codling wind park

Environmental Impact Assessment Report

Volume 3

Chapter 19 Land Soils and Geology


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Abbreviations

Abbreviation	Term in full
AIS	Air insulated switchgear
BS	British standard
C&D	Construction and Demolition
CEA	Cumulative Effects Assessment
CEMP	Construction Environmental Management Plan
CRA	Contamination Risk Assessment Report
CSM	Conceptual Site Model
CWP	Codling Wind Park
CWPE	Codling Wind Park Extension
CWPL	Codling Wind Park Limited
C4SL	Category 4 Screening Levels
DCC	Dublin City Council
DECC	Department of the Environment, Climate and Communications
DHLGH	Department of Housing, Local Government and Heritage
EC	European Commission
ECC	Export Cable Corridor
ED	Electoral District
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
ESBN	ESB Networks
EU	European Union
FOS	Fred Olsen Seawind
FRA	Flood Risk Assessment
GIS	Geographic Information System
GSI	Geological Survey Ireland
GW	Gigawatt
HDD	Horizontal directional drilling
HGV	Heavy Goods Vehicle
IACs	Inter-array cables

BTEX	Benzene, toluene, ethylbenzene, and xylenes
IAM	Impact Assessment Matrix
HEC-RAS	Hydrologic Engineering Centre's – River Analysis System
HWM	High Water Mark
IAQM	Institute of Air Quality Management
IED	Industrial Emissions Directive
IE	Industrial Emissions
IPC	Integrated Pollution Control
IPPC	Integrated pollution prevention and control
kV	Kilovolt
LoD	Limit of Deviation
mOD	Metres above ordnance datum (Malin)
mbgl	meters below ground level
PAH	Polycyclic Aromatic Hydrocarbon
MW	megawatts
NHA	Natural Heritage Area
NRA	National Roads Authority
ODM	Ordnance Datum (Malin)
OECC	Offshore Export Cable Corridor
OSI	Ordnance Survey of Ireland
OTI	Onshore Transmission Infrastructure
OfTI	Offshore Transmission Infrastructure
OWF	Offshore wind farm
O&M	Operations and maintenance
OMB	Operations and maintenance base
SDZ	Strategic Development Zone
SVOC	Semi-volatile Organic Compounds
S4UL	Suitable 4 use levels
TII	Transport Infrastructure Ireland
TJB	Transition joint bay
VOC	Volatile Organic Compounds
WTG	Wind Turbine Generator
ZoI	Zone of influence

Definitions

Glossary	Meaning
alluvial deposit	Unconsolidated clay, silt, sand and gravel, deposited by a body of running water.
the Applicant	The developer, Codling Wind Park Limited (CWPL).
array site	The area within which the wind turbine generators (WTGs), inter-array cables (IACs) and the Offshore Substation Structures (OSSs) are proposed.
aquifer	A permeable geological stratum or formation that can both store and transmit water in significant quantities.
Codling Wind Park (CWP) Project	The proposed development as a whole is referred to as the Codling Wind Park (CWP) Project, comprising of the offshore infrastructure, the onshore infrastructure and any associated temporary works
Codling Wind Park Limited (CWPL)	A joint venture between Fred. Olsen Seawind (FOS) and Électricité de France (EDF) Renewables, established to develop the CWP Project.
combi-wall	A piling wall that is comprised of high modulus structural components interspaced by lighter sheet piles. The high modulus components - known as king piles - can be tubular, box, bearing or other types of fabricated piles.
Compound A	A temporary construction compound, support area and storage facility for the landfall works and to support the installation of the onshore export cables. It will operate as a hub for the onshore construction works as well as acting as a staging post and secure storage for equipment and component deliveries.
Compound B	An additional temporary construction compound/laydown area for general cable route and onshore substation construction activities.
Compound C	A temporary construction compound for the onshore substation site. Contractor welfare facilities will be located in this compound as well as some material storage space.
Compound D	A temporary construction compound and laydown area to facilitate the construction of the bridge over the cooling water channel.
construction phase	Phase during which the construction of the offshore / onshore transmission infrastructure for the Codling Wind Park (CWP) Project will take place.
decommissioning phase	Phase during which the decommissioning activity for the offshore / onshore transmission infrastructure for the Codling Wind Park (CWP) Project will take place.
EirGrid	State-owned electric power transmission system operator in Ireland and nominated Offshore Transmission Asset Owner
Environmental Impact Assessment (EIA)	A systematic means of assessing the likely significant effects of a proposed project, undertaken in accordance with the EIA Directive and the relevant Irish legislation.

