

APPLICATION FOR A MARINE LICENCE FOR MARINE WORKS

Marine Works include, but are not limited to, coast defences, beneficial uses of dredged materials, subsea cables, pontoons, jetties, land reclamation, grab samples and outfall pipes under the Marine and Coastal Access Act 2009

Please read the notes carefully before completing the form.

- The Marine Licensing Team (MLT) administers Part 4 of the Marine and Coastal Access Act 2009 on behalf of the Licensing Authority, the Welsh Ministers.
- The completed application form must be accompanied by a location plan and, where appropriate, descriptive drawing(s) and any supporting environmental assessments. One completed hard copy of the application and supporting documents will always be required. Additional copies are required for consultation purposes.
 - For application and supporting documents less than 10MB we can accept an additional copy via email.
 - For applications larger than 10MB **16** additional copies in CD/DVD format will be required
 - When applications and supporting documents are hard copy only **16** copies will be required.
- Please submit applications to the **Permit Receipt Centre** via the details at the top of this form
- Please submit marine licence applications, including this form and all supporting documents, **at least 4 months before the licence is required.**

Some projects may raise matters that require a significantly longer time for consideration. These are most likely to be:

- Projects that fall **within** The Marine Works (Environmental Impact Assessment) Regulations 2007 – as amended requiring an Environmental Statement
- Large scale projects with substantial volumes of material being deposited or excavated
- Works requiring an Appropriate Assessment to be conducted under The Conservation of Habitats and Species Regulations 2017.
- Information should be provided about the anticipated **duration of the entire project** in respect of works below/seaward of Mean High Water Spring (MHWS). Where appropriate, planned phasing of the work for which consent is sought must be detailed. For projects lasting more than one calendar year, planned phasing details must be given for each 12 month period.

A licence fee is payable in respect of an application. Details of fees can be found on our web pages.

Please note applications will not be processed without the correct relevant fee or invoicing details.

- Payments can be made via Cheque, BACS or credit/debit card.
 - Cheques should be crossed and made payable to **Natural Resources Wales.**
 - For BACS payments ensure you provide the reference number (not remittance number)

- For credit/debit card payments please complete the CC1 form and submit with the application. The CC1 form can be found on our web pages

Further information on payment methods can be found on our web pages

- **All activities need to comply with the Water Framework Directive (WFD). The framework and guidance can be found on the Natural Resources Wales website, <http://naturalresources.wales>. The results of your WFD assessment must be attached to your marine licence application.**
- Please answer all questions. If any information is not available at the time of application please indicate in the relevant section, giving reasoning in a covering letter. Outstanding details must be submitted as soon as possible. Any delay in forwarding details is likely to result in delays in determining your application.

Your application may not be considered complete and therefore not processed until key information has been submitted. Your application may be returned if you fail to submit outstanding information within given timescales.

- Please note any licence may have conditions that must be discharged before works can commence. This will take additional time.
- If you have any queries with regards to completing this application please contact the MLT: marinelicensing@naturalresourceswales.gov.uk

How your application will be processed by the MLT:

- Submit all application to the **Permit Receipt Centre** via the details at the top of this form.
- Checked and acknowledged by the MLT within 21 days of receipt of application and payment
- If the application is complete and no further information is needed at this time, your application will be placed in a work queue to be assigned a permitting officer
- If the application is not complete, further information will be request and need to be provided before the application can be considered as complete
- Our **4 months** service level for determining non-EIA applications will begin from the date the **completed** application is received (*Please note some projects may take significantly longer than 4 months to determine due to their nature*)
- EIA projects may take significantly longer due to their scale and complexity. Therefore we encourage early engagement with the MLT
- Your application and supporting documents will be sent to for an initial consultation period of 28 days (*42 days for EIA projects*)
- For the majority of projects, a public notice must be advertised. Public consultation will be 28 days (*49 days for EIA projects*).
For EIA projects a second public notice will be required. The MLT will advise on how this should be done.
- Responses to consultation will be considered and additional information requested at this time, if necessary.

- A decision on your Marine Licence Application will be made

All information submitted may be referred to within a licence, therefore all works must be in accordance with this information, unless otherwise agreed with NRW acting on behalf of the Licensing Authority during the determination process.

It is the responsibility of the applicant to obtain any other consents/authorisations that may be required.

Application Form Structure

1. Project Description and Cost
2. Applicant Details
3. Details of Agent, Contractor, Vehicles and/or Vessels used to carry out works
4. Environmental Impact Assessment (EIA)
5. Licensable Period
6. Project Description
7. Methods Statement
8. Materials of Project
9. Beach Replenishment, Land Reclamation or Salt Marsh Feeding
10. Temporary Works
11. Dredge and Disposal of Dredge Material
12. Protected Sites
13. Other Consents
14. Statutory Powers
15. Public Register
16. Application Fee
17. Declaration

Check List

Please ensure that you have included all the necessary information before you submit your application. **If any of the below are not completed in the application form, the application is likely to be considered incomplete and may be returned to you**

Item	Yes (✓)
The applicant is a legal entity?	✓
The declaration is signed by the applicant?	✓
Is the application fee correct?	✓
Are the grid references/coordinates correct?	✓
Do the coordinates match map locations?	✓
Have all the relevant supporting documents been submitted?	✓
Has a clear methodology been provided in the application form?	✓
Has Protected sites information been included?	✓
Has a Water Framework Directive (WFD) assessment been submitted?	✓
Are all the continuation sheets for application questions appended with correct corresponding numbers?	✓

Should you have any queries regarding your application please contact the MLT via marinelicensing@naturalresourceswales.gov.uk

1. Project Description and Cost

1 (a). Project Name

Greenlink Interconnector

1(b). Please provide a brief description of the proposed project, including location

Greenlink is a proposed subsea and underground electricity interconnector cable between the existing electricity grids in the Republic of Ireland and Great Britain with a nominal capacity of 500 megawatts. Greenlink will provide a new interconnector between EirGrid's Great Island substation in County Wexford (Ireland) and the National Grid's Pembroke substation in Pembrokeshire (Wales). The power will be able to flow in either direction at different times, depending on supply and demand in each country.

Greenlink will consist of two converter stations, one close to the existing substation at Great Island in County Wexford (Ireland) and one close to the existing substation at Pembroke in Pembrokeshire (Wales). The converter stations will be connected by two high voltage direct current (HVDC) cables under the Irish Sea. HVDC provides the most efficient and effective means to transport electricity over the distance involved.

This Marine Licence application covers the Welsh marine components of Greenlink from mean high-water springs (MHWS) at the Welsh landfall at Freshwater West, Pembrokeshire out to the UK/Ireland median line, a distance of 73.9km with an average width of 500m. This is defined as the Proposed Development and comprises:

- Two high voltage direct current (HVDC) electricity power cables;
- A smaller fibre-optic cable for control and communication purposes;
- All associated works required to install, test, commission and complete the aforementioned cables; and
- All associated works required to operate, maintain, repair and decommission the aforementioned cables, including five repair events over the 40 year lifetime of Greenlink.

1(c). Please provide an estimated gross cost of the project (Inc. materials and labour) for works that fall below/seaward of Mean High Water Springs (MHWS)

£20 to £50 million

2. Applicant Details

To whom the licence will be issued. *This must be a legal entity such as an individual, registered company/ charity or public body.*

Title

Mr

Full Name

Angus Norman

Company or Trading Name

Greenlink Interconnector Limited

Company Registration Number (if applicable)

536954

Name of Contact or individual (if different)	Tom Brinicombe
Position in Company	Planning and Permitting Manager (Wales)
Address inc. postcode (provide registered Company address if applicable)	Greenlink Interconnector Limited, Mason Hayes and Curran South Bank House, Barrow Street, Dublin 4, Ireland
Telephone Number	00447814169380
Email Address	tom.brinicombe@greenlink.ie

3. Details of Agent, Contractor, Vehicles and/or Vessels used to carry out works

3(a). Agent Details

This is who we will correspond with unless otherwise informed. If no agent we will contact the applicant.

Title	Mrs	Full Name	Anna Farley
Company or Trading Name	Metoc Ltd, trading as Intertek Energy & Water Consultancy Services		
Company Registration Number (if applicable)	01489779		
Name of Contact or individual (if different)			
Position in Company	Associate Director		
Address (Inc. postcode)	Exchange House, Station Road, Liphook, Hampshire, GU30 7DW, UK		
Telephone Number	00441428728537		

Email Address

Anna.farley@intertek.com

3(b). Does the Applicant wish to be included in all correspondence? Yes ☒ No ☐

3(c). Contractor Details

In order for contractors to benefit from the licence permission, details must be provided.

Any details not provided with application must be confirmed before operations commence.

Contractor Company or Trading Name	Address
TBC	

3(d). Will the works require the use of vessels? Yes ☒ No ☐

3(d) (i). Vessel Details (if applicable and available)

In order for contractors to benefit from the licence permission, details must be provided.

Any details not provided with application must be confirmed before operations commence.

Operator	Name of Vessel	Type of Vessel	Vessel Registration Number	Country of Registration
TBC	TBC	Cable laying vessel	TBC	TBC
TBC	TBC	Jack-up barge (JUB)	TBC	TBC
TBC	TBC	Cable lay barge (CLB)	TBC	TBC
TBC	TBC	Small work boats used to support the CLV, CLB	TBC	TBC
TBC	TBC	Guard vessel(s)	TBC	TBC
TBC	TBC	Rock placement vessel	TBC	TBC
TBC	TBC	Trailing suction hopper dredger	TBC	TBC
TBC	TBC	Survey Vessels incl: UXO, PGLR Vessel	TBC	TBC

3(e). Will the works require the use of vehicle?

Yes ☐

No ☒

3(e) (i). Vehicle Details (if applicable and available) to be used below MHWS

In order for contractors to benefit from the licence permission, details must be provided.

Any details not provided with application must be confirmed before operations commence.

Operator	Type/Description of Vehicle

3(f). If the contractor or vessels or vehicles are not known at the application stage, when do you expect to provide these details?

These details will need to be confirmed prior to the licence and operations commencement

The tender process to secure an Installation Contractor is ongoing. Information will be available after award of contract. Any vessel will be able to adhere to the conditions outlined in the application. Details of the Contractor and vessels to be used should be available in the first quarter of 2020.

4. Environmental Impact Assessment (EIA)

Certain projects, due to their scale, location and/or nature, may require an EIA under the Environmental Impact Assessment Directive (Directive 85/337/EEC – as amended). If a project qualifies under EIA, an Environmental Statement (ES) must be prepared and submitted with the application.

