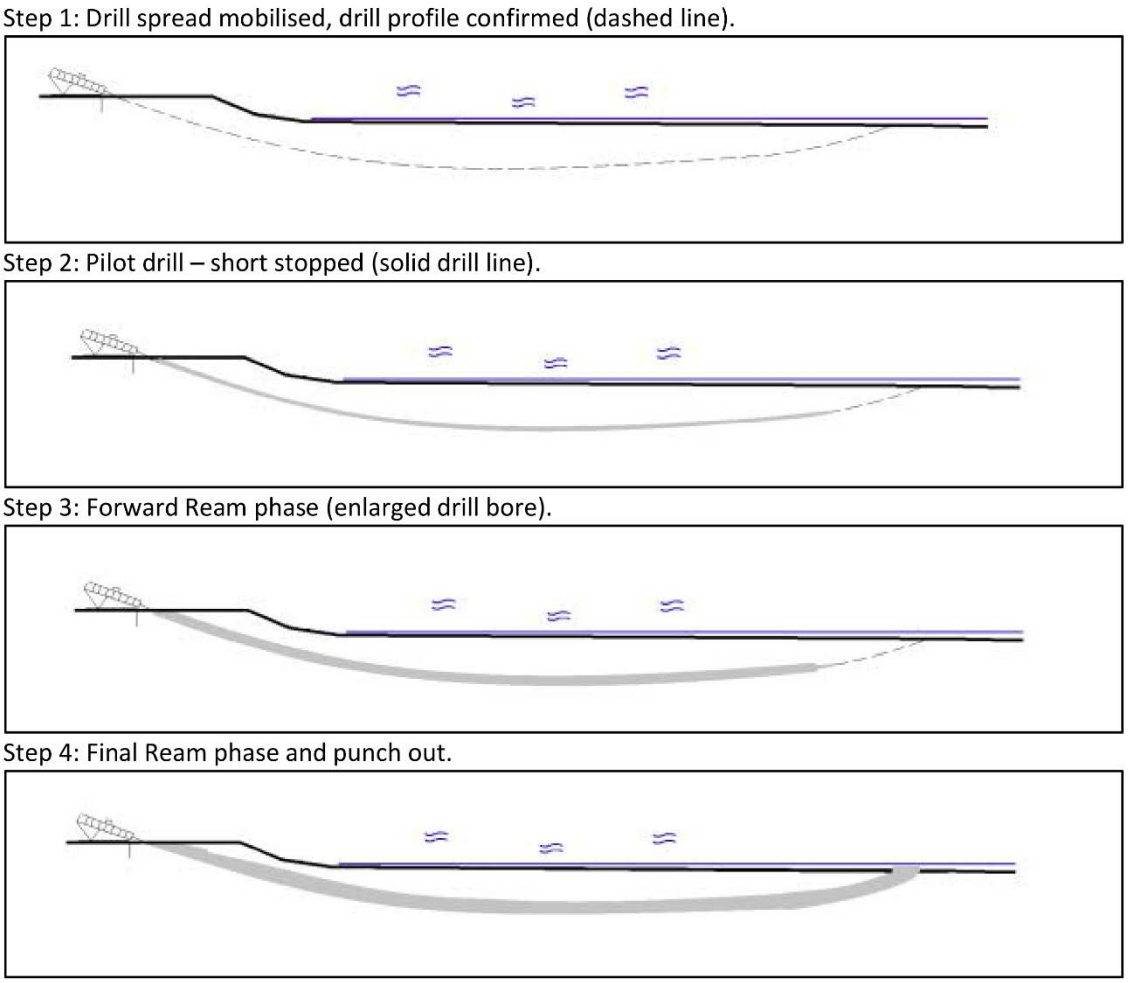


Figure 20: Illustrative visualisation of a landfall HDD Installation.

Figure 21: Example of typical HDD equipment.

(Courtesy of JP Kenny)

81 For AyM, the likely HDD process would be to drill from the works area located to the south of the railway, which will contain the HDD entry pits, in a northerly direction.

82 The HDD exit pits may be located within the intertidal zone or the shallow subtidal area (within the area between MHWS and 1,000 m seaward of MHWS). Exit pits will be excavated or dredged to the required depth, and side-cast material for backfilling will be stored adjacent to the exit pit. Depending on the final methodology and location, it may be necessary to install cofferdams to reduce water intrusion. Temporary cofferdams consist of sheet piled walls and may be installed either by vibro-piling or impact piling methods.

Figure 22: Example of an intertidal cofferdam installed using sheet piles. (courtesy of RWE renewables UK Ltd).

83 Once the drilling operation has taken place, the ducts are pulled through the drilled holes. The ducts are either assembled off-site, then sealed and floated to site by tugs, or will be assembled at the Landfall compound and pulled over the beach on rollers. The ducts are then pulled back through the boreholes either by the HDD rig itself, or by separate winches.

84 Once the ducts are in place, the exit pits will likely be temporarily backfilled until ready for cable pull through. The ducts will then need to be re-exposed to pull in the cable. Once installation is complete, the exit pits will either be backfilled using available side-cast material, and the remainder left to naturally backfill.

85 During the trenchless works at Landfall, public access will be maintained on the beach, wherever possible, with only access to the works area restricted and with suitable means made available for the public to pass around the trenchless works area.

86 Other equipment used on the beach may include a temporary guidance cable and survey pegs placed along the line of the drill. The guidance cable will be buried under the sand so will not present a trip hazard for personnel. In addition, the survey pegs are marked so that they are not a hazard to the public.

87 The design envelope for trenchless techniques is described in Table 4 .

Table 4: Design envelope for Landfall trenchless techniques.

PARAMETER	DESIGN ENVELOPE
Number of cable circuits	2
Number of cable ducts	3 (one per circuit plus one spare)
Indicative maximum duct depth	20 m
Entry/Exit pit location	One to south of railway and the other within the intertidal or shallow subtidal, between MHWS and 1,000 m seaward of MHWS
Number of exit pits required	3
Exit pit dimensions	10 m x 75 m
Exit pit depth	2.5 m
Total volume of sediment excavated from exit pit	5,625 m^3

Open cut installation at Landfall

88 The design envelope for open-cut installation is included within the design envelope for the offshore export cables described in the Offshore Project Description (Volume 2, Chapter 1). Cable protection requirements are similarly included within the envelope for the offshore export cables described within the Offshore Project Description (Volume 2, Chapter 1). However, if required within the intertidal, cable protection will be buried and will not consist of loose rock or gravel. In the shallow subtidal (out to 1,000 m seaward of MHWS), cable protection will similarly not consist of loose rock or gravel.

Landfall (Beach access TCC) Traffic Generation

89 Summary traffic generation estimates are provided in Table 5 with further information on traffic generation estimates provided within the Traffic and Transport Chapter (Volume 3, Chapter 9: Traffic and Transport(application ref: 6.3.9)).

Table 5: Minimum, maximum and average daily traffic generation estimates for Beach access (two way movements).

	TOTAL VEHICLES			HGVS			EMPLOYEE VEHICLES		
	MIN	MAX	AV.	MIN	MAX	AV.	MIN	MAX	AV.
Beach Access (including beach access TCC construction/ reinstatement)	0	73	12	0	22	3	0	51	9

1.7.3 Onshore cable route

90 The onshore cables will operate at a voltage of up to 400kV and connect the Landfall to the OnSS located to the west of SABP. There will also be an onwards link to the National Grid Bodelwyddan Substation. The onshore ECC route will have a length of approximately 12 km.

91 Cable route construction works are anticipated to take place over an 18 month period.

92 An HVAC export cable solution has been chosen for AyM. HVAC is an efficient solution both in terms of minimising electrical losses and in minimising the size and amount of infrastructure required.

93 Up to two HVAC circuits will be required to transmit the power from the TJBs to the OnSS and from the OnSS to the existing national Grid Bodelwyddan substation. Each cable circuit will consist of three onshore power cables as well as up to three fibre optic cables and one earth cable. The power cables will be installed in individual lengths varying from c.500 m to c.1700 m and then jointed. The fibre optic cables may be installed in longer sections.

94 Each circuit will typically have three main ducts – one for each electrical cable - and four smaller ducts for fibre optic and earth cables. Figure 23 shows a typical cable duct arrangement.

Figure 23: Typical onshore cable ducts arranged in a standard trefoil arrangement with 2 smaller ducts for fibre optic cables (courtesy of RWE renewables UK Ltd)

95 The MDS associated with the onshore export cable is described in Table 6.

Table 6: Onshore export cable MDS.

ONSHORE CABLE ROUTE	MAXIMUM DESIGN SCENARIO
Max number of Export circuits	2
Number of power cables per circuit	3
Max number of comms cables per circuit	3

ONSHORE CABLE ROUTE	MAXIMUM DESIGN SCENARIO
Max number of earth cables per circuit	1
HVAC cable technology	XLPE insulation
Indicative max export cable voltage	Up to 400 kV
Indicative external cable diameter	150 mm
Bedding Material	Cement bound sand (CBS)
No. of ducts required per circuit	7

Cable installation

96 Preliminary site works will be required before construction within each cable route section can commence. These may include:

- Fencing;
- Upgrade of existing or installation of new access from the public highway where required;
- Utility diversions and installation of temporary site drainage where required;
- Archaeological and ecological survey and mitigation works as necessary;
- Vegetation clearance; and
- Establishment of temporary construction compounds, offices, welfare facilities, security, wheel wash, lighting and signage.