Glossary	Meaning
Environmental Impact Assessment Report (EIAR)	The report prepared by the Applicant to describe the findings of the EIA for the CWP Project.
ESB Networks (ESBN)	Owner of the electricity distribution system in the Republic of Ireland, responsible for carrying out maintenance, repairs and construction on the grid.
ESBN network cables	Three onshore export cable circuits connecting the onshore substation to the proposed ESBN Poolbeg substation, which will then transfer the electricity onwards to the national grid.
export cables	The cables, both onshore and offshore, that connect the offshore substations with the onshore substation.
generating station	Comprising the wind turbine generators (WTGs) inter array cables (IACs) and the interconnector cables.
groundwater	That part of the subsurface water that is in the saturated zone, i.e., below the water table.
horizontal directional drilling (HDD)	HDD is a trenchless drilling method used to install cable ducts beneath the ground through which onshore export cables from can be pulled. HDD enables the installation of cables beneath obstacles such as roads, waterways and existing utilities.
high water mark (HWM)	The line of high water of ordinary or medium tides of the sea or tidal river or estuary
inter-array cables (IACs)	The subsea electricity cables between OSSs.
karst feature	Landscape feature which results from karstification (solution of limestone) such as a turlough, swallow hole, cave, etc. Type of topography characterised by closed depressions or sink holes and an absence of surface drainage, resulting from underground solution of rocks and diversion of surface waters to underground routes.
landfall	The point at which the offshore export cables are brought onshore and connected to the onshore export cables via the transition joint bays (TJB). For the CWP Project, the landfall works include the installation of the offshore export cables within Dublin Bay out to approximately 4 km offshore, where water depths that are too shallow for conventional cable lay vessels to operate.
landfill	A site used for the deposit of waste on to or under land.
limestone	A sedimentary rock consisting chiefly of calcium carbonate (CaCO3), primarily in the form of the mineral calcite. It is mostly formed by the accumulation of calcareous shells, cemented by calcium carbonate precipitated from solution.
limit of deviation (LoD)	Locational flexibility of permanent and temporary infrastructure is described as a LoD from a specific point or alignment.
Maritime Area Planning (MAP) Act 2021	An Act to regulate the maritime area, to achieve such regulation by means of a National Marine Planning Framework, maritime area consents for the occupation of the maritime area for the purposes of maritime usages that will be undertaken for undefined or relatively long periods of time (including any such usages which also require

Glossary	Meaning
	development permission under the Planning and Development Act 2000) and licences for the occupation of the maritime area for maritime usages that are minor or that will be undertaken for relatively short periods of time
National Parks and Wildlife Services	The National Parks and Wildlife Service is a division of the Department of Housing, Local Government and Heritage which manages the Irish State's nature conservation responsibilities. As well as managing the national parks, the activities of the NPWS include the protection of Natural Heritage Areas, Special Areas of Conservation and Special Protection Areas.
offshore export cables	The cables which transport electricity generated by the wind turbine generators (WTGs) from the offshore substation structures (OSSs) to the TJBs at the landfall.
onshore export cables	The cables which transport electricity generated by the WTGs from the TJBs at the landfall to the onshore substation
onshore development area	The entire footprint of the OTI and associated temporary works that will form the onshore boundary for the planning application.
onshore transmission Infrastructure (OTI)	The onshore transmission assets comprising the TJBs, onshore export cables and the onshore substation. The EIAR considers both permanent and temporary works associated with the OTI.
onshore substation	Site containing electrical equipment to enable connection to the national grid.
onshore substation site	The area within which permanent and temporary works will be undertaken to construction the onshore substation
onshore substation site boundary	The physical boundary of the onshore substation site.
operations and maintenance (O&M) activities	Activities (e.g., monitoring, inspections, reactive repairs, planned maintenance) undertaken during the O&M phase of the CWP Project.
operation and maintenance (O&M) phase	This is the period of time during which the CWP project will be operated and maintained.
parameters	Set of parameters by which the CWP Project is defined and which are used to form the basis of assessments.
planning application boundary	The area subject to the application for development consent, including all permanent and temporary works for the CWP Project.
Poolbeg 220kV substation	This is the ESBN substation that the ESBN network cables connect into, from the onshore substation. This substation will then transfer the electricity onwards to the national grid.
revetment	A facing of impact-resistant material applied to a bank or wall in order to absorb the energy of incoming water and protect it from erosion.
sheet piles	Sections of sheet materials with interlocking edges that are driven into the ground to provide earth retention and excavation support. Sheet