Projects that fall within Annex I of the Directive automatically require an EIA. Projects that fall within Annex II of the Directive are assessed on a case-by-case basis for the requirement for an EIA to be undertaken.

4(a). Do you consider the works to be under the Environmental Impact Assessment Directive (Directive 85/337/EEC – as amended)?

Yes ☐

No ☒

6. Project Description

6(a). Please give a description of the proposed project.

This should include the purpose of the project, estimated timescales of construction and operation, and broken down by the phases of works, if applicable.

Details should include, but not be limited to, dimensions of project, quantity of material being deposited and removed.

The Proposed Development comprises:

- Two high voltage direct current (HVDC) electricity power cables;
- A smaller fibre-optic cable for control and communication purposes;
- All associated works required to install, test and commission the aforementioned cables; and
- All associated works required to operate, maintain, repair and decommission the aforementioned cables, including five repair events over the 40 year lifetime of Greenlink.

The Proposed Development is 73.9km long and generally 500m wide, between Freshwater West and the UK/Ireland median line. A small part of this width will be required for installation (of the order of 10-20m) once the final cable route within this corridor is agreed. It is proposed to finalise the precise position of the submarine cables within the corridor after permits are granted but before installation has commenced. This will allow for optimisation of the final laid submarine cables to minimise engineering and environmental challenges. Cables will be bundled together as a pair with no separation between the cables.

The programme for the commencement of installation has not yet been agreed but for a scheme of this size to be constructed it is expected to take approximately 36 months from start to finish. The project is envisaged to commence on-site construction in late 2020 and be fully operational in 2023.

The project description includes the deposit of the cables; deposit of external cable protection (concrete mattresses or rock berm) over an area of 16.5km x 10m wide; dredging of sandwaves and the re-deposit of the material within the licence area; and the contingency for one unexploded ordnance detonation.

The Project Description also includes up to five discrete repairs of the cables, including as a worst case the deposition of external cable protection, should it be required.

An extended summary of the Project Description is provided on a continuation sheet. A detailed project description of the Proposed Development is provided in Chapter 4 of the Greenlink Marine ES.

Please continue on a separate sheet if necessary. Please tick if you have done this ☒

6(b). Please detail the location of the proposed construction project.

This should be either Ordnance Survey National Grid Reference (i.e. AB 12345 67890) or Latitude and Longitude in decimal degrees to 4 decimal places (i.e. Lat 52.1234 Long - 4.1234), defining the extent of the project. **Please specify which coordinate system has been used.**

The Proposed Development is 73.9km long and generally 500m wide, between Freshwater West and the UK/Ireland median line. The coordinates for the licence application area are defined on the continuation sheet. Coordinates are in WGS 84 UTM Zone 30N.

The Proposed Development is shown in Drawing P1975-CORR-001.

Please continue on a separate sheet if necessary. Please tick if you have done this ☒
6(c). The following must be provided with the completed application form:

- (i) a suitably scaled extract of an Ordnance Survey Map or Admiralty Chart with location of project, complete with **North Arrow** and **Scale**
- (ii) construction plans and sectional drawings showing those proposed works below/seaward of MHWS, which should give details of the materials to be used (for beach replenishment the quantity, particle size and source of material to be deposited and deposit location is also required).
- (iii) a descriptive schematic drawing and suitably scaled location plan which show the full extent of the project clearly in relation to the surrounding area and features.

Please list below **all supporting documents** that have been submitted with this application, including suitable documents/maps/drawing titles and reference numbers

Continuation Sheet – Table containing coordinates for Proposed Development
Drawing P1975-CORR-001 – Figure showing Proposed Development and coordinates
Drawing P1975-INST-005 – Figure showing indicative external cable protection locations
Drawing P1975-INST-007 – Figure showing indicative sandwave pre-sweeping locations

Greenlink Marine ES (Including Technical Appendices, noting the the Greenlink Marine HRA and Waterframework Directive Scoping Assessment are included as Technical Appendices)

NRW Greenlink Route advice Oct 2018 & Dec 2018

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

The applicant should note that these drawings/plans may be copied to others as part of the MLT's consultation procedures. If they are subject to copyright, it is the **responsibility of the applicant to obtain the necessary approvals to reproduce the documents and to submit up to 16 copies with the application.**

7. Methods Statement

7(a). Please provide a detailed method statement for the works

This must include methods for all works including temporary structures or deposits such as jetties, cofferdams, moorings or landing stages to be constructed seaward of MHWS

A detailed project description of the Proposed Development is provided in Chapter 4 of the Greenlink Marine ES.

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

7(b). Do you intend to undertake activities that could generate underwater noise?

This include piling, use of explosives, geophysical, acoustic deterrent devices and multibeam echosounders.

Yes ☒ No ☐

7(b) (i). If Yes, what type(s) of activities will be undertaken?

Base case activities that will definitely be undertaken:

- Geophysical survey
- Cable installation (including vessel movements, jetting and plough trenching, rock placement)
- Cable repair & maintenance (including geophysical survey, vessel movements, jetting and plough trenching, rock placement)

Contingency activities that may be required:

- UXO detonation
- Deployment of acoustic deterrent devices (as mitigation measure for UXO detonation)

7(b) (ii). If Yes, approximately how many days will the activity be undertaken for?

Base case activities

The exact duration of the base case activities is currently unknown. A geophysical survey of the centreline would likely be completed within a week, but would be dependant on weather.

Cable installation is likely to be completed within a three month period.

Cable repair and maintenance activities will be of a smaller scale when compared to installation but vessels could be present at a location for 2-6 weeks if a repair is required.

Contingency activities:

UXO detonation and ADD deployment would be completed within 1 day.

If Yes, you will be required to complete an additional form that will be provided.

7(c). Please state the measures to be taken to:

(i) Minimise risk to the marine environment

Greenlink has been developed through an iterative process that sought to avoid or reduce potential environmental effects. Steps taken to reduce environmental disturbance include:

- Sensitive environmental features were identified through a desk-based assessment that used publicly available datasets and survey data acquired from other developers in the region.
- Nearshore sections of the route in Wales were refined to follow identified sand channels through the bedrock reef habitat prior to survey.
- Three possible routes through the Pembrokeshire Marine Special Area of Conservation (SAC) were designed for further investigation (see Greenlink Marine ES Chapter 3). Natural Resources Wales (NRW) was consulted on the routes and survey strategy.
- A reconnaissance survey was undertaken on two route options (Route A & Route E) through the SAC to identify areas of bedrock reef. NRW reviewed preliminary survey results.
- In consultation with NRW, a new route option was engineered between Route A and Route E that sought to avoid a greater majority of the sensitive habitats in the area. This route is the final application area.

- Geophysical survey was widened in selected places to investigate the extent of sand wave features to see if they could be avoided.
- Geophysical survey was widened to investigate previously unknown sand channels and route engineered to make use of this feature

Chapter 17 of the Greenlink Marine ES provides a Schedule of Mitigation which will be implemented during the lifetime of the Proposed Development to minimise the risks to the environment. Mitigation measures fall into two categories: mitigation which forms part of the Proposed Development design which is referred to as embedded mitigation; and mitigation which is part of the construction and operation of the Proposed Development, which is referred to as Project Specific Mitigation and has been identified through the EIA process. Tables in Chapter 17 list all Embedded Mitigation and Project Specific Mitigation.

(ii) Prevent undue interference to others

Please refer to the Schedule of Mitigation provided as Chapter 17 of the Greenlink Marine ES.

(iii) Maintain navigational safety, including marking and lighting of works

Please refer to the Schedule of Mitigation provided as Chapter 17 of the Greenlink Marine ES.

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

8. Materials of Project

8(a). Description of materials to be deposited seaward of MHWS (Please tick all that apply)

Timber	☐	Iron/Steel	☐	Concrete	☒	Biocides/other chemicals	☐
Silt	☐	Stone/Rock	☒	Gravel	☐	Plastic/Synthetics	☐
Sand	☒	Other	☒				

If other, please provide a description of materials.

Other - Two high voltage direct current electricity cables and one fibre optic cable.

Concrete mattresses / rock berm for the external protection of cables. Please see continuation sheet – Section 3 for a description of concrete mattress and rock berm.

Contingency for deposition of sand if dredging is used to for pre-sweeping sandwaves (see response to question 8(c))

8(b). Delivery method of materials to site

If sea delivery, please include details of vessels to be used with a chart of proposed route and transshipment area. If vehicle delivery, please provide the proposed access route.

Project vessels to be used are detailed in Chapter 4 of the Greenlink Marine ES. Exact details of proposed routes to access the Proposed Development will be confirmed by the selected Installation Contractor, but existing shipping routes will be used where possible.

Please continue on a separate sheet if necessary. Please tick if you have done this ☒

8(c). Will the works involve removals seaward of MHWS?

Yes ☒ No ☐

8(c) (i). Description of materials to be removed seaward of MHWS (Please tick all that apply)

Timber	☐	Iron/Steel	☐	Concrete	☐	Biocides/other chemicals	☐
Silt	☐	Stone/Rock	☐	Gravel	☒	Plastic/Synthetics	☐
Sand	☒	Other	☐				

8(c) (ii). Description of objects/materials to be removed seaward of MHWS

Including quantities to be removed.

Initial analysis of the Greenlink cable route survey data indicates that approximately 5.6km of the route may require pre-sweeping. Two techniques can be used for pre-sweeping; dredging and mass flow excavation. As it is not currently known which technique will be used, the marine licence application is applying for consent to use both techniques and the subsequent deposition of dredged material within the Proposed Development area.

The spoil would be deposited back on the seabed in the immediate vicinity of the pre-sweeping activity, thus keeping the dredged soil in the mobile seabed system and within the Proposed Development. The dredged soil will be dispersed equally by sailing slowly whilst opening the bottom doors at a slow pace.

It is possible that two sandwaves at approximately KP26 will require pre-sweeping. Shown in Drawing P1975-INST-007 the eastern sand wave is 7m high and the western sand wave is 3m high. The wave length (distance from crest to crest) is 230m.

An additional area between KP64 and KP69 has also identified that may require pre-sweeping. The table below presents indicative dimensions for the area of pre-sweeping.

KP start	KP end	Length (m)	Maximum width (m)	Seabed footprint (m ²)	Maximum volume of sediment removed and re-deposited (m ³)	Sediment
KP25.8	KP26.4	600	20	12,000	96,000*	Gravelly Sand to Sandy Gravel (58% gravel, 39% sand, 3% fines)
KP64	KP69	5000	20	100,000	400,000**	Slightly silty slightly gravelly SAND (10% gravel, 86% sand, 4% fines)

* Assumes that 8m of sand (7m trough to crest + 1m for cable burial) will need to be removed across the whole profile. In reality it is likely to be less as the two sand waves are not 7m high across the entire length of the transect.