97 Construction activities for each section of the cable corridor may include:

- Topsoil removal (to edge of working area);
- Temporary haul road installation along all sections of the route;
- Trenchless duct installation beneath obstacles (such as roads, railways, rivers and drains);
- Installation of header or interceptor drains at cable corridor boundaries;

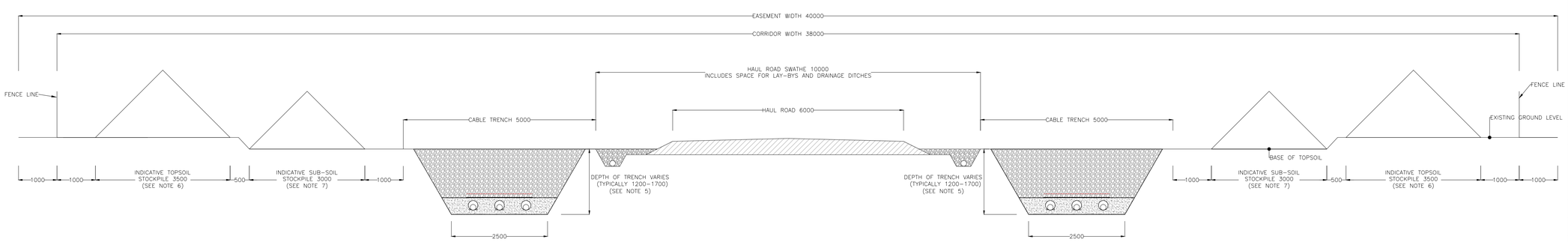
- Trench excavation (up to two, one for each circuit);
- Duct and tile installation;
- Trench backfilling;
- Existing field drainage repairs (where disruption occurs);
- Joint pit installation (including French drains to prevent water pooling above joint pit);
- Cable installation (pulled through ducts from each joint pit);
- Cable jointing; and
- Cable testing and commissioning.

98 Once commissioning is complete, demobilisation and reinstatement can occur. Activities are expected to consist of:

- Removal of haul road;
- Joint pit ground re-instatement;
- Replacement of topsoil;
- Landscaping and hedge re-planting, where appropriate; and
- Demobilisation and fence removal.

99 The main cable installation method will be through the use of open-cut trenching with High Density Polyethylene (HDPE) ducts installed, the trench backfilled and cables pulled through the pre-laid ducts.

100 The cable circuits will be installed within an onshore ECC generally between 40 m and 60 m wide during the construction phase. This corridor includes space to store topsoil, subsoil and a temporary haul road, as well as any equipment required for that section of work during construction and accommodate any PRoW diversions required during the construction phase. An indicative cross section is shown in Figure 24.



TYPICAL CABLE CORRIDOR CONSTRUCTION SWATHE CROSS SECTION
NOT TO SCALE

DO NOT SCALE FROM THIS DRAWING

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
3. ALL LEVELS ARE IN METRES UNLESS STATED OTHERWISE.
4. DRAWING IS NOT FOR CONSTRUCTION.
5. FOR TYPICAL CABLE TRENCH DETAILS SEE DRAWING ED13184-C-3027.
6. TOPSOIL STOCKPILE SIZE INDICATIVE ONLY. VOLUME OF TOPSOIL TO BE STORED ONSITE DEPENDANT ON THICKNESS OF TOPSOIL PRESENT AND REINSTATEMENT REQUIREMENTS.
7. SUB-SOIL STOCKPILE SIZE INDICATIVE ONLY. VOLUME DEPENDANT ON DIMENSIONS OF CABLE TRENCH, DEPTH OF TOPSOIL AND CABLE ROUTE REINSTATEMENT REQUIREMENTS.
8. DRAWING IS INDICATIVE ONLY AND FEATURES SHOWN MAY BE POSITIONED AT DIFFERENT LOCATIONS WITHIN THE CABLE SWATHE DEPENDING ON LOCAL SITE CONDITIONS AND GROUND CONDITIONS.

REV	DATE	REASON FOR ISSUE	BY	CHK	APP
03	06-08-2021	UPDATE OF DRAWING	PM	AH	AH
02	03-02-2021	FINALISATION OF DRAWING	PM	NP	AH
01	22-01-2021	DRAFT FOR COMMENT	PM	NP	AH

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DRAWING TITLE
FIGURE 24: TYPICAL CABLE CORRIDOR CONSTRUCTION SWATHE CROSS SECTION

DRAWING STATUS
FINAL

SHEET SIZE	DESIGNED	DRAWN	CHECKED	APPROVED
A1	PM	PM	AH	AH
SHEET SCALE	DATE	DATE	DATE	DATE
NTS	06.08.2021	06.08.2021	06.08.2021	06.08.2021

WA DRAWING NUMBER	REVISION
ED13184-C-3028	03
AYM DOCUMENT NUMBER	REVISION
AYM-WAR-V2-XX-M2-C-0037-C	03
RWE ECODOC NUMBER	SHEET No / REVISION
003870576-02	001 OF 001 / 02

REV	DATE	REASON FOR ISSUE	PREPARED	CHECKED	APPROVED	RELEASED
03	06-08-2021	UPDATE OF DRAWING	PM	AH	AH	PM
02	03-02-2021	FINALISATION OF DRAWING	PM	NP	AH	PM
01	22-01-2021	DRAFT FOR COMMENT	PM	NP	AH	PM

101 The cables will be installed in one trench per circuit (maximum of 2 trenches for up to 2 circuits), with each trench up to 5 m wide at the top and up to 2 m deep (although this depth could increase where cables cross obstacles). The indicative maximum burial depth is 1.64 m (to top of the duct) and the indicative minimum burial depth is 0.60 m (to top of duct).

102 The cables are typically installed in a trefoil (cables bunded together in a triangular shape) or flat (cables laid adjacently and horizontally) formation, depending on detailed cable system design, with sufficient horizontal separation between circuits to ensure thermal separation.

103 The soil will be carefully maintained during the storage process (an outline Soil Management Plan (application ref 8.13.4) is provided within Appendix 4 of the outline CoCP (application ref 8.13)). The cable trenches will be excavated, typically utilising tracked excavators. The excavated subsoil will be stored separately from the topsoil, with the profile of the soil maintained during the storage process. Soil may be stored immediately adjacent to the trench or stored elsewhere within the development boundary at temporary construction and laydown areas. The nominal width of topsoil affected reflects the width of the onshore ECC and is 40 to 60 m.

104 Construction materials, such as ducting, may be temporarily stored outside of TCCS and within the cable corridor as they will need to be laid out prior to installation.

105 A pre-construction drainage plan will be developed and implemented to minimise water within the trench and ensure ongoing drainage of surrounding land. Where water enters the trenches during installation, this will be pumped via the appropriate means to remove sediment, before being discharged into local ditches or drains via temporary interceptor drains.

106 The base of the trench will be prepared by laying a base fill material of CBS. A duct for each cable and separate ducts for a fibre optic bundle will be laid on the base fill material and surrounded with further CBS material before being backfilled with stored subsoil. The stored topsoil will be placed on top of the backfilled subsoil to reinstate the trench to pre-construction condition, so far as reasonably possible.

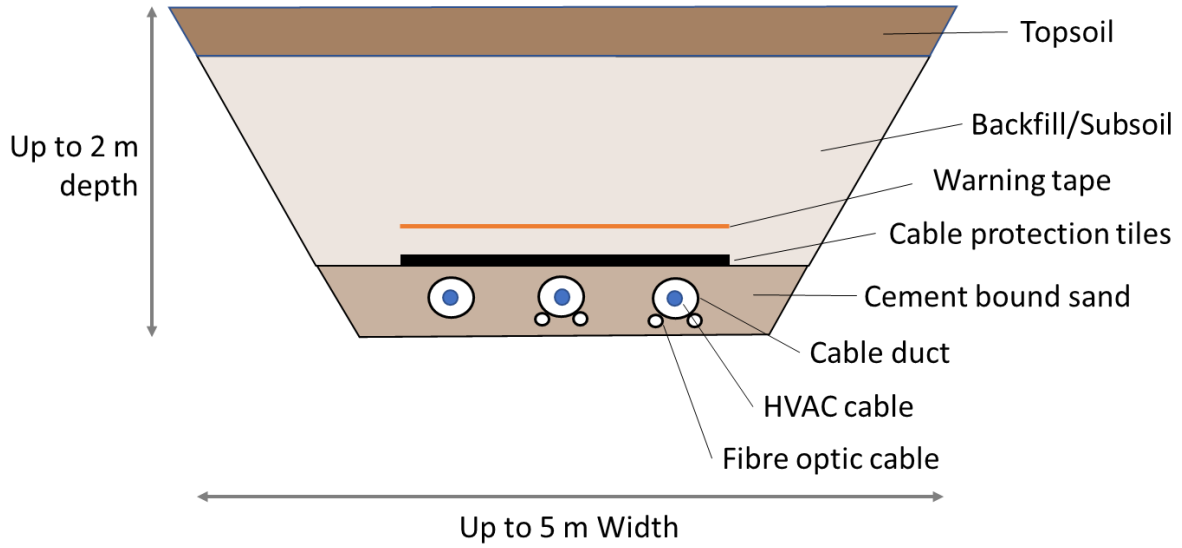


Figure 25: Indicative cross section of a direct lay burial trench

107 Cables will be pulled and installed through the buried ducts and will not require the trenches to be reopened, however access to and from the joint pits will be required to facilitate the works. Cable pulling is likely to require temporary laydown and welfare for the period of jointing pit works, cable pulling and commissioning alongside the cable route.

108 TCCs associated with the onshore ECC may accommodate welfare facilities, car parking and storage areas for the purposes of enabling the construction works. Water, sewage and electricity services may also be required at these sites (these may be serviced from the local utility network or water storage tanks and foul water storage tanks used if no immediate utility connection is available).

109 Cable drums will be delivered by HGV to TCCs for storage where necessary, then transported to the joint pit locations. The cable drum will be located adjacent to the joint pit on a temporary hard standing. A winch will be attached to the cable with a pilot wire, and the cable will be pulled off the drum through the buried ducts.

Figure 26: Example of a cable drum delivery to cable storage area (Courtesy of Scira Offshore Energy).

110 The cable trench will be closed and backfilled between cable joints, once conduit laying is completed. The soil will be reinstated at the end of the cable works however it should be noted that the haul road will remain in place for access to the joint pits until cable jointing and testing is complete. The soil will be reinstated with a warning tape buried approximately 100mm above the boards to indicate the presence and location of the cables below (as shown in Figure 27).

Figure 27: Cable trench having been partially backfilled, with cable marker boards (courtesy of RWE renewables UK Ltd).

111 The MDS associated with the installation of the onshore export cable are described in Table 7.

Table 7: Onshore export cable MDS.