Glossary	Meaning
	piling is used in construction to provide both temporary and permanent walls.
Source Protection Area (SPA)	The catchment area around a groundwater source which contributes water to that source (Zone of Contribution), divided into two areas; the Inner Protection Area (SI) and the Outer Protection Area (SO).
subsoil	The material between the topsoil and the bedrock.
temporary cofferdam	A barrier to tidal inundation whilst the existing stone covered foreshore is temporarily removed to install the landfall cable ducts.
temporary HDD compound 1	The area within Compound C that will house the ESBN network cable HDD entry or exit pits as well as associated plant, equipment and facilities.
temporary HDD compound 2	The area adjacent to the Poolbeg 200kV substation that will house the ESBN network cable HDD entry or exit pits as well as associated plant, equipment and facilities.
temporary tunnel compound 1	The area within Compound A, near the landfall, within which the Compound A tunnel launch shaft will be located.
temporary tunnel compound 2	The area within which the Shellybanks Road tunnel reception shaft will be located.
temporary tunnel compound 3	The area within the onshore substation site, within which the onshore substation tunnel launch shaft will be located.
till	Unsorted glacial deposits consisting of boulders and cobbles mixed with very finely ground-up rock such as sand, silt or clay.
transition joint bay (TJB)	This is required as part of the OTI and is located at the landfall. It is an underground bay housing a joint which connects the offshore and onshore export cables.
tunnel	The onshore export cables will be installed within a tunnel that extends from within Compound A, near the landfall, to the onshore substation site.
tunnel shaft	Located within the temporary tunnel compounds, the tunnel shafts will facilitate the two tunnel drives required to complete the construction of the tunnel.
unsaturated zone	The zone between the land surface and the water table, in which pores and fissures are only partially filled with water. Also known as the vadose zone.
vulnerability	A term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities
water table	The uppermost level of saturation in an aquifer at which the pressure is atmospheric.
zone of contribution (ZOC)	The catchment area around a groundwater source which contributes water to that source.

19 LAND, SOILS AND GEOLOGY

19.1 Introduction

1. Codling Wind Park Limited (hereafter 'the Applicant') is proposing to develop the Codling Wind Park (CWP) Project, a proposed offshore wind farm (OWF) located in the Irish Sea approximately 13 - 22 km off the east coast of Ireland, at County Wicklow.

2. This chapter forms part of the Environmental Impact Assessment Report (EIAR) for the CWP Project. The offshore geological components are discussed in the Offshore EIAR **Chapter 6 Marine Geology, Sediments and Coastal Processes**. The purpose of the EIAR is to provide the decision-maker, stakeholders and all interested parties with the environmental information required to develop an informed view of any likely significant effects resulting from the CWP Project, as required by the European Union (EU) Directive 2011/92/EU (as amended by Directive 2014/52/EU) (the EIA Directive).

3. This EIAR chapter describes the potential impacts of the CWP Project's onshore transmission infrastructure (OTI) on land, soils and geology during the construction, operation and maintenance (O&M) and decommissioning phases. The OTI is situated on the Poolbeg Peninsula and includes the transition joint bays (TJBs), onshore export cables, the onshore substation and the Electricity Supply Board Networks (ESBN) network cables to connect the onshore substation to the Poolbeg 220kV substation. This chapter will also describe the potential impacts of the works at the landfall (landward of the high water mark (HWM)), where the offshore export cables are brought onshore and connected to the onshore export cables at the TJBs (hereafter these works are referred to as the 'OTI').

4. In summary, this EIAR chapter:

   - Details the EIA scoping and consultation process undertaken and sets out the scope of the impact assessment for land, soils and geology;
   - Identifies the key legislation and guidance relevant to land, soils and geology, with reference to the latest updates in guidance and approaches;
   - Confirms the study area for the assessment and presents the impact assessment methodology for land, soils and geology;
   - Describes and characterises the baseline environment for land, soils and geology, established from desk studies, project survey data and consultation;
   - Defines the project design parameters for the impact assessment and describes any primary mitigation measures, summarised in **Section 19.9**, relevant to the land, soils and geology assessment;
   - Presents the assessment of potential impacts on land, soils and geology and identifies any assumptions and limitations encountered in compiling the impact assessment; and
   - Details any additional mitigation and/or monitoring necessary to prevent, minimise, reduce or offset potentially significant effects identified in the impact assessment.

5. The assessment should be read in conjunction with **Appendix 19.1 Cumulative Effects Assessment**, which considers other plans, projects and activities that may act cumulatively with the CWP Project and provides an assessment of the potential cumulative impacts on land, soils and geology. A summary of the CEA for land, soils and geology is presented in **Section 19.11**.

6. Additional information to support the assessment includes:

   - **Appendix 19.2** to **19.4 Site Investigation Reports**; and
   - **Appendix 19.5 Contamination Risk Assessment**.

19.2 Consultation

7. Consultation with statutory and non-statutory organisations is a key part of the EIA process. Consultation with regard to land, soils and geology, has been undertaken to inform the approach to and scope of the assessment.