**Assumes that 4m of sand (3m trough to crest + 1m for cable burial) will need to be removed across the whole profile.

In reality the removed sand volumes are likely to be less as the sand waves are not the quoted height across the entire length of the transect.

9. Beach Replenishment, Land Reclamation or Salt Marsh Feeding

For works involving any of the above, please provide the following information

9(a). Is the material to be deposited like for like to existing material? Yes ☐ No ☐

9(a)(i) If No for Beach Replenishment please provide justification why?

N/A

9(b). Description of material to be deposited

Please provide the grading specification of materials to be used, if using a range of grain sizes please state the percentage by weight passing. *If unsure, please refer to the Wentworth Scale*

N/A

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

9(c). Source of the material to be deposited

Including dredged or land based stating the origin of material

N/A

9(d). Has the material been chemically analysed?

Yes ☐ No ☐

If material has been analysed, we may request this information to determine the application

9(d) (i) If Yes, is the analysis data been included with the application? Yes ☐ No ☐

10. Temporary Works

10(a). Will there be any temporary deposits below MHWS?

Yes ☐ No ☒

This includes construction materials, removed objects/material, jetties or cofferdams

If **Yes**, please continue with section **10**

10(b). Please provide the location of temporary deposits

Please include a map/chart displaying the location of temporary deposits, if necessary.

10(c). Description of temporary deposits

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

11. Dredge and Disposal of Dredge Material

If you are undertaking Dredge and Disposal activities please also complete the Dredge and Disposal application form and submit together.

11(a). Do you intend to apply for a marine licence to dispose of dredged material to sea as part of the works in this application? Yes ☐ No ☒

12. Protected Sites

Licensing Authorities have a duty to ensure that projects will **not have significant adverse environmental impact**, particularly on any designated **European Site of Conservation Importance - Special Areas of Conservation (SAC) and Special Protection Areas (SPA)**, listed under the Habitats Directive (Council Directive 92/42/EEC on the conservation of natural habitats and of wild fauna and flora). In addition, it is Government Policy that Wetlands of International Importance (Ramsar sites) are also considered as European Sites. There is a duty to take reasonable steps to further the conservation and enhancement of nationally designated sites (Sites of Special Scientific Interest (SSSIs).

12(a). Have you had pre-application correspondence with NRW, its legacy bodies or Natural England? Yes ☒ No ☐

12(a)(i). If Yes, please provide copies of correspondence with application and state which team(s) you have contacted?

Meetings held with Jon Hudson, Lily Pauls and James Moon at NRW in relation to potential effects of cable installation in Pembrokeshire Marine SAC on:

11 February 2016

03 May 2017

25 January 2018.

29 March 2019

Pre-application advice received from Lily Pauls and James Moon in relation to survey routing:

12 October 2018 (attached)

07 December 2018 (attached)

Pre-application meetings held with NRW Marine Licensing Team

26 June 2018

29 March 2019

Additional email and telephone correspondence between January 2016 and June 2019 with Jon Hudson, Lily Pauls, James Moon and Debbie Nicholas.

12(b). Are any part of the works located *within* or *likely to affect* a designated conservation site? (SAC, SPA, SSSI or Ramsar)

Yes ☒ No ☐

12(b)(i). If Yes, which designated site(s) may be affected?

The Proposed Development crosses the Pembrokeshire Marine / Sir Benfro Forol SAC (site code: UK0013116), the West Wales Marine / Gorllewin Cymru Forol SAC (site code: UK0030397), Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA (site code: UK9014051) and the landfall is within the Castlemartin Coast SPA (site code: UK9014061) and the Limestone Coast of South West Wales / Arfordir Calchfaen de Orllewin Cymru SAC (site code: UK0014787). The landfall is also within the Broomhill Burrows SSSI (site code: 1136).

12(c). Please provide a description of all mitigation measures proposed to avoid any impact on designated conservation sites.

Please refer to the Schedule of Mitigation provided as Chapter 17 of the Greenlink Marine ES.

Please also see attached Greenlink Marine Habitat Regulation Assessment (HRA) which forms Technical Appendix C of the GreenlinkMarine ES

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

12(d). If the works are not located *within* or *likely to affect* a designated conservation site, please indicated the approximate distance to the nearest designated conservation site.

N/A. The Proposed Development crosses the sites listed above. It is also near to other designated sites which are listed in the attached Greenlink Marine Habitat Regulation Assessment (HRA).

Please note that if the proposed works are in or within 2km of a European Site of Conservation Importance you will have to provide suitable mitigation measure to avoid any impact on designated conservation sites.

13. Other Consents

Please detail all consents that you have applied for or received for these works

Type of Consent	Applied for	To be applied for	Reference Number	Date of Issue and Expiry
Planning Permission under Town and County Planning Act 1990 – From Local Planning Authority (LPA)		✓		
Name and Address of LPA for location of works	Pembrokeshire County Council Pembrokeshire Coast National Park Authority			
Land Owners Consent such as The Crown Estate Consent		✓		
Port Authority or Local Harbour permissions		✓		
Other NRW consents such as Flood Defence or SSSI assent				
Details of NRW consent				
Other consents such as Transport and Works Act Order, Section 36 Electricity Act, grant/loan sanction		✓		
Details of other consents	Potential for Highways Closures and Works			

14. Statutory Powers

14(a). Does the applicant have statutory powers to consent any aspect of the project?
E.g. coast protection authority, dredging powers, statutory undertakers Yes ☒ No ☐

14(a)(i).If Yes, please give details and state the relevant legislation that gives these powers

Onshore Greenlink Interconnector Limited has Permitted Development Rights under the Electricity Act (add year), however, it is applying for permission for all components of the project.

15.Public Register

Under The Marine Licensing (Register of Licensing Information)(Wales) Regulations 2011 and the Environmental Impact Assessment Directive (Directive 85/337/EEC – as amended) , all information contained within or provided in support of this application will be placed on the Public Register unless NRW approve of the applicant’s reasons for withholding all or part.

15. Is there any information contained within or provided in support of this application that you consider should NOT be included on the Public Register on the grounds that its disclosure:

15(a). Would be contrary to the interest of National Security? Yes ☐ No ☒

15(b). Would prejudice to an unreasonable degree you, or some other person’s commercial interest of those of a third party? Yes ☐ No ☒

If **Yes** to either (a) or (b), please provide full justification as to why all or part of the information you have provided should be withheld

Please continue on a separate sheet if necessary. Please tick if you have done this ☐

16. Application Fee

16(a). What are the corresponding fee band for this application? Band 2 ☐ Band 3 ☒

16(b) Band 2 Only

Projects are charged at a fixed fee of £1920. The application will not be processed until the correct fee has been provided.

Please provide the method of payment

Method	Yes (✓)	Reference Number
Cheque		
BACS (not remittance no.)		
World Pay (phone or CC1)		

Please attach **CC1 Form** with application. Can be found on our web pages

16(c) Band 3 Application only

Band 3 applications are charged at on hourly rate of £120 and are invoiced in arrears. Please complete the details below which will be required for invoicing.

Customer Name	Metoc Limited
FAO	Anna Farley
Purchase order number	P1975/PO11012
Address for invoice	Intertek, Exchange House, Station Road, Liphook, Hampshire, GU30 7DW, UK
Telephone Number	0044 1428 728537
Email Address	Anna.farley@intertek.com

17. Declaration

I declare that to the best of my knowledge and belief that the information given in this application form and supporting documentation is true.

WARNING: It is an offence under the Marine and Coastal Access Act 2009, under which this application is made, to fail to disclose information or to provide false or misleading information and can invalidate any licence granted.

Signature

Angus Norman

Date

17/06/19

Name (in capitals)

Angus Norman

Position in Company

Interim Program Director

*Applications cannot be processed unless signed by the **Applicant** (not agent), the applicant must have appropriate level of authority within the company.*

Applications will not be processed unless signed

1. Description of the Proposed Development

1.1 Submarine cable route description

The submarine cable corridor derived from preliminary cable route engineering, consultation with stakeholders and survey is shown in Drawing P1975-CORR-001. The Proposed Development is 73.9km long between Freshwater West and the UK/Ireland median line.

The Proposed Development is generally 500m wide. The final cable configuration will only need a small part of this width for installation (of the order of 10-20m). It is proposed to finalise the precise position of the submarine cables within the corridor after permits are granted but before installation has commenced. This will allow for optimisation of the final laid submarine cables to minimise engineering and environmental challenges.

It is likely that cables will be bundled together as a pair with no separation between the cables.

1.2 Indicative programme

The programme for the commencement of installation has not yet been agreed but for a scheme of this size to be constructed it is expected to take approximately 36 months from start to finish. The project is envisaged to commence on-site construction in late 2020 and be fully operational in 2023. Table 1-1 presents an indicative programme of the marine works for Greenlink.

Table 1-1 Indicative programme for marine works

Activity	Duration (months)	2021				2022			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Landfall preparations - Ireland*	3								
Landfall preparations - Wales*	5								
Pre-lay survey	1								
Route preparation	1								
Cable lay & burial	3								
External cable protection installation	1								

* Sequencing of landfall preparation works may change

1.3 Pre-installation works

Ahead of cable installation a number of activities are likely to be undertaken either along the whole route or at discrete locations to prepare the seabed for the cable laying machinery. These will include:

- **Geophysical survey:** to confirm that no new obstructions have appeared on the seabed since the detailed engineering surveys completed in autumn 2018 - spring 2019.
- **Pre-lay grapnel run:** a wire with a string of specially designed hooks will be towed along the entire route to remove any debris.

- **Pre-sweeping:** a dredger or a mass flow excavator will be used in areas of large mobile sandwave to remove / flatten a portion of the sandwave. This is to allow the cables to be buried relative to a non-mobile reference level; to reduce the likelihood of the cables becoming exposed in future.
- **Boulder clearance:** large boulders will be cleared from the cable centreline using a plough that pushes them to either side of the route.
- **Prepare telecommunications cable crossing:** Greenlink will cross an in-service telecommunications cable using a bridge comprised of aggregate (rock) or concrete mattresses. This first layer of protective material that will be positioned during route preparation. The remainder of the crossing will be constructed after the cables are laid.
- **Unexploded ordnance (UXO) clearance:** The primary objective will be to avoid encountered potential UXO by micro-routeing within the permitted corridor. If re-routeing around a particular potential UXO appears not to be possible, and visual inspection confirms a UXO, then if it is safe to do so the UXO will be removed. As a last resort demolition measures will be undertaken in accordance with Best Practice. The marine licence application assumes one UXO detonation will be required, although initial survey data suggests this is unlikely.