ONSHORE CABLE ROUTE	MAXIMUM DESIGN SCENARIO
Indicative Maximum Depth of Burial (DOB) and Excavation depth (DOE) (excluding crossing points)	1.64 m (DOB) 2.00 m (DOE)
Indicative Minimum DOB and DOE	0.60 m (DOB) 0.96 m (DOE)
Cable corridor construction swathe	40 to 60 m
Max no. of trenches for all cables	2

ONSHORE CABLE ROUTE	MAXIMUM DESIGN SCENARIO
Indicative cable duct trench dimensions (per trench)	5 m wide x 2 m depth
Number of ducts per crossing	Total 8 per project if flat arrangement used. Total 2 – 3 per project if trefoil arrangement used
Indicative HDD / trenchless drives max depth (m below ground level)	20 m
Max trenchless crossing compound dimensions	100 m X 80 m

Use of HDD or other trenchless crossing technique

112 The process for HDD has been described in Section 1.7.3. HDD (or other trenchless crossing technique) will be used at a number of locations as an alternative methodology to open-cut trenching to cross significant environmental and physical features such as main rivers, major drains, roads and railways.

113 Volume 5, Annex 1.1 provides a copy of the Crossing Schedule (application ref: 6.5.1) which comprises a table noting the identified obstacles on the cable route that will be crossed by the onshore ECC. The list of obstacles where HDD (or other trenchless techniques) will be used to cross them is not exhaustive. The most suitable method for crossing obstructions will be determined during the construction stage of AyM which may identify additional trenchless crossings. Any variation to the Crossing Schedule for any section of the onshore ECC will be agreed with the relevant local authority within the final CoCP.

114 The crossing locations where a trenchless crossing has been confirmed as the selected technique (i.e. where open trenching is not an option), are as follows:

- A525 crossing;

- River Clwyd crossing
- A55 crossing;
- Bodelwyddan Road crossing;
- Crossing of ancient woodland to north west of Bryn Cwnin Farm; and
- Crossing of woodland block to north of A55

115 A number of minor obstacles are identified in the crossing schedule as being crossed by trenchless techniques as they are adjacent to a major feature, such as a small ditch next to a main road and as a result will be crossed together as a group of obstacles.

116 Drilling compounds or launch and receptor pits (dependant on the technique chosen) will be set up within the cable corridor at suitable locations adjacent to each obstacle, or group of obstacles, to be crossed. The distance that each compound will be from the obstacles will be determined during the construction stage of AyM and will depend on factors such as the length of the crossing, the height differential of the land either side of the obstacles, depth of the obstacle to be cleared and the local ground conditions.

117 As the length of each crossing will not be known until the construction phase, the duration for each trenchless duct installation is not currently known. As set out in 1.7.8, 24-hour working may be required at the River Clwyd and A55 drill locations.

Joint Pits

118 Joint pits will be required along the cable route to allow cable pulling and jointing of two sections of cable. One joint pit will be required approximately every 500 m to 1700 m of cable (to be determined by detailed design), resulting in a maximum of 48 joint pits (this is 24 per circuit with a maximum of two cable circuits), in addition to the TJBs at Landfall and cable termination at the OnSS. The joint pits will be of a similar design and installed in a similar approach to the TJBs and will have a maximum footprint of 65m^2 (indicatively up to 13 m long by 5 m wide by 1.5 m deep). While crossing agricultural land the highest point in the pit – including the cable circuit and associated protection – will be at a minimum depth of 600 mm below the top of the subsoil layer. In some areas the joint pits could be deeper, for example where there is extensive field drainage.

119 The joint pits will require separate, smaller cable-testing pits (known as link boxes) to allow for fault testing. These will consist of a manhole set in a concrete plinth at ground level. The manhole covers will either be heavy duty to provide agricultural vehicle load-bearing capabilities or lightweight construction allowing access to personnel without need for additional lifting machinery. Each plinth is typically 1.7 m x 2.1 m.

120 Figure 28 shows a typical joint pit under construction.

Figure 28: Typical joint pit under construction (courtesy of RWE renewables UK Ltd)

121 All excavation and reinstatement activities for the joint pits will be conducted as per the cable trenching activities.

122 The MDS associated with the onshore export are described in Table 8.

Table 8: Cable joint pit MDS.

ONSHORE CABLE ROUTE	MAXIMUM DESIGN SCENARIO
Minimum spacing between joint pits	500 m
Max number of joint pits	48
Indicative joint pit dimensions	13 m X 5 m

ONSHORE CABLE ROUTE	MAXIMUM DESIGN SCENARIO
Max number of Link boxes (infrastructure will be underground, with manhole covers visible at ground level)	50

Traffic and access

123 A temporary haul road will be established along the onshore ECC to provide safe access for construction vehicles; from TCCs to cable installation sites. The temporary haul road could be up to 10 m wide including verges and drainage channels, and wider in places where lay-bys are required, and extend the full length of the onshore ECC. A separation of 2 m is maintained from the edge of the temporary haul road and the cable trench for safety and to maintain trench stability. The indicative location of the temporary haul road within the onshore ECC is shown in Figure 24.

124 Summary traffic generation estimates are provided in Table 9 with further information on traffic generation estimates provided within the Traffic and Transport Chapter (Volume 3, Chapter 9)).

Table 9 Minimum, maximum and average daily traffic generation estimates for cable installation (two way movements).

ROUTE SECTION	TOTAL VEHICLES			HGVS			EMPLOYEE VEHICLES		
	MIN	MAX	AV.	MIN	MAX	AV.	MIN	MAX	AV.
B	0	80	50	0	33	14	0	60	36
C	93	159	127	9	59	40	51	128	87
D	0	121	74	0	42	17	0	104	57
E	81	194	141	14	97	52	51	137	89
F	0	106	43	0	26	9	0	88	34

ROUTE SECTION	TOTAL VEHICLES			HGVS			EMPLOYEE VEHICLES		
	MIN	MAX	AV.	MIN	MAX	AV.	MIN	MAX	AV.
G	0	130	67	0	44	18	0	102	49
Existing NG Substation	2	84	34	2	22	8	0	62	26

125 Depending upon the ground conditions in critical flood zone areas, it may not be necessary to undertake works to construct the designated haul road. Where the ground is sufficiently firm enough it may be acceptable to use significantly less granular sub-base material.

126 Following topsoil stripping, the temporary haul road will be formed of protective matting, temporary metal road or permeable hardcore aggregate dependant on the ground conditions, vehicle requirements and any necessary protection for underground services. Proposed measures to manage soil are provided within the outline Soil Management Plan (application ref: 8.13.4) that is provided within the outline CoCP (application ref: 8.13).

127 Consideration will also be given to alternatives such as a specialist track-way if appropriate. The final decision will depend upon ground conditions and the contractor's preferred construction strategy and will not be confirmed until the detailed design stage.

128 HGV traffic will only be able to enter the onshore ECC from the highway at agreed access points, thus minimising the impact on the local minor road network. Personnel traffic and Light Good Vehicles (LGVs) may access the cable route from the public highway network at any point where they cross.

129 Where the onshore ECC crosses the local road network, construction vehicles will need to cross the existing road to continue along the onshore ECC. As noted above, HGV construction traffic will not be permitted to access the onshore ECC from the public highway at these crossings, unless defined as an access location, and will be limited to directly crossing from one side of the road to the other to continue along the haul road. The temporary works required at each of these crossing locations will therefore be significantly less than that required at TCC entrances, where HGV traffic will be exiting the public road network. Priority will be given to existing traffic on the local roads and, where necessary, the traffic entrance onto the roads will be managed. Barriers will be provided, and accesses will be controlled, to prevent members of the public accessing the construction works.

130 Access locations are denoted on Figure 4 to Figure 16 as crossing zones which are short stretches of roadside areas within which the final access point will be determined following detailed design. The location and design of the construction and permanent access junctions will be confirmed following detailed design. The type of traffic management measures that will be implemented during construction of AyM are set out in the outline Construction Traffic Management Plan (CTMP) (application ref: 8.13.7) provided in Appendix 7 of the outline CoCP. Specific traffic management measures for each construction access location will be developed and agreed with DCC, or for two of the proposed construction access locations that connect to the strategic road network (SRN), the North and Mid Wales Trunk Road Agent (NMWTRA) prior to the commencement of construction.

131 The haul road will need to cross a number of ditches and drains to allow construction traffic to access all parts of the onshore ECC within each cable section. Even where cable circuits are installed under drains by way of HDD (or other trenchless crossing technique) the drains will still need to be crossed by the haul road. The exceptions to this are the major drains and rivers as set out in the Crossing Schedule (Volume 5, Annex 1.1 (application ref: 6.5.1.1)).

132 Where drains and ditches are crossed by the haul road a variety of techniques will be used. Principally these will be temporary culvert, flumes, temporary cofferdams with pumping of water round the dammed section and temporary bridging such as Bailey bridges (steel framed modular units). Where a bridge already exists in the location, this may require upgrading. Crossings will be engineered to suit all the local conditions and required loadings.

133 It is assumed as a worst case that the haul road along the onshore ECC may need to remain in place throughout the cable route construction period in order to allow access to all parts of the onshore ECC. Following completion of all construction works, the haul road will be removed and watercourses and land fully reinstated although rights will be retained to access the temporary haul road location should repairs of the cables be required through the lifetime of AyM.

Temporary construction compounds (TCCs)

134 TCCs will be required along the onshore ECC for the duration of the preliminary and installation works. The compounds will provide secure and potentially lit, storage locations for heavy duty plant, local site management offices, welfare and local first aid points, and will also provide space for storage of cables, optical fibres, ducts and other supplies required to complete the installation works. Cranes may be used during establishment and decommissioning of each TCC.

135 The TCC base area will be constructed by removing the topsoil and setting aside for reuse, laying a geotextile membrane or similar separation membrane directly on top of the subsoil, over which layers of granular stone will be spread. Alternatively protective matting, a temporary metal road surface (i.e. trackway) or a tarmac surface could be used. Once the compound has been constructed, foundations for the site cabins will be installed.

136 TCCs will have sufficient space to ensure no vehicles are parked on the public highway. Further information is provided in the outline CTMP (application ref: 8.13.2). Table 10 sets out the TCCs and access points that will be used for each of the cable sections below and these are shown in Figure 4 to Figure 16.