8. The key elements to date have included EIA scoping, consultation events and meetings with key stakeholders. The feedback received throughout this process has been considered in preparing the EIAR. EIA consultation is described further in **Chapter 5 EIA Methodology**, the **Planning Documents** and in the **Public and Stakeholder Consultation Report**, which has been submitted as part of the planning application.

9. **Table 19-1** provides a summary of the key issues raised during the consultation process relevant to land, soils and geology and details how these issues have been considered in the production of this EIAR chapter.

Table 19-1 Consultation responses relevant to land, soils and geology

Consultee	Comment	How issues have been addressed
Scoping responses		
Geological Survey of Ireland (GSI) June 2021 & May 2023	Provided a response letter and sources for relevant datasets. Referenced the location of County Geological Sites at Killiney Bay and on the Wicklow-Greystones Coast. Ideally, these sites should not be impacted. Use of GSI data or maps should be attributed correctly to 'Geological Survey Ireland'.	Information sources identified are utilised throughout the assessment. There are no Geological heritage sites located within 2 km of the planning application boundary. The GSI datasets and maps are attributed in **Section 19.6**.
Dublin City Council (DCC) 20 February 2024	Reference was made by the DCC Representatives to the Poolbeg Planning Scheme 2019 & policies in this document relating to the management of contaminated land	A **Contamination Risk Assessment Report** was undertaken for the onshore components and addresses the management of contaminated land. The report is provided in **Appendix 19.5.**

19.3 Legislation and guidance

19.3.1 Legislation

10. The main legislation that is applicable to the assessment of land, soils and geology is summarised below. Further detail on legislation is provided in **Chapter 2 Policy and Legislative Context**.

- European Union (EU) Directive 2011/92/EU (as amended by Directive 2014/52/EU) (the EIA Directive);

- The Planning and Development Act, 2000 (as amended); and
- The Planning and Development Regulations, 2001 (as amended).

19.3.2 Policy

11. The overarching planning policy relevant to the CWP Project is described in EIAR **Chapter 2 Policy and Legislative Context**.

12. The assessment of the CWP Project against relevant planning policy is provided in the **Planning Report**. This includes planning policy relevant to land, soils and geology.

19.3.3 Guidance

13. The principal guidance and best practice documents used to inform the assessment of potential impacts on land, soils and geology are summarised below.

- The Institute of Geologists Ireland (IGI) (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements (hereafter referred to as the IGI Guidelines);
- National Roads Authority (NRA) (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (hereafter referred to as the NRA Guidelines); and
- CIRIA 2006: Control of water pollution from linear construction projects. CIRIA C649. London, 2006.

14. Though the NRA is now known as Transport Infrastructure Ireland (TII), for the purpose of this assessment, the guidelines mentioned above are referred to as the NRA Guidelines.

15. In addition, the following guidelines were considered and consulted in the preparation of this chapter:

- Environmental Protection Agency (EPA) (2022). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines);
- Department of Environment, Community and Local Government (2018). Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018);
- Department of Communications, Climate Action and Environment & Sustainable Energy Authority of Ireland (2017). Guidance on EIS and NIS Preparation for Offshore Renewable Projects;
- European Commission (2017). Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report; and
- EPA (2003). Advice Notes on Current Practice in the Preparation of Environmental Impact Statements.

19.4 Impact assessment methodology

16. **Chapter 5 EIA Methodology** provides a summary of the general impact assessment methodology applied to the CWP Project, which includes the approach to the assessment of transboundary and inter-related effects. The approach to the assessment of cumulative impacts is provided in **Chapter 5**, **Appendix 5.1 CEA Methodology**.

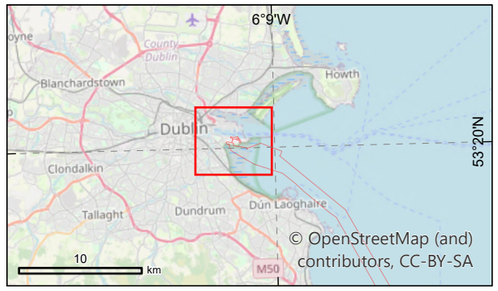
17. The following sections confirm the methodology used to assess the potential impacts on land, soils and geology.

18. The approach to the assessment of cumulative impacts, transboundary impacts and interrelated effects and provided in **Sections 19-11, 19-12** and **19-13**, respectively.

19.4.1 Study area

19. The study area for the land, soils and geology assessment is outlined in **Figure 19-1**, and has been defined on the basis of a 2 km radius from the onshore development area, as suggested in the IGI 2013 Guidelines. This is subject to review of the geological environment and any increase to the study area will be to reflect the sensitivity of the subsurface and the presence of sensitive features which may be impacted by the OTI.