1.4 *Cable installation*

The cable lay operation will be performed on a 24-hour basis. It will be undertaken by a cable lay vessel (CLV); a specialist ship designed specifically to carry and handle long lengths of heavy power cables. Other vessels, such as a jack-up barge or cable lay barge and small work boats may be used to support the CLV, particularly in the nearshore area where water depths are shallow.

Two cable installation techniques are being considered for the Proposed Development:

- **Simultaneous lay and burial** - in this operation the CLV may tow the burial equipment or it is deployed by another vessel navigating close behind, creating effectively a single large spread. The cables are fed into the burial equipment directly from above and the cables are buried as the spread progresses along the route.
- **Post-lay burial** - in this operation the CLV lays the cables on the seabed first. A post-lay burial vessel follows to bury the cables. The post-lay burial vessel may be some physical distance, or indeed some days, behind the lay vessel, so there are two discrete operations separated physically and in time.

Guard vessels may be deployed in areas where the cables are exposed on the seabed prior to burial or external protection being applied.

Due to the length of the route, it may be necessary to install the cables in two sections. A cable joint will be made on board the cable lay vessel, at which point the vessel is likely to remain in position for up to a week.

1.5 Cable burial and protection

The nature of the seabed varies along the cable route ranging from fine sediments to stony reefs, consisting of pebbles and boulders and bedrock outcrops. Bedrock outcrops are predominantly found relatively close to the Pembrokeshire coastline. The choice of burial technique or protection method will depend upon the seabed conditions in each section. The preference is burial in the seabed as this provides the best protection. Where the seabed composition is not suitable for burial, external mechanical protection will be provided through rock placement or concrete mattresses.

There are three generic types of equipment for installing cables into the seabed:

- Jetting machines - use water jets to fluidise the seabed and allow the cable to sink into the seabed.
- Cable ploughs - like ploughs used in farming, a narrow blade (the plough 'share') is pulled through the seabed to create a furrow.
- Cutting - a trench is cut using a wheel or a driven chain cutter to break and move rock and hard sediments.

A typical trench is up to 1m wide. The overall footprint of the installation machinery is approximately 15m. Whilst jetting is considered to have the least effect on the environment because the footprint of the tool is smaller than other installation tools such as ploughs, the use of jetting tools does result in higher suspended sediment concentrations. However, in a review of seabed disturbance from various activities it was observed that disturbance resulting from jetting was largely restricted to fines (e.g. clay and silt particles) and remained low in comparison with dredging and some fishing techniques (BERR 2008).

The recommended target burial depths along the cable length were determined in a detailed Cable Burial study completed in 2019 using the Carbon Trust cable burial risk assessment (CBRA) methodology. This concluded the target burial depth is 1.0m for all areas of loose sediment (sands / gravels) and 0.6m for areas of glacial till.

A preliminary assessment of cable installation methods is presented in Table 1-2.

Table 1-2 Potential installation method

Cable Protection Option	Length (km)
Burial in sediment (jetting or ploughing)	57.44
External cable protection only	0.120
Potential burial in rock or external cable protection	16.34
Total	73.9

1.6 Landfall installation

The landfall is where the marine cables come ashore. In Wales it is Freshwater West, Pembrokeshire.

The shore-crossing will be accomplished by horizontal directional drilling (HDD) which will exit seaward of the low water mark. The cable ducts will pass approximately 10m below

the beach. There will be no works on the beach at Freshwater West between MHWS and mean low water.

HDD is a surface-launched process for boring a hole, under any sensitive features, to a point a suitable distance in the nearshore. A pipe is inserted into the drilled hole which is used as a duct into which the cables are installed.

The land cables will connect with the marine cables in transition joint pits. These will be dug above MHWS within the area defined as the temporary HDD compound in Figure 3-1. Three cable ducts (two for use and one as a spare) will be drilled from the HDD compound to an exit location in the nearshore. The fibre optic cable will be installed in a duct with one of the power cables.

The ducts will fan out of the transition joint pits to achieve exit points approximately 10m distance from each other in the nearshore. From the exit point the cables will then merge back together, usually within 100m to form the bundle. The cables and duct exits will be buried into the sediment.

Preliminary design of the HDD has been undertaken, but the final design will be completed by the Installation Contractor. Based on the geological conditions at Freshwater West, the HDD is likely to exit within the orange hatched box presented in Figure 3-2.

The ducts will be drilled in advance of the arrival of the CLV, so that that vessel is not delayed in its operations.

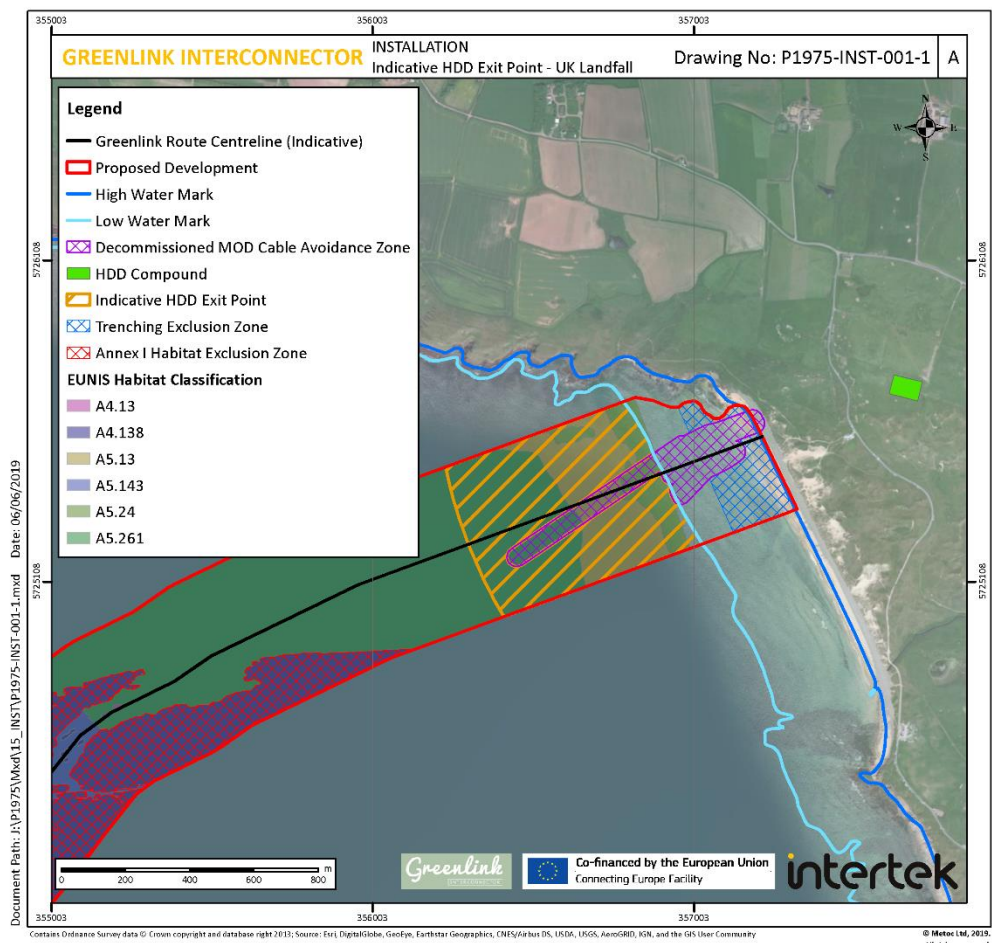
The installation sequence for each of the submarine cables and the fibre optic cable is likely to be similar, and will be defined by the Installation Contractor. An indicative methodology is provided below.

- The end of the duct accepting the cable will be dug out using an excavator positioned on a jack-up barge or anchored barge. Material excavated will be left adjacent to the pit and refilled after the cable pull-in.
- The submarine cable will be floated to the duct exit. Small work boats and divers would support this activity.
- The submarine cable would be connected to a pre-installed messenger wire in the duct and winched from a position close to the transition joint pit through the duct.
- The cable is then buried away from the exit point using a plough or trencher.

Figure 1-1 Indicative location of HDD compound - Freshwater West



Figure 1-2 Indicative HDD exit point (Drawing P1975-INST-001-1)



1.7 Cable operation

1.7.1 Emissions

During operation of the cables emissions to the environment will consist of magnetic (B) and induced electric (iE) fields and heat. The influence of Greenlink on the background geomagnetic field along the cable route has been calculated to be low with B and iE fields dissipating to natural background levels within 2m of the cables.

Temperature increases in the upper sediments of the seabed over buried cables are not expected to emanate further than 1m from the cable and exceed 2°C.

1.7.2 Maintenance and repair

It is likely that routine inspection surveys using standard geophysical survey equipment and/or remotely operated vehicles to monitor buried depth and integrity of rock berms will be undertaken, particularly in the initial years of operation, and should the local environmental conditions change or be suspected as having changed.

Once installed, marine cables are not expected to require routine maintenance. If a cable fault is detected, usually as a consequence of damage cause by external interaction e.g. trawlers and commercial ship anchors, the relevant section of the cable will be located and retrieved to surface for inspection and replacement. It may be necessary to unbury the cable prior to cable recovery. A repair will typically be carried out by a single vessel.

The extra length of a repaired short cable section means it cannot be returned to its exact previous alignment on the seabed. The excess cable will be laid on the seabed in a loop off to one side of the original route. The additional joints and the extra cable length will be buried, typically using jetting machines deployed from either the repair vessel itself or a separate specialised vessel.

1.8 Decommissioning

GIL recognise the importance of considering the decommissioning process at an early stage and should decommissioning be undertaken the operation will be conducted according to the standard industry protocol at the agreed time.

At the end of the cable's life the options for decommissioning will be evaluated.

The objectives during the decommissioning process will be to minimise both the short and long term effects on the environment whilst making the sea safe for others to navigate. Based on current regulations and available technology, the following level of decommissioning is proposed and has been assessed:

- Cables - to be either removed or to be left safely in-situ, buried to below the natural seabed level
- Mattresses - to be left in-situ
- Rock protection - to be left in-situ

1.9 *Embedded Mitigation*

Greenlink has been developed through an iterative process that sought to avoid or reduce potential environmental effects. Steps taken to reduce environmental disturbance include:

- Sensitive environmental features were identified through a desk-based assessment that used publicly available datasets and survey data acquired from other developers in the region.
- Nearshore sections of the route in Wales were refined to follow identified sand channels through the bedrock reef habitat.
- Geophysical survey was widened to investigate previously unknown sand channels and route engineered to make use of this feature.
- A reconnaissance survey was undertaken on two route options (Route A & Route E) through the SAC to identify areas of reef habitat. In consultation with NRW, a new route option was engineered between Route A and Route E that sought to minimise the crossing of the sensitive habitats in the area. This route is the Proposed Development.