Table 10: TCCs and access points by Route Section.

ROUTE SECTION	TEMPORARY CONSTRUCTION COMPOUNDS	ACCESS
Route Section A – Intertidal Area	Landfall Trenchless crossing works compound (Intertidal or shallow subtidal) TCC located between Brynhedydd Bay and promenade. TCC located to the west of Rhyl Bowling Centre	A548 Rhyl Coast Road – • Garford Road (west of the Golf Course); • Existing Golf Course access on the A548 Rhyl Coast Road (used for pedestrian and/or light vehicle for inspection purposes only); and • Ferguson Avenue and land to west of Bowls Center
Route Section B – Intertidal to B5119	A TJB construction compound to the south of the Railway. Trenchless crossing works compounds: TCC at B5119 Access	B5119 Dyserth Road (adjacent to Rhydorddwy Fawr)
Route Section C – B5119 to A525	Trenchless crossing works compounds TCC to the east of the A525	B5119 Dyserth Road A525
Route Section D: A525 to A547	Trenchless crossing works Compounds TCC to the west of the A525 TCC at A547	A525 Eglwys Road, Rhuddlan A547

ROUTE SECTION	TEMPORARY CONSTRUCTION COMPOUNDS	ACCESS
Route Section E: A547 to A55	Trenchless crossing works Compounds TCC at Bodelwyddan Road TCC north of A55	A547 Bodelwyddan Road A55 (J26)
Route Section F: A55 to B5381 including OnSS	Trenchless crossing works Compounds OnSS TCC	Farm track from A55 (J26) B5381 (Glascoed Road)
Route Section G: B5381 to National Grid Connection	Trenchless crossing works Compounds TCC at B5381 (Glascoed Road) TCC at National Grid Bodelwyddan Substation	B5381 Glascoed Road (west of SABP) B5381 Glascoed Road (east of SABP)

137 Temporary site drainage will be installed during construction at each TCC, with the routing and discharging of water undertaken in accordance with NRW and DCC requirements.

138 Cranes will be used to transfer the cable drums from the delivery lorries either directly to the cable vehicles or to a storage point until they are required.

139 The MDS associated with the TCCs are described in Table 11.

Table 11: Onshore ECC TCC MDS.

ONSHORE ECC TCCS	MAXIMUM DESIGN SCENARIO
Max no. of TCCs associated with Onshore ECC	11
Indicative maximum Onshore ECC TCC area	22,500 m^2

Post-installation activities

140 Following the installation of all cables and joint pits in a section, the construction working width will be cleared and reinstated. This reinstatement will include replanting of hedgerows where possible, replacement of fences, removal of temporary land drains and settlement ponds and reinstatement of permanent land drains. Reinstatement will be undertaken in line with the Final Landscape and Ecology Management Plan (LEMP), an outline version of which is provided with the application (Outline Landscape and Ecology Management Plan (application ref: 8.4)). Reinstated habitats may be subject to an aftercare period and the methods of aftercare will be agreed in the Final LEMP and subject to the results of monitoring. During the aftercare period certain areas (such as adjacent to PROW) are likely to need protection from disturbance by people, dogs and grazing animals. The precise methods for protection will be agreed as part of the Final LEMP. Figure 29 shows an area of cable corridor during restoration.

Figure 29: Cable corridor during restoration (courtesy of RWE renewables UK Ltd).

Estimated waste and materials for onshore ECC

141 Table 12 provides an estimate of the materials used in construction of the onshore ECC.

Table 12: Estimate of materials used in construction of the onshore ECC.

IMPORTED MATERIALS / PERMANENT EQUIPMENT	UNITS	INDICATIVE MAXIMUM VALUE
Mot Type 1	Tonnes	166,572
Asphalt	Tonnes	7,000
HB2 External Radii Kerbs	No	261
Concrete	m^3	1,151
20/40mm Drainage Stone	Tonnes	14,499
Length of perforated pipe	m	26,850
Geogrid	m^2	256,031
Geotextile	m^2	256,031
Stock Proof Fencing (including required posts)	m	27,490
Heras fencing panels	No	2,607
Length of Onshore Export Cable	m	66,480
Length of Onshore Fibre Cable	m	66,480
Length of Onshore Earth Cable	m	22,160
Trench Tiles / cable protective covers	No	69,247
Cement Bound Sand	Tonnes	27,249

IMPORTED MATERIALS / PERMANENT EQUIPMENT	UNITS	INDICATIVE MAXIMUM VALUE
Selected Sand	Tonnes	2,368
Length of 250 mm duct	m	46,950
Length of 32 mm duct	m	62,600
Length of ducting for install in onshore HDD bores	m	45,570
Bentonite	kg	709,050
Water	m^3	17,809
Steel Reinforcement	Tonnes	67
Link box lids	No	100
Cable Joint Kits	No	144
TJB pre-cast concrete slabs	No	76

142 Table 12 provides an estimate of the materials used in construction of the onshore ECC

Table 13: Estimate of waste generated from construction of the onshore ECC.

WASTE MATERIAL TYPE	UNITS	INDICATIVE MAXIMUM VALUE
Mot Type 1	Tonnes	166,572
Asphalt	Tonnes	7,000
HB2 External Radii Kerbs	No	261

WASTE MATERIAL TYPE	UNITS	INDICATIVE MAXIMUM VALUE
HB2 Straight Kerbs	No	0
Concrete	m^3	119
20/40mm Drainage Stone	Tonnes	14,499
Length of perforated pipe	m	26,850
Geogrid	m^2	256,031
Geotextile	m^2	256,031
Heras fencing	No	2,607
Native Soil	Tonnes	58,498
Topsoil	Tonnes	140
Drill Fluid Removal	m^3	6,088
Stock Proof Fencing (including required posts)	m	27,490

143 An Outline Site Waste Management Plan (SWMP) is provided as Appendix 5 to the Outline CoCP (application ref: 8.13.5).

144 The Outline SWMP identifies obligations with regard to waste legislation. It provides the details regarding roles and responsibilities of the Applicant and its contractors (including any subcontractors) to ensure that the Applicant complies with its waste obligations (under waste legislation) and current environmental best practice.

1.7.4 Onshore substation (OnSS)

145 One OnSS (HVAC) will be required for AyM and will be sited to the west of SABP in order to facilitate ease of connection to the National Grid.

146 A number of zones have been identified for the OnSS and form the design envelope. These zones are shown in Figure 15 and have been assessed and will be further refined as part of the detailed design process post-consent, and agreed with DCC in order to define specific footprints:

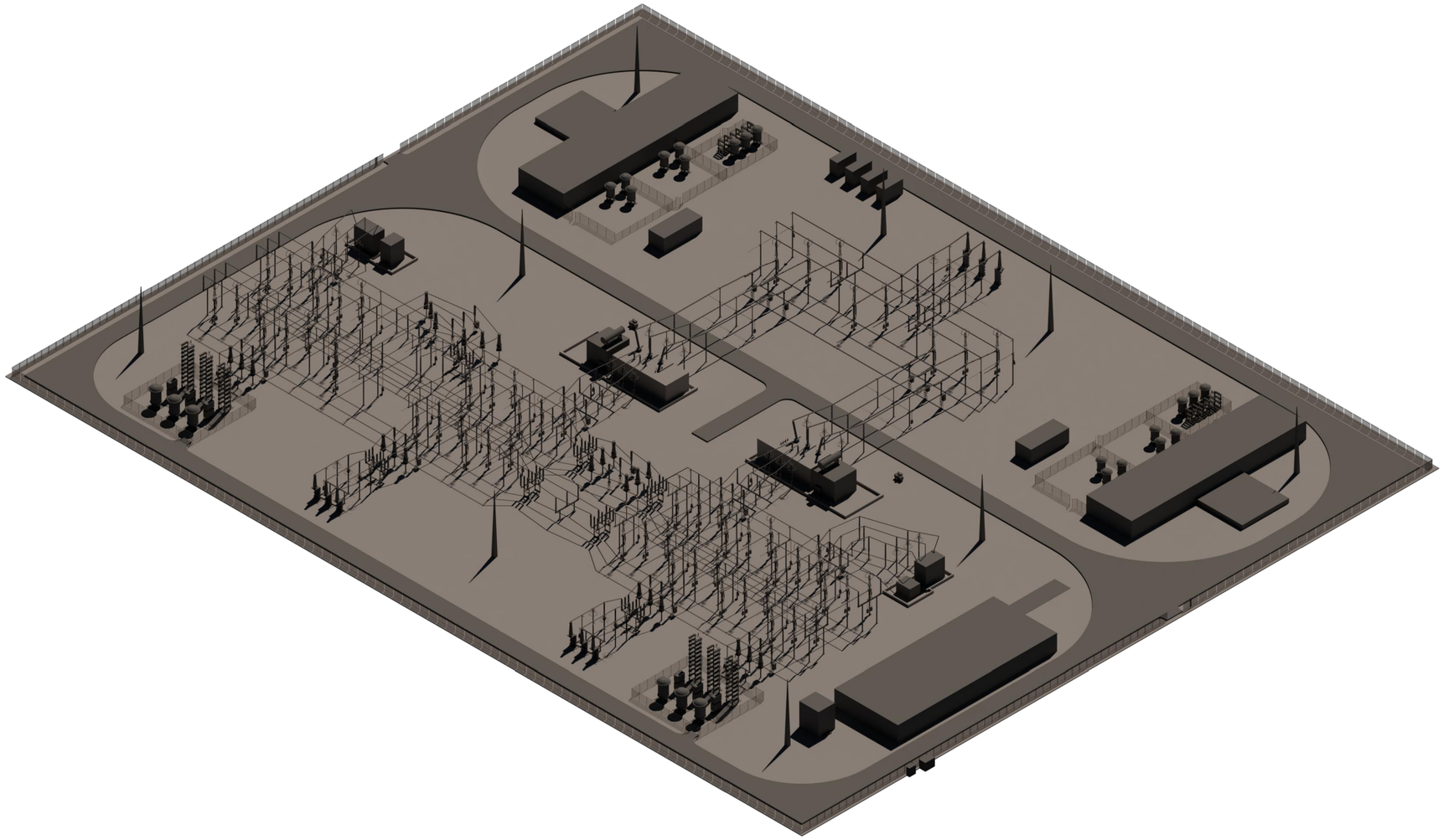
- OnSS Access Zone The area which will contain final OnSS access routes (both construction and operational) linking the substation to Glascoed Road. The routes of the construction and operational accesses will be confirmed post consent during detailed design
- OnSS Cable Corridor Zone The area which will contain the final cable connection into and out of the substation. The route of the cable connections to the substation will be confirmed following detailed design (post consent). The cable route will be either east or west of the pond located immediately south of the substation.
- OnSS Temporary Access Zone The area between the OnSS TCC and the OnSS Construction Area, through which a number of access tracks will be routed to allow vehicles to move between the two areas.