20. The proposed study area of 2 km is appropriate in this instance and focuses mainly on the area within the Poolbeg Peninsula due to the limited potential for effects outside of the peninsula.



Legend

- Planning application boundary
- Onshore substation boundary (operational)
- 2 km buffer from the onshore development area
- High water mark

codling wind park

Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 19.1
Land, soils & geology study area for the onshore development area

CWP doc. number: CWP-TOB-ENG-08-01-MAP-0984

Internal descriptive code: DU.BAY - ALL.RLB..STUDY.AREA.FOR.LSG - EIAR.FIG.19.01

Size: A3

Scale: 1:20,000

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	SP	DM/EA	ES

19.4.2 Data and information sources

Site specific surveys

21. Site walkover surveys of the onshore development area were undertaken by the land, soils and geology team on 28 June 2022, 5 May 2023 and 1 August 2023. This included a visit to the onshore substation site, a walk along Pigeon House Road toward the Dublin Waste to Energy (DWtE) facility, a visit to the landfall area, Construction Compound A (Compound A) and Construction Compound B (Compound B). A walkover of the adjacent Irishtown Nature Park and beach area was also undertaken.

22. Onshore geotechnical Site Investigations (SI) were also undertaken within the onshore development area in 2022, 2023 and 2024. Further details on these are outlined in **Section 19.6**.

Desk study

23. A comprehensive desk-based review was undertaken to inform the baseline for land, soils and geology. Key data sources used to inform the assessment are set out in **Table 19-2**.

Table 19-2 Key Data sources

Data	Source	Date	Notes
Topography Aerial Photography Teagasc soils Quaternary sediments (subsoils) Bedrock geology including structural symbols, bedrock outcrops and bedrock linework. Karst features Geotechnical site investigation locations Geological heritage Landslide susceptibility Depth to bedrock	GSI	11 October 2022 & 11 April 2023	Online map viewer consulted to obtain information on the regional baseline environment.
Soils and bedrock type	Dublin Docklands Masterplan	2008	Information gathered from the accompanying environmental report.
Corine land use Waste facilities Industrial licensed areas	EPA	11 October 2022 & 11 April 2023	Online map viewer consulted to obtain information on the regional baseline environment.
Historical Maps	Glucksman Library, Trinity	3 April 2023	Review of historical maps covering the cable and onshore substation areas.

Data	Source	Date	Notes
Aerial Photography 1995, 2000, 2005, 2013	Ordnance Survey of Ireland (OSI)	11 October 2022 & 11 April 2023	Online map viewer consulted to obtain information on the historical features and land use.
Historical Maps 6" historical map dated 1829 to 1841 25" historical map dated 1897 to 1913 6" historical map dated 1830s to 1930s (Cassini map)	Ordnance Survey of Ireland (OSI)	11 October 2022 & 11 April 2023	Online map viewer consulted to obtain information on the historical features and land use.
Tier 1 Risk Assessment Poolbeg Historical Landfill	Fehily Timoney	2019	Assessment of data in relation to historical infilling on the peninsula.
Site investigation data – onshore substation	Causeway Geotech	2018	Information on site specific environmental conditions. 2018 SI (Causeway Geotech, 2018) was undertaken for a separate development on behalf of L&M Keating at the location of the onshore substation (Berth 47a) in December 2018. It included five boreholes all drilled to a depth of 20m (BH01 to BH05), each with a groundwater monitoring installation and eight trial pits excavated to a maximum depth of 3.6m across the site. This SI also included soil and groundwater sampling. Results are included in **Appendix 19.4**.

19.4.3 Impact Assessment

24. The significance of potential effects has been evaluated using a systematic approach, based on the source-pathway-receptor (SPR) model, which looks at all identified receptors and their sensitivity to the project activity, together with the predicted magnitude of the impact. Examples of receptors are given in **Table 19-3** and comprise various geological features both man-made and natural.

25. The terms used to define receptor sensitivity and magnitude of impact are based on the NRA Guidelines presented in Appendix C of the IGI Guidelines (2013). These criteria have been adopted in order to implement a specific methodology for land, soils and geology.

Sensitivity of receptor

26. For each effect, the assessment identifies receptors sensitive to that effect and implements a systematic approach to understanding the impact pathways and the level of impacts on given receptors.

27. The definitions of receptor sensitivity for the purpose of the land, soils and geology assessment are provided in **Table 19-3**.