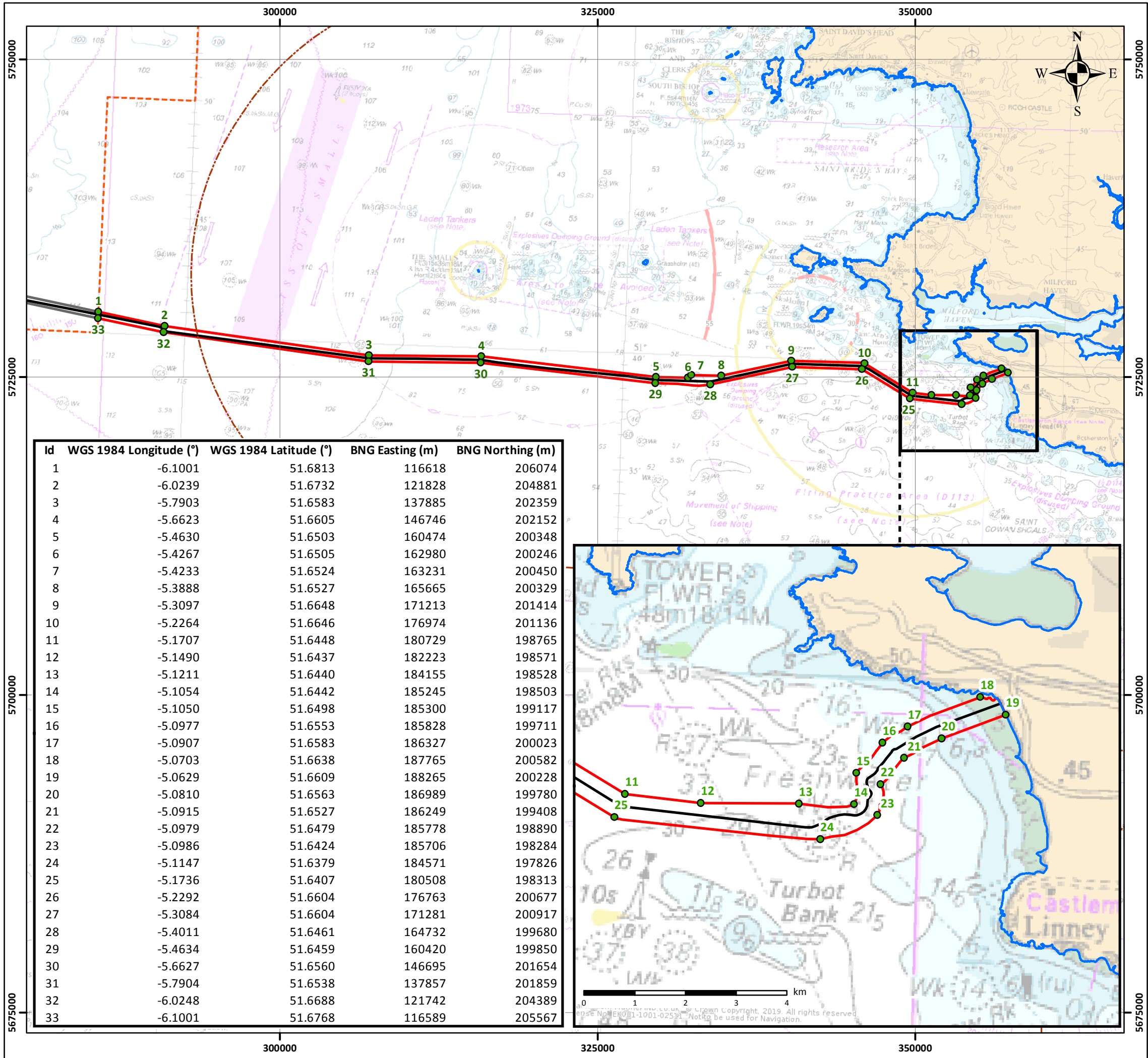
In addition, to the route engineering that has taken place, the project will comply with international and national statute which is designed to avoid or abate negative environmental effects.

Embedded mitigation which forms part of the design of Greenlink and is considered the 'base case' as primary mitigation is outlined in Chapter 4 of the Greenlink Marine ES.

2. Proposed Development Coordinates

Datum: WGS 84 UTM Zone 30N

ID	LON_DD	LAT_DD	East_BNG	North_BNG
1	-6.1001	51.6813	116618	206074
2	-6.0239	51.6732	121828	204881
3	-5.7903	51.6583	137885	202359
4	-5.6623	51.6605	146746	202152
5	-5.4630	51.6503	160474	200348
6	-5.4267	51.6505	162980	200246
7	-5.4233	51.6524	163231	200450
8	-5.3888	51.6527	165665	200329
9	-5.3097	51.6648	171213	201414
10	-5.2264	51.6646	176974	201136
11	-5.1707	51.6448	180729	198765
12	-5.1490	51.6437	182223	198571
13	-5.1211	51.6440	184155	198528
14	-5.1054	51.6442	185245	198503
15	-5.1050	51.6498	185300	199117
16	-5.0977	51.6553	185828	199711
17	-5.0907	51.6583	186327	200023
18	-5.0703	51.6639	187765	200582
19	-5.0629	51.6609	188265	200228
20	-5.0810	51.6564	186989	199780
21	-5.0915	51.6527	186249	199408
22	-5.0979	51.6479	185778	198890
23	-5.0986	51.6424	185706	198284
24	-5.1147	51.6379	184571	197826
25	-5.1736	51.6407	180508	198313
26	-5.2292	51.6604	176763	200677
27	-5.3084	51.6604	171281	200917
28	-5.4011	51.6462	164732	199680
29	-5.4634	51.6459	160420	199850
30	-5.6627	51.6560	146695	201654
31	-5.7904	51.6538	137857	201859
32	-6.0248	51.6688	121742	204389
33	-6.1001	51.6768	116589	205567



GREENLINK INTERCONNECTOR

PROPOSED DEVELOPMENT

UK Waters

Drawing No: P1975-CORR-001

A

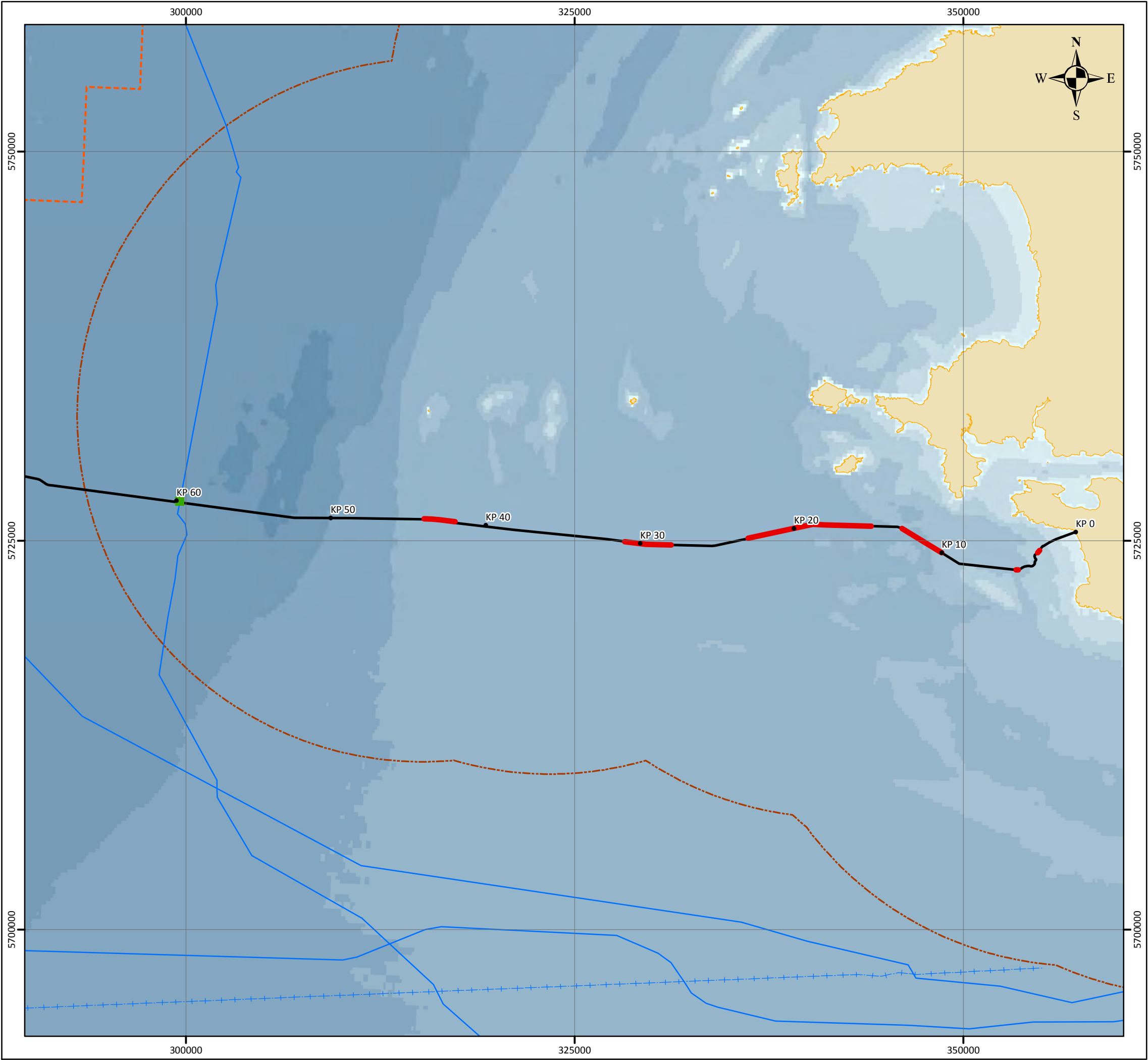
Legend

- Proposed Development Points
- Greenlink Route Centreline (Indicative)
- Proposed Development
- Irish Offshore
- UK Mean High Water
- 12nm Limit
- Median Line

Date	Wednesday, June 5, 2019 12:44:02
Projection	WGS_1984_UTM_Zone_30N
Spheroid	WGS_1984
Datum	D_WGS_1984
Data Source	CDA; GEBCO; UKHO; ;OSOD; MarineFind
File Reference	J:\P1975\Mxd\03_CORR\ P1975-CORR-001.mxd
Created By	Chris Goode
Reviewed By	Emma Langley
Approved By	Anna Farley