147 In addition to the zones above, the defined areas of the OnSS are:

- OnSS Footprint The footprint for the substation which would incorporate either AIS or GIS technology.
- OnSS Construction Area The area within which the substation construction would take place. This area incorporated both the Substation Footprint and areas of cut and fill required to construct the substation platform.

148 The OnSS will contain a number of elements including switchgear, busbars, transformers, capacitors, reactors, reactive power compensation equipment, battery rooms, filters, cooling equipment, control and welfare buildings, lightning protection rods (if required) and internal road access. A security fence will surround the OnSS compound.

149 The OnSS technology will employ either AIS or GIS. The choice of switchgear affects both the total land area required and the size and type of buildings which will be needed. GIS substations are generally smaller than their AIS counterparts, typically taking up a 35% smaller footprint than an equivalent AIS substation, although they are likely to require a greater number of taller buildings. GIS substations typically require less maintenance as the interior elements are sealed and insulated. GIS systems do, however, have a higher upfront cost, but may have a lower lifetime cost than equivalent AIS systems. The choice of AIS or GIS will be part of the detailed design process and a decision will be made post-consent prior to construction commencing. Figure 30 and Figure 31 provide indicative substations layouts for AIS and GIS technologies.



Notes

1. DIMENSION IS IN MM UNLESS STATED OTHERWISE.
2. THIS LAYOUT IS INDICATIVE ONLY. THE FOLLOWING ASPECTS SHALL BE CONSIDERED WHEN DEVELOPING THE DESIGN:
   - -MAGNETIC CLEARANCE FROM THE AIR CORE REACTORS
   - -FIRE SUPPRESSION SYSTEM
   - -SITE LIGHTING AND SECURITY SYSTEMS
   - -PEDESTRIAN ACCESS REQUIREMENT TO EQUIPMENT/BUILDING
   - -LIGHTNING PROTECTION
3. THE EQUIPMENT APPEARANCE AND SIZE SHOWN ARE INDICATIVE ONLY.

Key to symbols

Reference drawings

AYM-MOT-V7-ZZ-M3-E-0001

Rev	Date	Drawn	Description	Ch'k'd	App'd
02	10/08/21	JK	Title Change	MB	SA
01	22/04/21	JK	Preliminary Issue	MB	SA

Status Stamp

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Fferm Wynt Alltraeth
AWEL Y MÔR Offshore Wind Farm

Title

Awel y Môr Offshore Wind Farm
Onshore Substation
Figure 30: Indicative AIS Substation

Sheet 01 of 01

Designed	J. Kensall	JK	Eng check	M. Barton	MB
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Dwg check	T. King	TK	Approved	S. Anantharam	SA

MMD Project Number	Scale at A1	Security
419577	NTS	STD

Client Number	Suit. Code
003977835	S3

Drawing Number	Revision
AYM-MOT-V0-XX-DR-E-0052	02

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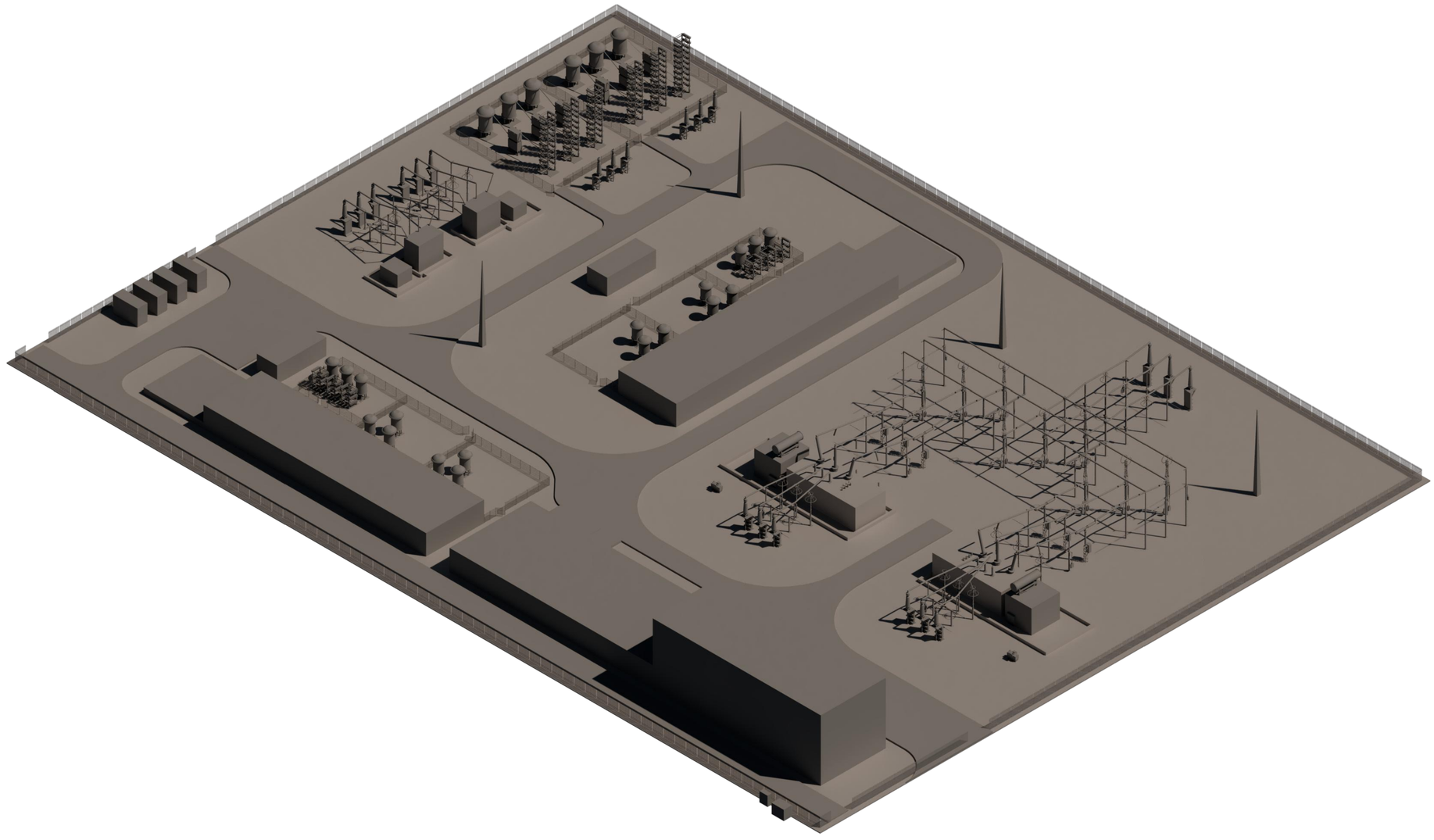

Notes

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2. THIS LAYOUT IS INDICATIVE ONLY. THE FOLLOWING ASPECTS SHALL BE CONSIDERED WHEN DEVELOPING THE DESIGN:
   - -MAGNETIC CLEARANCE FROM THE AIR CORE REACTORS
   - -FIRE SUPPRESSION SYSTEM
   - -SITE LIGHTING AND SECURITY SYSTEMS
   - -PEDESTRIAN ACCESS REQUIREMENT TO EQUIPMENT/BUILDING
   - -LIGHTNING PROTECTION
3. THE EQUIPMENT APPEARANCE AND SIZE SHOWN ARE INDICATIVE ONLY.
4. THE PROPOSED SOLUTION SHOWS AN ALTERNATIVE ARRANGEMENT FOR THE SUBSTATION WITH A WORST VISUAL IMPACT. HOWEVER, WE NOTE THAT THE ARRANGEMENT DOES NOT INTEND IN ANY WAY TO OPTIMISE THE LOCATION OF THE EQUIPMENT. THIS MODEL IS FOR PLANNING PURPOSES ONLY, WITH THE AIM TO SHOW A WORST VISUAL IMPACT OF THE SUBSTATION.

Key to symbols

Reference drawings

AYM-MOT-V7-ZZ-M3-E-0002 - On shore substation - GIS 3D Model
AYM-MOT-V7-XX-DR-E-0002 - Single Line Diagram

Rev	Date	Drawn	Description	Ch'k'd	App'd
04	31/03/22	JK	Client Comments Incorporated	GR	PL
03	28/03/22	JK	Updated Layout	GR	PL
02	10/08/21	JK	Title Change	MB	SA
01	22/04/21	JK	Preliminary Issue	MB	SA

Status Stamp

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Fferm Wynt Alltraeth
AWEL Y MÔR Offshore Wind Farm

Title

Awel y Môr Offshore Wind Farm
Onshore Substation
Figure 31: Indicative GIS Substation

Sheet 01 of 01

Designed	J. Kensall	JK	Eng check	G. Rossi	GR
Drawn	J. Kensall	JK	Coordination	T. King	TK
Dwg check	T. King	TK	Approved	P. Lear	PL

MMD Project Number	Scale at A1	Security
419577	NTS	STD

Client Number	Suit. Code
003977836	S3

Drawing Number	Revision
AYM-MOT-V0-XX-DR-E-0053	04

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150 The largest structure within the OnSS will be the OnSS building, with a maximum height of 15 m above finished OnSS ground level (assuming a GIS design). All other equipment (e.g. transformers, switchgear) will not exceed a height of 12.5 m above finished ground level with the exception of slender lightning masts which would be 18m in height. The total land requirement for the HVAC OnSS to the perimeter fence is 50,000 m^2 (Assuming AIS technology), as well as a 37,500 m^2 TCC.