Table 19-3 Examples of receptor sensitivity

Sensitivity	Criteria	Typical examples
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and / or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Existing large-scale quarry or pit. Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and / or soft organic soil underlying site is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage (i.e., fuel farm). Recent large-scale landfill site used for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and / or high fertility soils. Moderate-size existing quarry or pit. Marginally economic extractable mineral resource
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and / or soft organic soil underlying site is moderate on a local scale.	Contaminated soil on site with previous light industrial usage. Recent small-scale landfill site used for mixed wastes. Moderately drained and / or moderate fertility soils. Existing small-scale quarry or pit. Sub-economic extractable mineral resource
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and / or soft organic soil underlying site is small on a local scale.	Large historical and / or recent site used for inert construction and demolition wastes. Small historical and / or recent site used for construction and demolition wastes. Poorly drained and / or low fertility soils. Uneconomical extractable mineral resource.

Magnitude of impact

28. The scale or magnitude of potential impacts (both beneficial and adverse) depends on the degree and extent to which the CWP Project activities may change the environment, which usually varies according to project phase (i.e., construction, operation, maintenance, and decommissioning).

29. Factors that have been considered to determine the magnitude of potential impacts include:

- The extent of the development which requires works that may have a direct impact on the land, soils and geology, such as excavation works at the onshore development area; and
- The level of deviation from baseline conditions.

30. The criteria for determining magnitude of impact for the purpose of the land, soils and geology assessment are provided in **Table 19-4**.

Table 19-4 Criteria for determination of magnitude of impact

Magnitude	Criteria	Typical examples
High Adverse	Results in the loss of the attribute	Loss of a high proportion of future quarry or pit reserves. Irreversible loss of a high proportion of local high fertility soils. Removal of the entirety of a geological heritage feature. Requirement to excavate / remediate an entire waste site. Requirement to excavate and replace a high proportion of peat, organic soils and/or soft mineral soils beneath the OTI.
Medium Adverse	Results in impact on the integrity of the attribute or the loss of part of the attribute	Loss of a moderate proportion of future quarry or pit reserves. Removal of part of a geological heritage feature. Irreversible loss of a moderate proportion of local high fertility soils. Requirement to excavate / remediate a significant proportion of a waste site. Requirement to excavate and replace a moderate proportion of peat, organic soils and/or soft mineral soils beneath the OTI
Low Adverse	Results in minor impact on the integrity of the attribute or the loss of small part of the attribute	Loss of small proportion of future quarry or pit reserves. Removal of small part of geological heritage feature. Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. Requirement to excavate / remediate small proportion of waste site. Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath the OTI.
Negligible	Results in an impact on the attribute but of insufficient magnitude to affect either	No measurable changes in the attribute.

Magnitude	Criteria	Typical examples
	its use or integrity	
Low Beneficial	Results in minor improvement of attribute quality	Minor enhancement of a geological heritage feature. Remediation of a small, contaminated site.
Medium Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of a geological heritage feature. Remediation of a small/medium, contaminated site.
High Beneficial	Results in major improvement of attribute quality	Major enhancement of a geological heritage feature. Remediation of a medium/large, contaminated site.

Significance of effect

31. As set out in **Chapter 5 EIA Methodology** of this EIAR, an Impact Assessment Matrix (IAM) is used to determine the significance of an effect. In basic terms, the potential significance of an effect is a function of the sensitivity of the receptor and the magnitude of the impact, as shown in **Table 19-5**.

32. The matrix provides a framework for the consistent and transparent assessment of predicted effects across all technical chapters; however, it is important to note that individual assessments are based on relevant guidance and the application of professional judgement.

33. The matrix provides levels of effect significance ranging from Imperceptible to Profound, as defined in the Environmental Protection Agency (EPA) (2022) EIAR Guidelines. For the purposes of this assessment, effects rated as being "Significant- Moderate" or above are considered to be significant in EIA terms. Effects rated as being "Moderate" are effectively significant/not significant subject to professional judgement, with a rationale provided for this in the main assessment. Effects identified as less than moderate significance are not considered to be significant in EIA terms.

Table 19-5 Impact assessment matrix for determination of significance of effect

Sensitivity of Receptor	Magnitude of Impact			
	High Adverse	Medium Adverse	Low Adverse	Negligible
Very High	Profound	Profound/Significant	Significant/Moderate	Not Significant
High	Profound/ Significant	Significant/ Moderate	Slight/Not Significant	Imperceptible
Medium	Significant	Moderate	Slight	Imperceptible
Low	Moderate/Slight	Slight/Not Significant	Not Significant	Imperceptible

19.5 Assumptions and limitations

34. The boundaries of the GSI mapping do not extend to the onshore development area. Generally, the GSI mapped extents correspond to the 6 inch or 25 inch OSI maps, which do not reflect the more recent reclaimed nature of the Poolbeg Peninsula. On this basis, the soils and subsoils have been classified based on the site-specific information obtained during the 2018-2024 SI works.