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GREENLINK INTERCONNECTOR
INSTALLATION
Indicative Rock Protection Requirements
UK Waters

Drawing No: P1975-INST-005	A
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Legend

- KP
- Telecom Cable
- - - Telecom Cable (Disused)
- - - 12nm Territorial Sea Limit
- - - Median Line

Assumed Installation Requirement

- Known Cable Crossing
- Potential External Protection Over Hard Ground
- Assumed Successful Depth of Burial

Bathymetry

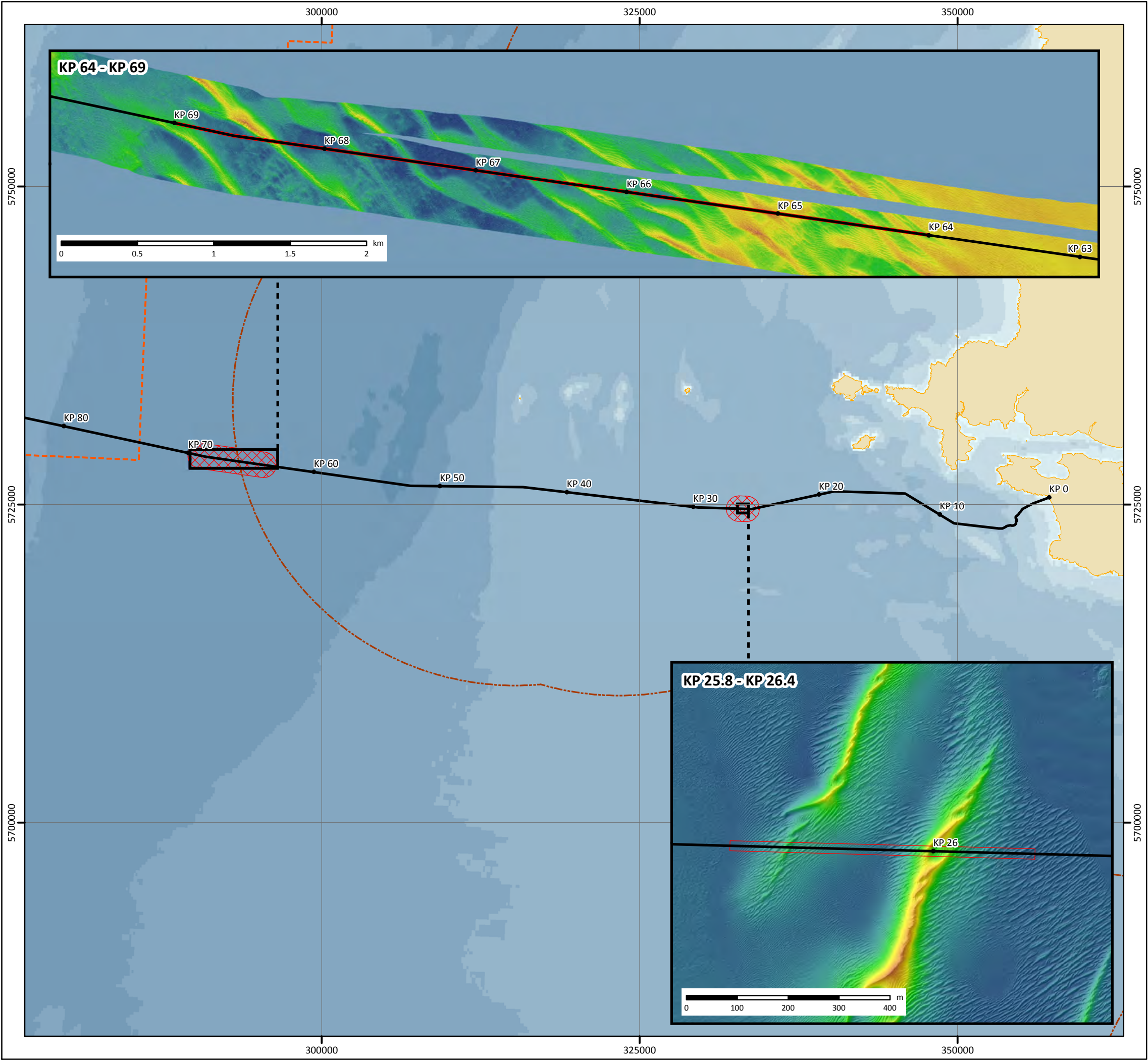
Depth below LAT (m)

—	-10 - 0
—	-20 - -10
—	-30 - -20
—	-50 - -30
—	-80 - -50
—	-100 - -80
—	-120 - -100
—	-145 - -120

NOTE: Not to be used for Navigation

Date	Monday, April 29, 2019 14:06:44
Projection	WGS_1984_UTM_Zone_30N
Spheroid	WGS_1984
Datum	D_WGS_1984
Data Source	KISORCA; UKHO; CDA; OSOD; EMODNET; ESRI
File Reference	J:\P1975\Mxd\15_INST\ P1975-INST-005.mxd
Created By	Chris Carroll
Reviewed By	Chris Goode
Approved By	Anna Farley

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GREENLINK INTERCONNECTOR
INSTALLATION
Indicative Sand Pre-Sweeping Locations
UK Waters

Drawing No: P1975-INST-007

A

Legend

- KP
- Greenlink Route Centreline (Indicative)
- - - 12nm Territorial Sea Limit
- - - Median Line
- ▤ Indicative Sand Pre-Sweeping General Location
- ▭ Indicative Sand-Pre-Sweeping 20m Corridor

Bathymetry

Depth below LAT (m)

- 10 - 0
- 20 - -10
- 30 - -20
- 50 - -30
- 80 - -50
- 100 - -80
- 120 - -100
- 145 - -120

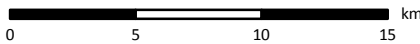
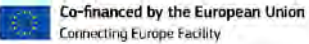
NOTE:

False colour representation
to the Surveyed bathymetry
have been used to show the
sandwaves at the two pre-
sweeping locations.



NOTE: Not to be used for Navigation

Date	Tuesday, April 16, 2019 09:17:34
Projection	WGS_1984_UTM_Zone_30N
Spheroid	WGS_1984
Datum	D_WGS_1984
Data Source	UKHO; CDA; OSOD; MMT; EMODNET;
File Reference	J:\P1975\Mxd\15_INST\ P1975-INST-007.mxd
Created By	Chris Goode
Reviewed By	Chris Carroll
Approved By	Anna Farley



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3. Materials of Proposed Development

3.1 *Rock placement*

Rock placement is used to protect subsea cables by covering them in a continuous profiled berm of graded rock. The berm provides a strong protective cover to prevent potential impact and snagging, and also ensures stability by shielding the cable from the current flow. The size of the berm and grade of rock required will depend on the current and wave loading conditions. The rock grading needed for a dynamically stable rock berm decreases with increasing water depths. In shallower waters the wave induced water action at the seabed is larger than in deeper waters. Therefore, at shallower water depths a larger rock grading is needed.

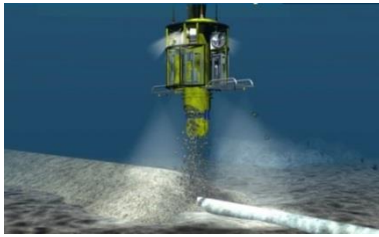
Typically, rock placements are designed to be dynamically stable. This implies that under design wave and current conditions some displacement of rock is allowed for, provided the protection by the rock is not compromised. As a result of some displacement of rock under these conditions the slopes of the rock berms will decrease in steepness, which in its turn results in an increasing stability of the rock berm. By allowing a dynamically stable rock berm design, the effect on the environment by the rock placement and its footprint can be reduced to some extent.

Where required, rock berms will be designed to ensure long-term stability however, it is likely that some level of maintenance (periodic inspections and replacement of disturbed rock) will be required particularly in shallower water sections where the impact of waves under storm conditions is greater compared to deeper water sections.

Although the size of the berm will depend on the location and conditions, as a worst-case it has been assumed the maximum height will be 1.5m, with a crest width of 1.0m. The side slopes of such a rock berm would be 1 vertical in 2.5 horizontal, which is the natural angle of repose of placed rock. Where additional stability is required due to higher wave loads under design conditions, the side slopes can be reduced to 1 in 5 or even 1 in 8 under a dynamically stable design; although then the maximum height would also be reduced. To further increase the stability of the rock berm, a heavier rock type can be used. The assessment assumes rock berms for external cable protection will have a maximum width of 10m.

The particle size of the rock used will be driven by an assessment of the local seabed geology, metocean conditions, water depth and the nature of the external threat which is being protected against. Engineering design has not yet been completed for the berms but rock sizes are likely to be in the range of 2cm to 22cm. A filter layer is sometimes required either to provide a stable base in soft sediment for the armour layer to be installed on and/or provide protection to the cable bundle from the impact of the installation of the armour layer. If used, the filter layer would be laid first comprising of smaller particle sizes, followed by larger layer designed to prevent segregation of sediments during placement. The final layer (i.e. the armour layer) covers the other two layers and is designed to provide protection against identified external threats (e.g. anchors and fishing gear) whilst also withstanding severe metocean events.

Figure 3-1 Rock placement



The cable burial risk assessment, informed by the geophysical and geotechnical survey data, has identified indicative locations where external cable protection may be required. Table 3-1 provides indicative locations where rock placement could be required due to ground conditions.

Table 3-1 Indicative rock protection locations (due to ground conditions)

KP start	KP end	Distance (km)	Comment	Biotope	Presence of Annex I habitat
2.38	2.41	0.03	Outcrop within sandy channel. Likely to be too tight to route around.	Outcrop is A4.138 - <i>Molgula manhattensis</i> with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock. Surrounding area is A5.143 - <i>Protodorvillea kefersteini</i> and other polychaetes in impoverished circalittoral mixed gravelly sand.	Bedrock reef
2.7	2.9	0.2	0.3-0.5m cover of sand. May be able to cut down into rock below sand. Protection likely to be 2-3m wide.	A5.143 - <i>Protodorvillea kefersteini</i> and other polychaetes in impoverished circalittoral mixed gravelly sand. A5.25 - Circalittoral fine sand	
4.86	5	0.14	Small sand channel identified through bedrock reef confirmed by analysis of video transect data.	A4.138 - <i>Molgula manhattensis</i> with a hydroid and bryozoan turf on tide-swept moderately wave-exposed circalittoral rock	Bedrock reef
10	13	3.0	0.4-0.9m layer of sand over hard ground. May be able to cut down into rock below sand.	A5.451 - Polychaete-rich deep Venus community in offshore mixed sediments A4.213 - <i>Urticina felina</i> and sand-tolerant fauna on sand-scoured or covered circalittoral rock	
15	23	8.0	~0.4 to ~1.2m layer of Sand/Gravel /Clay/Cobble over hard ground. May be able to cut down into rock below sand.	A5.141 - <i>Pomatoceros triqueter</i> with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles A5.14 - Circalittoral coarse sediment	Medium grade stony reef
28	31	3.0	~0.3 to ~0.8m Layer of Sandy Gravel over hard ground. May be able to	A5.27 - Deep circalittoral sand	

KP start	KP end	Distance (km)	Comment	Biotope	Presence of Annex I habitat
			cut down into rock below sand.		
42	44	2.0	Vibrocore refusal indicating thin layer of sediment over hard ground. Cone penetrometer test reached a depth of 0.8m	A5.611 - Sabellaria spinulosa on stable circalittoral mixed sediment A5.45 - Deep circalittoral mixed sediments	Potential biogenic reef

3.2 Concrete mattresses

Concrete mattresses are matrices of interlinked concrete blocks which form a close-fitting layer over the cable. Typically, concrete mattresses are 6m long by 3m wide.