151 The OnSS site topography falls from higher ground in the south (approximately 38 m above Ordnance Datum (AOD)) towards lower ground in the north (approximately 29.6 m AOD). The construction of the OnSS will require some cut and fill in order to provide a level platform upon which to construct the substation. The level of this platform (finished ground level) is anticipated to be 34.175 m AOD to 34.975 m AOD depending on the final technology and design.

152 The MDS associated with the OnSS are described in Table 14.

Table 14: Substation site MDS.

SUBSTATION	MAXIMUM DESIGN SCENARIO
Indicative dimensions of AIS footprint (area of substation up to perimeter fence line excluding any areas of cut and fill)	250 m X 200 m
Max Area of AIS footprint	50,000 m^2
Indicative dimensions of GIS footprint	200 m X 150 m
Max area of GIS footprint	30,000 m^2
Indicative number of buildings	8
Indicative building dimensions	1 x GIS building: 50 m x 15 m x 15 m high 2 x Static Var Compensator buildings: 55 m x 14 m x 5 m

SUBSTATION	MAXIMUM DESIGN SCENARIO
	1 x Control building: 50 m x 20 m x 5 m 2 x Storage/ backup power units : 15 m x 10 m x 4 m (possibly in the form of containers) 2 x Workshops: 15 m x 10 m x 4 m (possibly in the form of containers)
Max external equipment height	18 m
Max area of TCC	37,500 m^2
Indicative finished platform level	34.175 m AOD to 34.975 m AOD

Onshore substation temporary construction compound (OnSS TCC)

153 During construction of the OnSS, a temporary construction compound (OnSS TCC) will be established to the north west of the substation construction site to support the works. The area will be formed of hard standing with appropriate access to allow the delivery and storage of large and heavy materials and assets, such as power transformers.

154 The area will be approximately 37,500 m^2 and will accommodate construction management offices, welfare facilities, car parking, workshops and storage areas. Areas of the OnSS TCC, such as car parking areas, may be tarmacked. Water, sewerage and electricity services will be required at the site and supplied either via mains connection or mobile supplies such as bowsers, septic tanks and generators. This area will also serve for cable installation works.

Substation construction

155 The likely sequence of activities at the OnSS are:

- Detailed site investigation works, pre-construction archaeological and ecological surveys and mitigation;
- Preliminary site works, including:

- site clearance;
- site mobilisation, fencing and the establishment of the OnSS TCC;
- the construction of temporary and permanent access roads,
- ground works including cable ducting and new site drainage; and
- ground raising and establishment of the stoned site platform.

- Installation of the OnSS, including;
  - permanent security fencing
  - the GIS building (if required) and other structures such as control and welfare buildings and lightning rods; and
  - electrical equipment such as switchgear, busbars, capacitors, reactors, reactive power compensation equipment, filters and cooling equipment.
- Commissioning of the electrical equipment; and
- Demobilisation and landscaping.

156 OnSS construction works are anticipated to take place over a 27 month period with additional periods for preliminary works and post construction commissioning as shown in Figure 2

157 The OnSS site will be stripped and graded as required with material being reused on site where possible. Any excess material will be disposed of at a licenced disposal site. Excavations and laying of foundations, trenches and drainage will commence after grading is complete.

158 Foundations for the OnSS may require piling, however, confirmation of the type and quantum of piling is dependent on further investigation.

159 The specialist electrical equipment will be delivered to site, installed and commissioned. Due to the size and weight of the transformers' tanks, these deliveries will be classed as Abnormal Indivisible Loads (AILs). Such loads will require specialist delivery methods to be employed and, when on site, offloaded and transported to position using suitable mobile cranes, rails and tracked system.

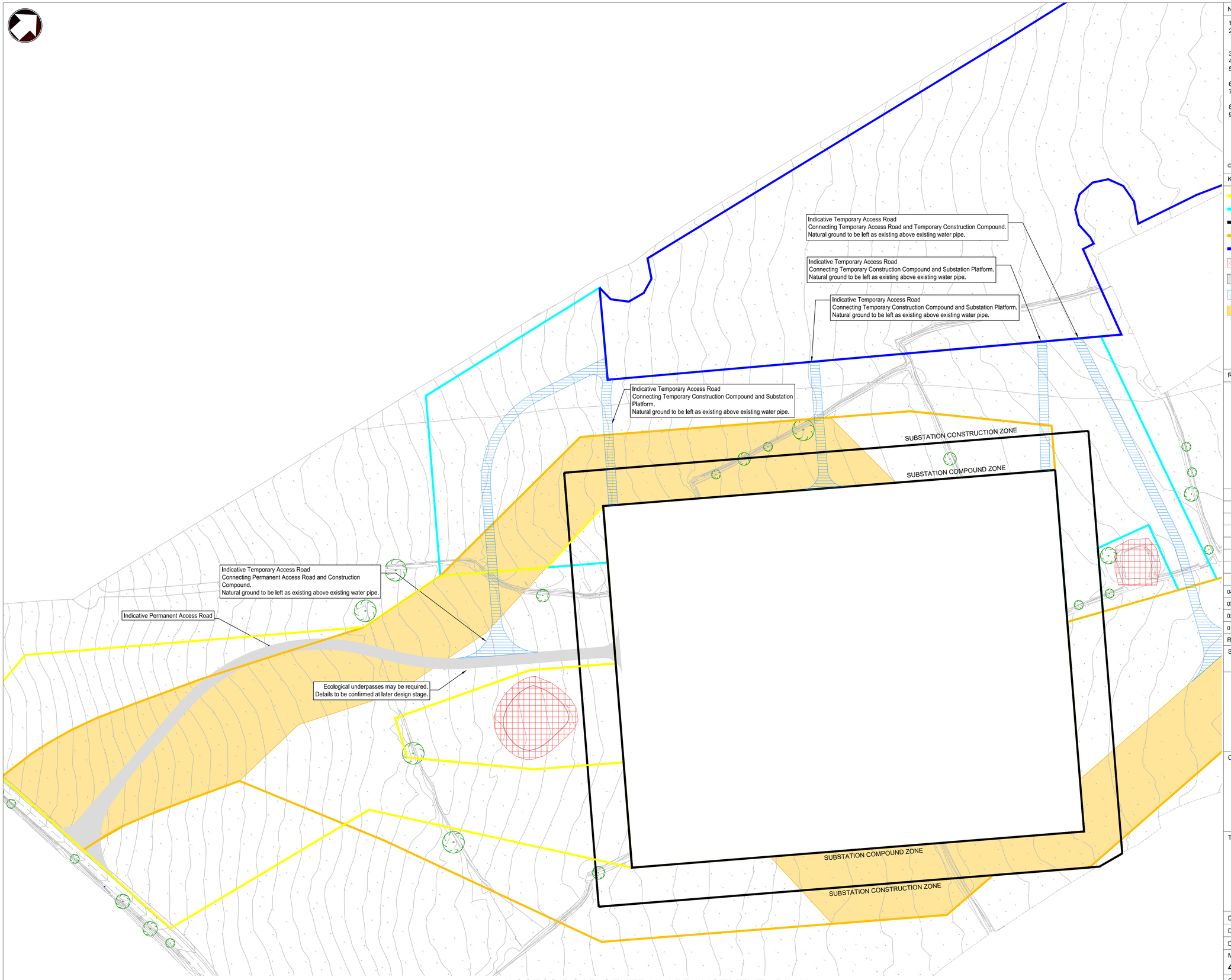
160 Construction access from Glascoed Road for the OnSS works will be an access track that will be routed through the OnSS Access Zones which are located the south west of the OnSS zone.

161 Following topsoil stripping, the temporary access road will be formed of protective matting, temporary metal road, tarmac or permeable hardcore aggregate dependant on the ground conditions, vehicle requirements and any necessary protection for underground services. Proposed measures to manage soil are provided within the outline Soil Management Plan (application ref: 8.13.4) that is provided within the outline CoCP (application ref: 8.13).

162 Consideration will be given to alternatives such as a specialist track-way if appropriate. The final decision will depend upon ground conditions and the contractor's preferred construction strategy and will not be confirmed until the detailed design stage.

163 The same location would be used for the permanent OnSS access route (i.e. the initial construction access may be a track with the permanent access subsequently constructed next to it). An illustrative drawing which provides an indicative representation of how the access track could be routed through the OnSS Access Zone is provided in Figure 32.

164 In addition to the access arrangements onto the site from Glascoed Road, a number of on-site access tracks will be routed between the OnSS TCC and OnSS Construction area to allow vehicles to move between the two areas. This area is referred to as the OnSS Temporary Access Zone.



ACCESS ROAD GENERAL ARRANGEMENT - PLAN

SCALE @ A1: 1:1000

1:1000 0 50m 100m

C:\Users\kin23165\ACCDocs\Mott MacDonald\419577 - ETO-RWE Innogy-Awel y Môr\Native Files\01 - MML\MML-CIV\DR\AYM-MOT-V0-XX-DR-C-0062.dwg Dec 16, 2021 - 3:19PM KIN23165

Notes

1. Do not scale from this drawing.
2. Information on this drawing is based on drawing: "RWE AWEL Y MôR OFFSHORE WIND FARM_REV0" by 3D Engineering Surveys dated March 2021.
3. All dimensions are in metres unless otherwise stated.
4. This drawing is to be read in conjunction with relevant documents and drawings.
5. Proposed arrangement shown for indicative purposes only. Dimensions and design may vary, subject to detailed design phase.
6. No unauthorised disclosure, storage or copying.
7. All spatial coordinates relate to the Ordnance Survey, British National Grid (OSGB36).
8. All levels are in meters and relate to AOD (Ordnance Survey, Newlyn).
9. This drawing presents the AIS equipment option for the 400kV/275kV substation due to the greater land requirement than GIS equipment option.