35. Limited access was available to the landfall berm for site investigations (SI) due to the presence of Japanese Knotweed. However, it has been assumed that the material is historical Made Ground/waste and is similar to the wider landfall site.

36. No overarching assumptions or limitations have been identified that apply to the assessment for land, soils and geology. Where routine assumptions have been made in the course of undertaking the assessment, these are noted in the following sections.

19.6 Existing Environment

37. The following section provides a description of the baseline conditions for land, soils and geology. The existing environment is discussed in terms of geomorphology (landscape and topography), superficial and solid geology.

19.6.1 Regional Overview

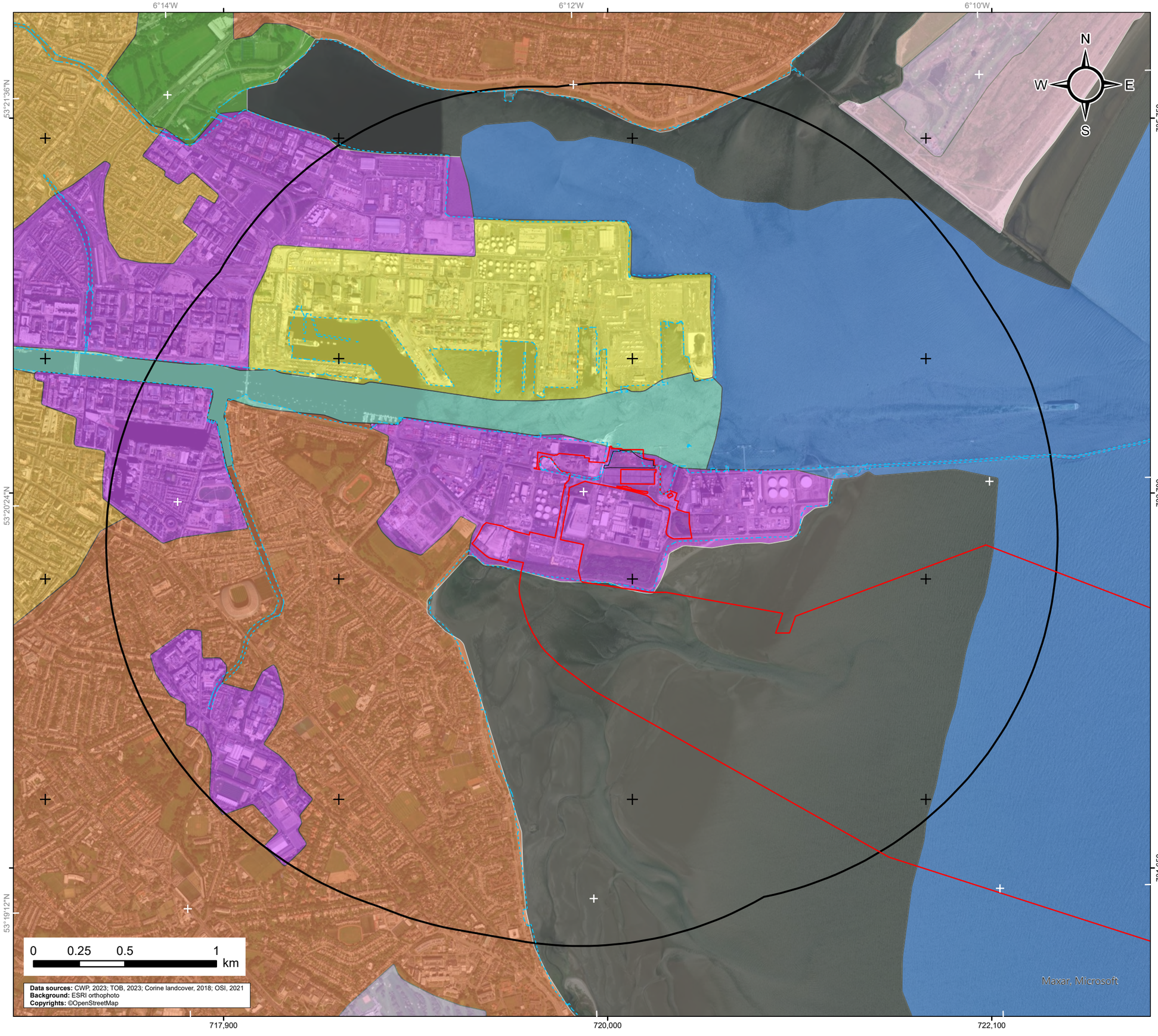
Study Area Overview

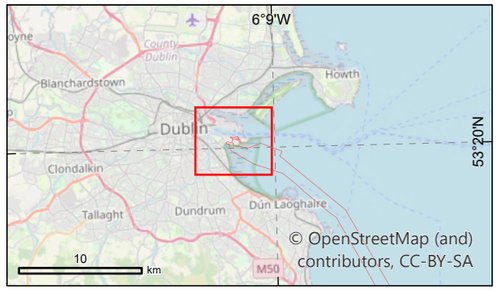
38. The study area includes a 2 km radius from the onshore development area as shown in **Figure 19-1**. However, the impact assessment focuses mainly on the area within the Poolbeg Peninsula due to the limited potential for effects outside of the peninsula.