The mattresses are installed via a crane from either a dive support vessel or a construction support vessel; which lowers them one at a time or in batches using a special frame.

The protection afforded by the concrete layer is substantial, and the risk of cable damage due to dragged or dropped objects is effectively reduced for the cable beneath. However, they are slow and expensive to install and hence are used only for localised, temporary or intermittent applications at cable crossing locations or jointing.

Figure 3-2 Concrete mattress deployment (courtesy of FoundOcean)



3.3 Cable crossing

Greenlink will cross one in-service cable within Welsh offshore waters; location provided in Table 3-2.

Table 3-2 Crossing location

Asset name & Operator	Indicative crossing location (decimal degrees) *			Crossing angle	Burial depth at crossing position
	Latitude	Longitude	KP		
Asset: Pan European Crossing 2: Operator: Century Link (Level 3)	51° 39.77" N	05° 53.85" W	KP59.791	93°	0.2m

* Decimal degrees. Datum: WGS84 UTM 30N

During route preparation a layer of aggregate or concrete mattresses will be placed over the existing (buried) in-service cable to create a 'bridge'. These will be positioned to either side of the cable and will prevent the overlaid cable/bundle and mattresses from contacting the buried cable as they settle into the sediment.

The Greenlink cable bundle will then be surface-laid across the mattresses. To do so the cables will have to transition from a buried state in the sediments close by to surface lay. An exclusion zone either side of the existing cable (distance as agreed with the third-party cable owner) will be observed for burial equipment. If a plough is used, it must transition out of the soil before reaching the exclusion boundary. Burial will continue after cable lay progresses outside the burial exclusion zone on the other side of the crossing.

Additional mattresses or rock protection will be laid along the Greenlink interconnector where it is surface laid in the burial exclusion zone.

The crossing design for the asset crossed will indicate the footprint of the impact to the seabed. For the purposes of assessment, it has been assumed that cable protection will be required up to 60m either side of the third-party asset; 200m in total. The rock berm will be up to 1.2m high and 8.2m wide.

Table 3-3 provides the worst-case dimensions and assumptions that have been used in the assessment.

Table 3-3 Key worst-case assumptions for crossings

Asset name	Total length of external protection (m)	Seabed footprint of crossing (m ²)	Total external protection volume (m ³)	Sediment	EUNIS Habitat
Proposed Development					
Pan European Crossing 2	120	1009	583.5	Sand	A5.251- <i>Echinocyamus pusillus</i> , <i>Ophelia borealis</i> and <i>Abra prismatica</i> in circalittoral fine sand
Assumptions					
Height of rock berm 1.2m					
Rock berm crest 1m wide					
Berm side slope 1:3 profile					

3.4 *Deposits for repair*

Cable repairs to correctly installed and protected marine cables are infrequent but require operations which temporarily intrude on the environment and the activities of other users of the sea. A full description of a cable repair is provided in the Greenlink Marine ES Chapter 4, but is summarised below.

Where a cable fault is detected, the relevant section of the cable will be located and retrieved to surface for inspection and replacement. The extra length of a repaired short cable section means it cannot be returned to its exact previous alignment on the seabed. The excess cable will be laid on the seabed in a loop off to one side of the original route; but still within the Proposed Development. The additional cable length will be buried, typically using jetting machines or rock placement deployed from either the repair vessel itself or a separate specialised vessel.

Greenlink Interconnector Limited is requesting a Marine Licence application that covers up to five discrete incidents of repair or replacement over the operational life time of the cable (50 years). This would be limited to 1km x 3 for bundled cable including the fibre optic. Five incidents for a marine cable over its operational life time is lower than the industry used 'rule of thumb' which is one fault every ten years per 100km; based on historic experience. It is also in line with other UK cable projects e.g. FAB Link and London Array that have Marine Licences for ten repairs.

After completion of repairs, a post-installation survey will be carried out along the section of cable that has undergone repair or replacement to demonstrate the successful burial and depth of the cable.

As a worst case it has been assumed that the repair location would need external cable protection (rock berm or concrete mattresses) although the preference would be to bury the loop back into the sediment. The marine licence application therefore also applies for an additional 5km x 10m of external cable protection as a contingency. The environmental effects of this contingency deposit have been assessed in the Greenlink Marine ES.

Pre-application advice to Greenlink/Intertek

December 7th 2018

Stations 1-4

Stations 1-4 show predominantly featureless boulder field and was identified by Greenlink as A4.22 *Sabellaria spinulosa* reef on circalittoral rock.

NRW does not agree with this identification, based on the drop-down video images provided. The *Sabellaria* crusts present are not sufficient to constitute a biogenic reef.

NRW would consider that this biotope may be closer to A5.141, or SS.SCS.CCS.SpiB “*Spirobranchus triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles”. This biotope has a **High** resilience but a **Low** resistance score which provides an overall **Low** sensitivity score to the pressure “Abrasion/disturbance of the surface of the substratum or seabed”, with the following rationale:

*“The impact of surface abrasion will depend on the footprint, duration and magnitude of the pressure. High levels of abrasion from scouring by mobile cobbles and pebbles is an important structuring factor in this biotope (Connor et al., 2004) but the persistence of the assemblage may depend on rapid recovery rather than high resistance (Gorzula, 1977). Evidence for the effects of severe scour and trawling on *Balanus crenatus* and *Spirobranchus triqueter*, suggest that resistance, to a single abrasion event is ‘Low’ and recovery is ‘High’, so that sensitivity is assessed as ‘Low’.*

NRW considers that this biotope forms part of the Annex I Reef (stony reef) habitat under the criteria set by Irving, 2008:

Table 3. The main characterising features of a stony reef.

Characteristic	Not a 'stony reef'	'Resemblance' to being a 'stony reef'		
		Low ²	Medium	High
Composition:	<10%	10-40% Matrix supported	40-95%	>95% Clast supported
<i>Notes: Diameter of cobbles / boulders being greater than 64mm. Percentage cover relates to a minimum area of 25m². This 'composition' characteristic also includes 'patchiness'.</i>				
Elevation:	Flat seabed	<64mm	64mm-5m	>5m
<i>Notes: Minimum height (64mm) relates to minimum size of constituent cobbles. This characteristic could also include 'distinctness' from the surrounding seabed. Note that two units (mm and m) are used here.</i>				
Extent:	<25m ²			
Biota:	Dominated by infaunal species			>80% of species present composed of epifaunal species

With regards to composition, NRW examined a random set of drop down video stills and found around 10% of the cobbles present to be over 64mm. It was not possible to evaluate the elevation characteristic, but it appears to be somewhere between flat seabed and 64mm in height. The extent characteristic is assumed by NRW to be over 25 m², in light of the biotope mapping undertaken by Greenlink. The biota characteristic is unknown.

The habitat can therefore be classified as low "resemblance" to being a stony reef.

For the cobble areas where Greenlink has identified the biotope as A4.21 "Echinoderms and crustose communities on circalittoral rock", this appears to NRW to be a similar biotope to A5.141 and not A4.21 "Echinoderms and crustose communities on circalittoral rock".

NRW agrees that the larger boulder habitat will fall within the suggested biotopes described by Greenlink as A4.111 and will be considered as Annex I Reef habitat and more sensitive to abrasion and other physical pressures caused by the cable lay.

Stations 5-7

For stations 5-7, NRW agree with the primarily sedimentary nature of the biotopes but note that there are still potential boulder and Sabellaria habitat areas within these areas which could be impacted by the cable lay.

NRW considers that this alternative route is likely to be preferable to routes A and E because:

- The cobble/sediment biotope identified, potentially A5.141, will have a low sensitivity to the cable lay. If the cable is buried within this biotope, and covered with the existing sediments, recovery will occur as the sediments are routinely scoured and moved by wave and tidal action. As stated in the JNCC biotope description for A5.141 "This biotope is characterized by a few ubiquitous robust and/or fast growing ephemeral species which are able to colonise pebbles and unstable cobbles and slates which

are regularly moved by wave and tidal action” and long-lived or delicate species are not regularly present.

- There are boulders and other potential Annex I habitats including Sabellaria reef present. The side scan and drop-down video however appear to indicate that these habitats can be avoided through micro-siting of the cable.

At this stage, and without prejudice to later comments made during the application phase, NRW would not consider that there would be significant issues with laying a cable within A5.141, should burial of the cable be possible within this habitat with covering of local sediments from A5.141 biotope.

If the cable in this habitat cannot be fully buried and requires covering using protection from materials foreign to the local area, NRW advises that consideration is taken to ensure that the protection will have the ability to support biota to the same extent or greater than the Annex I habitat lost.