Key to symbols

- Access Road Zone
- Temporary Access Road Zone
- Substation Boundary Zone
- Cable Corridor Zone
- Temporary Construction Compound Zone
- Denotes Pond Exclusion Zone (5m Buffer)
- Indicative Permanent Access Road
- Indicative Temporary Access Road
- Indicative 40m Cable Corridor

Reference drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
04	16/12/21	TK	Client comments incorporated	MB	SA
03	08/12/21	TK	Client comments incorporated	MB	SA
02	21/09/21	TK	Cable route and access road zones added. Notes updated.	MB	SA
01	29/07/21	JB	PRELIMINARY ISSUE	MB	SA

Status Stamp

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Client

Fferm Wynt Alltraeth
AWEL Y MÔR Offshore Wind Farm

Title

Awel y Môr Offshore Wind Farm
Figure 32: Access Road General Arrangement Plan

Sheet 01 of 01

Designed	M. Barton	MB	Eng check	M. Barton	MB
Drawn	J Bell	JB	Coordination	T. King	TK
Dwg check	T. King	TK	Approved	S. Anantharam	SA

MMD Project Number	Scale at A1	Security
419577	As Shown	STD

Client Number	Suit. Code
004046774	S3

Drawing Number	Revision
AYM-MMD-V0-XX-DR-C-0062	04

165 Summary traffic generation estimates for the OnSS construction are provided in Table 15 with further information on traffic generation estimates provided within the Traffic and Transport Chapter (Volume 3, Chapter 9).

Table 15: Average daily traffic generation estimates for OnSS construction (two way movements).

	TOTAL VEHICLES	HGVS	EMPLOYEE VEHICLES
OnSS	119	89	30

Estimated waste and materials for OnSS

166 Table 16 provides an estimate of the materials used in construction of the OnSS.

Table 16: Estimate of materials used in construction of the OnSS.

PARAMETER	BASE VALUE
Concrete	5,300 m^3
Imported Engineered Fill	95,550 m^3
Fencing	950 m
Reinforcement	600 tonnes
Chippings	3,600 m^3
Drainage	2,880 m
Structural Steel	1,200 tonnes
Cladding	5,850 m^2
Bituminous road	6,500 m^3

167 Table 17 provides an estimate of the materials used in construction of the OnSS. An Outline SWMP is provided as Appendix 5 to the Outline CoCP (Volume 8, Document 8.3.6).

Table 17: Estimate of waste generated from construction of the OnSS.

PARAMETER	BASE VALUE	CLASSIFICATION	WASTE MANAGEMENT OPTION
Vegetation (m^3)	20	Non-hazardous	Exemption on site or disposal for controlled plants
Soil and stones (m^3)	19,400 (OnSS Topsoil) 10,430 (Construction Compound Topsoil) 19,550 (Earthworks)	Non-hazardous	Reuse on site where possible
Hardstanding, road surfaces (m^3)	3,750 (Bituminous surface from Construction Compound)	Non-hazardous	Reuse on site
Mixed construction waste (m^3)	150	Non-hazardous	Disposal
Wood (m^3)	3000	Non-hazardous	Segregation and recycling or recovery
Metal (m^3)	100	Non-hazardous	Segregation and recycling

PARAMETER	BASE VALUE	CLASSIFICATION	WASTE MANAGEMENT OPTION
Hard core (m^3)	1000	Non-hazardous	Reuse on site
Mixed Packaging (m^3)	120	Non-hazardous	Segregation and re-use or recycling
Contaminated packaging (m^3)	10	Hazardous	Treatment and disposal
Office general waste (m^3)	20	Non-hazardous	Treatment
Office paper (m^3)	3	Non-hazardous	Recycling
Canteen waste (m^3)	15	Non-hazardous	Composting and treatment
Waste hydraulic oil (m^3)	5	Hazardous	Disposal
Wiping cloths (m^3)	2	Non-hazardous	Disposal

1.7.5 Connection to National Grid

168 The onshore ECC will continue southwards and then eastwards from the proposed OnSS to connect to the existing National Grid Bodelwyddan substation located to the south of SABP.

169 The 400 kV connection will rely on 'Enabling Works' that will be undertaken by National Grid. National Grid are responsible for undertaking works at the existing National Grid Bodelwyddan substation to facilitate the connection of AyM. Works required for the National Grid Bodelwyddan substation extension are excluded from the DCO and will be consented separately by National Grid. As such, the boundary of the AyM DCO works includes the termination of the 400 kV cables inside of the National Grid Bodelwyddan Substation.

170 The Enabling Works, undertaken by National Grid and excluded from the DCO, are anticipated to require the extension of the existing 400 kV substation compound, extension of the existing GIS buildings and associated electrical and civil works. The Enabling Works will also require construction of new, short sections of overhead lines to 'turn-in' the existing Connahs Quay-Pentir 400 kV line and new line landing gantries within the extended substation compound.

171 If required, National Grid will seek its own consents for the Enabling Works, and is currently preparing applications that will be submitted after the AyM DCO submission has been made. National Grid's design is in the early stages of development and when detailed information is available this will form the basis of an application for planning consent. The Applicant is working closely with National Grid to understand the works required to connect the new generation. Early work indicates the Enabling Works extension to the existing substation is likely to include new incoming bays, for AyM's connection as well as other projects, which will comprise of new 400kV Gas Insulated Busbar (GIB). Additionally, the GIS building will be extended. The new GIS building height will match the current height of the existing GIS building which is approximately 12m.

172 The extension footprint is anticipated to be to the west of the existing substation, with an external fence height that is the same as existing substation fencing. The Enabling Works will include the replacement of a small number of the existing overhead line towers with newer towers of similar height (approximately 50m). These will allow the overhead line to 'turn-in' to the substation. One or more additional towers may be required.

173 Preliminary programming suggests the works would mainly be undertaken in 2024/25/26. Although not specified at this stage, it is anticipated that the type of civils plant, equipment and activities (and therefore the associated construction noise levels), will be broadly similar to that proposed for the OnSS works, although on a smaller scale and duration.

174 Once the Enabling Works have been undertaken by National Grid, the Applicant will undertake the installation of 400 kV switchgear to connect the AyM system with the NGET 400 kV busbars and terminate the 400 kV cables that will connect the AyM OnSS to the NGET substation. These works may run in parallel to, or upon completion of the 'Enabling Works' and will take place entirely within the footprint of the National Grid Bodelwyddan substation extension. These works are designated as 'User Works' or 'Unlicensed Works'.

175 To support the 'Unlicensed Works', a TCC will be required in proximity to the unlicensed works with HGV access possibly from Glascoed Road via the existing National Grid Bodelwyddan substation access track. This TCC would also be used for the onshore ECC works to the south of Glascoed Road.

176 The configuration of the AyM switchgear within the footprint of the National Grid Bodelwyddan substation will depend on a number of factors including the detailed design of the equipment required and the final layout of the enabling works undertaken by National Grid.

177 The main components of the AyM switchgear will be housed within the National Grid switchgear building.

1.7.6 Construction plant and equipment

178 The types of construction plant and equipment that could be used during the onshore construction of AyM are listed below. This list is not an exhaustive list of equipment, but an indication of the types of plant and equipment that could be used during construction:

- Piling rig for cofferdam sheet pile installation;
- Vibrating compactor;
- Tarmac roller;
- Concrete mixer;
- Cable-pulling winch;
- Angle grinder;
- Pneumatic breaker;
- Tarmac production plant;
- Dump truck;
- Tracked excavator; and
- Lorries.

1.7.7 Onshore Code of Construction Practice (CoCP)

179 An onshore CoCP secured as a requirement of the DCO will set out the environmental measures to be applied on AyM, including details of any mitigation and how it will be managed through the construction phase.

180 An outline CoCP (application ref 8.13) has been provided alongside this ES and has been assumed to be adopted for the purposes of the assessments in the ES. The purpose of the outline CoCP is to set out the measures which will be taken to manage the potential environmental impacts of the onshore construction of AyM and limit the disturbance from onshore construction activities such as site preparation, material delivery and removal, works activities and site reinstatement as far as is reasonably practicable.

181 The Outline CoCP also introduces environmental management plans which are provided as appendices to the Outline CoCP and are listed in Table 18.

Table 18: Outline CoCP Environmental Management Plans.

NAME	DESCRIPTION	OUTLINE COCP APPENDIX AND APPLICATION REF:)
Outline Construction Method Statement (CMS)	Sets out the scope of the onshore construction works for AyM and the management methods employed to limit its environmental impacts.	1 (application ref: 8.13.1)
Outline Noise and Vibration Management Plan (NVMP)	Sets out the approach to minimising noise impacts and detail the methods that will be used.	2 (application ref: 8.13.2)
Outline Air Quality Management Plan (AQMP)	Sets out the approach to minimising emissions.	3 (application ref: 8.13.3)
Outline Soil Management Plan (SMP)	Sets out the approach to retain soil condition and quality and allow effective re-instatement.	4 (application ref: 8.13.4)
Outline Site Waste Management Plan (SWMP)	Sets out the approach to minimising and controlling the amount of construction waste to be disposed.	5 (application ref: 8.13.5)
Outline Pollution Prevention and Emergency Incident Response Plan (PPEIRP)	Sets out measures to avoid and control pollution, and the recording and response measures to be implemented in the case of a pollution incident.	6 (application ref: 8.13.6)
Outline Construction Traffic	Sets out the approach that will be taken to manage the potential impacts of construction traffic.	7 (application ref: 8.13.7)

NAME	DESCRIPTION	OUTLINE COCP APPENDIX AND APPLICATION REF:)
Management Plan (CTMP)		
Outline Public Access Management Plan	Sets out the approach that will be taken to manage the potential impacts upon PRoW and Active Travel Routes (ATCs)	8 (application ref: 8.13.8)
Outline Travel Plan	Provides a framework for promoting and encouraging a reduction in private cars	9 (application ref: 8.13.9)
Outline Artificial Light Emissions Plan (ALEP)	Sets out the approach to minimising artificial light impacts and the methods that will be used.	10 (application ref: 8.13.10)
Outline Invasive Non-Native Species Management Plan	Sets out how Invasive Non-Native Species will be managed during construction	11 (application ref: 8.13.11)
Outline Construction Communications Plan	Sets out the communication measures which will be implemented during the construction of the onshore works	12 (application ref: 8.13.12)

1.7.8 Construction hours

182 Construction hours for onshore elements of AyM are anticipated to be between 0700 hours and 1900 hours Monday to Saturday with no work where noise is audible beyond the OL on Sundays, Bank Holidays or in the night-time without prior agreement of the local planning authority

183 There may be particular activities where construction activities or deliveries are required outside these hours.

184 Where continuous periods of construction are required for works such as trenchless crossing operations, concrete pouring and finishing, and electrical circuit pulling, jointing and testing; delivery and unloading of abnormal loads; this will be agreed in advance with DCC through a requirement of the DCO to approve the final CoCP.

185 HDD (or other trenchless crossing works) at the Landfall and other major crossing points will require works to take place 24hrs a day for a period of up to 3 months and this has been assessed in the Airborne noise and vibration assessment (Volume 3, Chapter 10: Airborne Noise and Vibration (application ref: 6.3.10)).

1.8 Operation and maintenance

186 For the purposes of assessment, the operational lifetime of AyM is assumed to be 25 years.

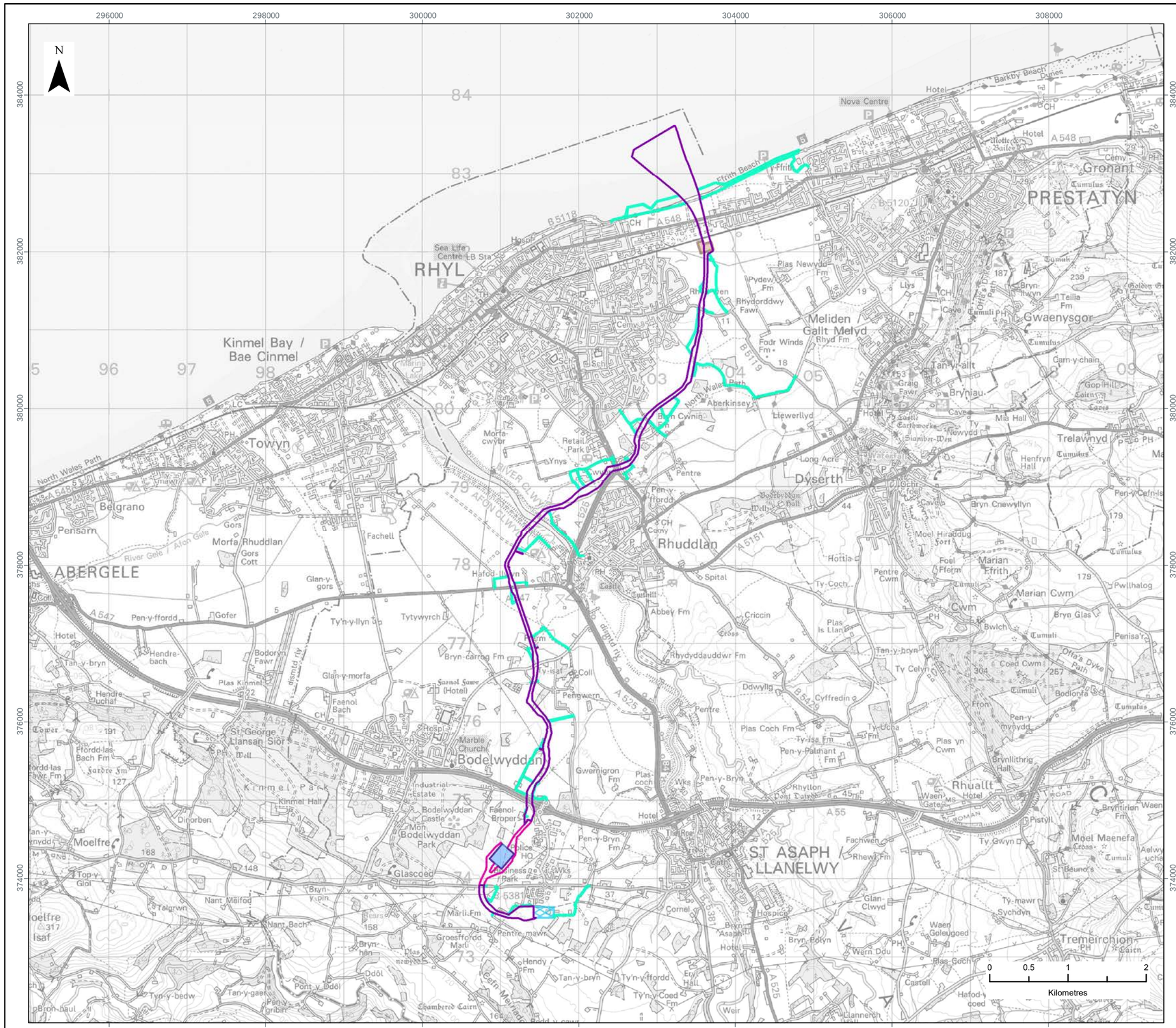
187 Onshore operations and maintenance activities can be categorised as preventative and corrective. Preventative maintenance is according to scheduled services whereas corrective maintenance covers unexpected repairs, component replacements, retrofit campaigns and breakdowns.

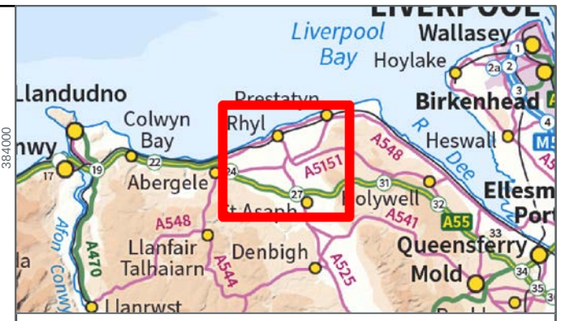
188 An O&M strategy will be developed further once the technical specification of AyM is finalised.

189 Onshore, the O&M requirements will be largely preventative, accompanied by infrequent on-site inspections of the onshore transmission infrastructure. However, the onshore infrastructure will be consistently monitored remotely, and there may be O&M staff visiting the OnSS to undertake works on a regular basis (expected to be once per week). The OnSS will not be manned, and lighting will only be required during O&M activities.

190 Link boxes will need to be serviced approximately once a year to ensure correct operation. Occasional access may also be required to the cable in the event of a fault and for repair purposes.

191 As the haul road will not be in place during the operational phase access will be required to each field using existing farms accesses. The location of operational accesses can be found in Figure 33.





LEGEND

- Proposed Onshore Export Cable Corridor
- Proposed Substation Cable Corridor Zone
- Proposed Transition Joint Bay Construction Compound
- Proposed Onshore Substation (OnSS) Footprint
- Proposed Operational Access Route
- Unlicenced Work Zone

Data Source:
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PROJECT TITLE:

AWEL Y MÔR OFFSHORE WINDFARM

FIGURE TITLE: POTENTIAL OPERATIONAL ACCESS ROUTES FOR ONSHORE EXPORT CABLE CORRIDOR

VER	DATE	REMARKS	Drawn	Checked
1	26/02/2022	ES Issue	JRS	MF

FIGURE NUMBER:

FIGURE 33

SCALE:	PLOT SIZE:	DATUM:	COORDINATE SYSTEM:
1:50,000	A3	ODN	British National Grid

Fferm Wynt Alltraeth
AWEL Y MÔR
Offshore Wind Farm

P:\05356 - GoBe Consultants Ltd\00009 Awel y Mor\Tech\GIS\Dwgs\Wking\202201 Environmental Statement\Chapter 3.1 - Project Description\05356.00009.0264.0 Potential Operational Access Routes.mxd

192 Small marker posts will be displayed immediately above each cable circuit at each field boundary to demark the location of the HVAC cables, in line with relevant guidance.

193 Unplanned maintenance associated with the onshore ECC may involve the repair of onshore cable faults. This is extremely rare (indicatively 1-2 events per lifetime). Typically, this involves excavating the two adjacent joint pits, pulling the cable back through the ducting and pulling a new cable through. Alternatively, the area of the fault may be excavated (with up to an additional 40 m in both directions) and two new joints installed within this area. Methods for excavation and reburial will be similar to the original installation as described in the cable installation section.

194 The MDS for onshore O&M activities is described in Table 19.

Table 19: Maximum design scenario for O&M activities.

PROJECT PARAMETER	MAXIMUM DESIGN SCENARIO
Indicative OnSS maintenance activity and traffic levels	Approximately 1 visit per week (typically including 2 full time personnel consisting of 4-8 traffic movements. This may increase to daily for a 2 week period per year during annual maintenance.
Indicative onshore ECC maintenance activity and traffic levels	Approximately 1 visit to each link box per year by 2 full time personnel.
Site operational lighting required	Directional lighting for safety and security. Task-specific lighting externally if required on a very infrequent basis.
Hazardous Materials/Substances quantities	Transformer oil. This will be filled during construction, and only topped up infrequently

1.9 Decommissioning

195 For the purposes of the MDS for EIA, at the end of the operational lifetime of AyM, it is assumed that all infrastructure will be completely removed.

196 Closer to the time of decommissioning, it may be decided that removal of infrastructure, such as the export cables, would lead to a greater environmental impact than leaving some components *in situ.* In this case it may be proposed that export cables, cable ducts and Landfall infrastructure are to remain *in situ* where appropriate and any requirements for decommissioning at the Landfall will be agreed with statutory consultees.

197 A decommissioning plan will be required to be submitted prior to decommissioning in accordance with a requirement in the DCO.

198 The activities and methodology for decommissioning are likely to include:

- Dismantling and removal of electrical equipment;
- Removal of ducting and cabling, and where required leaving *in situ*;
- Removal and demolition of buildings, fences, and services equipment; and
- Reinstatement and landscaping works.

199 A final decommissioning plan will require approval from the statutory consultees prior to the undertaking of decommissioning works.

1.10 References

Department for Energy and Climate Change (DECC) (2011a). Overarching National Policy Statement for Energy (EN-1).

Department for Energy and Climate Change (DECC) 2011b). Overarching National Policy Statement for Renewable Energy Infrastructure (EN-3).

The Planning Inspectorate (PINS) (2018). Advice Note Nine: Rochdale Envelope.

Fferm Wynt Alltraeth

AWEL Y MÔR

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