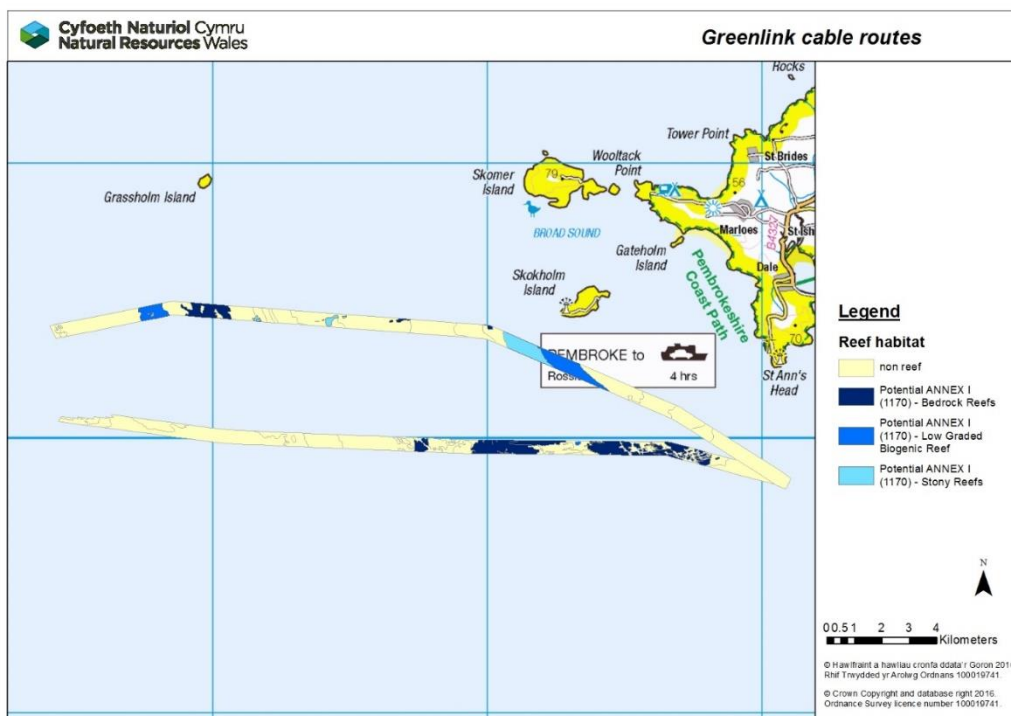
Appendix I

NRW advice on Routes A and E

Pre-application advice to Greenlink/Intertek

Oct 12th 2018

NRW has reviewed the evidence provided by Intertek with regards to Routes A and E (summary map of Annex I reef feature below). The Annex I features of relevance potentially affected by the cable routes in the Pembrokeshire Marine SAC are “Reef” and “Sandbanks slightly covered by seawater at all times”. The Reef feature is the habitat which NRW will be focusing advice in this document due to the fact that the habitat will likely be damaged and lost from the overlaying of the cable, unlike sedimentary habitats where recovery from impacts caused by cable burial is likely to be relatively rapid. Potential impacts on reef habitats include scour, erosion, disturbance, smothering, water quality deterioration and loss of habitat.



Map 1 - Reef

habitat (blue) and predominantly sediment habitats (yellow) within surveyed potential cable routes.

NRW have reviewed the Annex I EUNIS habitats identified against the Marlin habitat sensitivity assessments ([MarESA](#)). NRW has considered the resistance, resilience and sensitivity of the habitats for “Abrasion/disturbance of the surface of the substratum or seabed”. Other impact pathways will also be relevant such as “Penetration and/or disturbance of the substratum below the surface of the seabed”, “Changes in suspended solids (water clarity)”, “Smothering and siltation rate changes (Heavy)” and “Smothering and siltation rate changes (Light)” but in this context and to aid guidance in future decisions with regards to cable route, only the impacts relating to direct abrasion (disturbance) and habitat loss are discussed as they present usually the more severe impacts.

All marine habitats are considered to have **High** sensitivity to habitat loss.

Annex I Reef habitats

Route A

A4.1313 Mixed turf of bryozoans and erect sponges with *Sagartia elegans* on tide-swept circalittoral rock

A4.139 Sponges and anemones on vertical circalittoral bedrock

A4.22 *Sabellaria* reefs on circalittoral rock

A4.2211 *Sabellaria spinulosa* with a bryozoan turf and barnacles on silty turbid circalittoral rock

A4.2212 *Sabellaria spinulosa*, didemnid and small ascidians on tide-swept moderately wave exposed circalittoral rock

A4.241 *Mytilus edulis* beds with hydroids and ascidians on tide-swept exposed to moderately wave exposed circalittoral rock

Route E

A4.1312 Mixed turf of bryozoans and erect sponges with *Dysidia fragilis* and *Actinothoe sphyrodeta* on tide-swept wave-exposed circalittoral rock

A5.611 *Sabellaria spinulosa* on stable circalittoral mixed sediment

A4.131 Bryozoan turf and erect sponges on tide-swept circalittoral rock

A4.2211 *Sabellaria spinulosa* with a bryozoan turf and barnacles on silty turbid circalittoral rock

The listed biotopes above have a **Low** resistance, and **Medium** resilience and sensitivity to “Abrasion/disturbance of the surface of the substratum or seabed”. The MarESA sensitivity assessment is largely based on evidence from fishing pressures in which periods of recovery would be expected in between fishing events. In this case, the presence of a cable would lead to permanent disturbance of sessile and epifaunal species which characterise this habitat and resilience (ability to recover) would not be expected to be as high as “Medium”, depending on the degree of scour and movement of the cable.

The installation and presence of the cable on the surface of the seabed as well as any protective boulders or mattresses will result in loss of habitat. Trenching in reef habitat could also result in permanent physical changes and habitat loss. As stated in the [Regulation 37](#) Conservation Objectives for the Pembrokeshire Marine SAC, the range of Annex I features should such that “*The overall distribution and extent of the habitat features within the site, and each of their main component parts is stable or increasing*”.

Having reviewed the extent of the Annex I reef biotopes described above for the eastern arm of Route A, NRW considers that due to the extent of the reef and the type of reef habitats contained within, the presence of a cable and associated construction work and protective covering would compromise the conservation objectives of the feature, should this section of Route A be used. A degree of pragmatism would be applied when advising on potential impacts resulting in loss of habitat when considering impacts in which a very small area of habitat is lost or damaged. In this case however, NRW considers that the area of Annex I habitat lost would be too great to be considered insignificant.

The same rationale applies for the eastern sections of Route E where Annex I reef feature has been identified throughout the width of the corridor, the loss of reef in that area would also be too great to be considered insignificant. For example, if a cable was overlaid on the Annex I reef in the eastern site of Route E with a possible loss in width of 3m when including protective measures (mattresses, boulders etc.), this would result in 9600m² being lost (3200m x 3m). The areas to the west of Route E appear to be patchier and it appears that there is the potential for micro-siting the cable around these features following some further side-scan work around the areas identified.

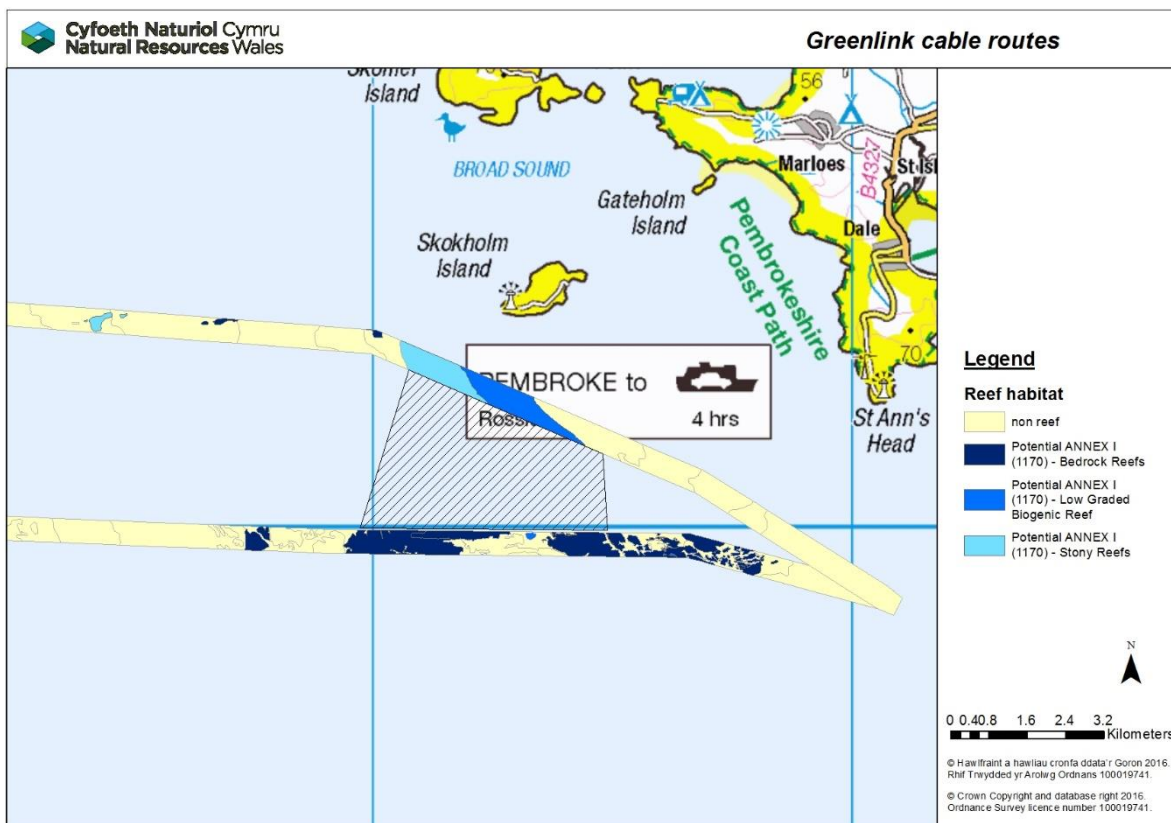
Summary and future work

- The western approaches for Route A appears feasible for cable lay due to the sedimentary nature of the benthos and on the assumption that the cable will be buried.
- Part of the western approach for Route E contains patchy areas of reef which potentially can have the cable micro-sited around them pending further survey work refining the boundary of the reef areas.

- The area of reef on the eastern aspects of both routes appears from the survey work carried out to contain extensive areas of reef which may be too great to simply micro-site a cable around.
- **NRW advises a campaign of side-scan or bathymetric surveys in the western areas between the extensive reef areas of Route A and E to identify potential suitable sediment areas in which a cable could be laid (please see map below).**

Note on Sandbanks: NRW is aware that there have been issues with repeated re-burial of cables in some dynamic areas and advises consideration of methods to avoid this with regards to Greenlink. This would be in to avoid potential repeated disturbance and damage to the Sandbank feature. NRW also advises that there have also been issues with sandbank seabed “flattening” from various project impacts, not just cabling, and that consideration should also be given to ensure that sandbanks and sandwaves are reinstated where necessary. The provision of suitable coastal process modelling which enables an understanding of sediment processes will help to address the points above at the application stage.

NRW welcomes the discussions at this pre-application stage to refine work plans and highlight areas of risk and sensitivity. NRW’s advice at this stage is provided without prejudice to the consideration of any statutory consultation response made by NRW during the Marine Licensing application. The final advice on future proposals is reserved until an application is made and will be based upon final evidence and information provided.



Map 2 - Hatched area of potential survey to determine presence of sediment habitats suitable for cable laying