39. To the north of the peninsula is the River Liffey, Dublin Port and the Tolka estuary. To the east and south of the peninsula is Dublin Bay. Dublin City is located to the west of the peninsula.

40. The Corine land use map identifies a number of different land uses in the study area. Within the study area, there are a number of land uses which consist of discontinuous urban fabric, industrial and commercial units, seaports and wetlands consisting of intertidal flats (EPA, 2022).

41. The Corine land use map for the study area is presented in **Figure 19-2**. The onshore development area is classified as “industrial or commercial units”.





Legend

- Planning application boundary
- Onshore substation boundary (operational)
- 2 km buffer from the onshore development area
- High water mark

Corine land cover 2018

- Beaches, dunes, sands
- Continuous urban fabric
- Discontinuous urban fabric
- Estuaries
- Green urban areas
- Industrial or commercial units
- Intertidal flats
- Port areas
- Salt marshes
- Sea and ocean
- Sport and leisure facilities

codling wind park

Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 19.2
Corine land cover

CWP doc. number: CWP-TOB-ENG-08-01-MAP-0985

Internal descriptive code: DU.BAY - ALL.RLB..CORINE - EIAR.FIG.19.02

Size: A3

Scale: 1:20,000

CRS: EPSG 2157

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00	Final for issue	2024/08/15	SP	DM/EA	ES

42. The Poolbeg Peninsula is used for a range of industrial activities which include Ecocem Ireland, Hammond Land Metal Recycling, ESB Dublin Bay Power Plant, All Away Waste, DWtE facility, Ringsend Wastewater Treatment Plant (WWTP) and ESB Poolbeg Generating Station.

Study area site history

43. The site history was determined based on a review of publicly available historical maps and aerial photography from the Ordnance Survey of Ireland (OSI) which are available to view on the OSI GeoHive Map Viewer (OSI, 2024). The onshore development area and wider port area are reclaimed since the 1960s.

44. The onshore substation site was reclaimed by Dublin Port Company (DPC) in the late 1990's/ early 2000's. The land was raised by a series of natural soils and Made Ground material during this period. Some stockpiled material was placed on the site around 2005. However, the site has remained relatively unused in recent years.

45. The former Ringsend Urban Landfill site is located primarily within Irishtown Nature Park; however, the precise boundaries are unknown. Some areas of waste are known to occur within Compound A, based on SI undertaken as part of this project.

46. The surface area of the landfill site is approximately 500 m from east to west and 50-100 m from north to south. It is estimated that the waste body amounts to 160,000 m^3 in volume.

47. The Ringsend Urban Landfill site was operated by DCC during a building boom in the 1970's where construction and demolition (C&D) rubble, and industrial and commercial waste was deposited and operated as a land-raised scheme. The majority of the waste was reportedly sourced from the redevelopment of Wood Quay during the 1970's. It is understood to have closed in 1978. DCC has placed the site on the Section 22 register (Ref: S22-02333) in accordance with the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations, 2008.

48. A shallow clay capping was reported to have been placed on top of the interred waste extending to the top of the rock armour on the eastern and southern boundary between 1978 and 1980. In the early 1980's, DCC and local residents began establishing the Irishtown Nature Park by planting seeds, trees and tall grasses across the elevated landform, encompassing the former landfill location.

49. Erosion of the former landfill clay barrier, along the southern landfill perimeter previously occurred when high tides breached the rock armour causing waste to be released into the South Dublin Bay area in recent years. It is believed that this occurred to the east of the onshore development area.

50. No evidence of organic waste or other waste was noted during the site walkovers within the onshore development area boundary

Site topography and geomorphology

51. Based on the GSI open-source topography data (GSI, 2024), the study area is relatively flat and low lying with the majority of the area lying at elevations between at 0 m ordnance datum (mOD) and 9.2 mOD. There are several surface waterbodies within the study area which include the River Dodder and the Grand Canal to the west, the Liffey Estuary Lower in the centre, the Tolka Estuary in the north and Dublin Bay to the east and south. There are no surface waterbodies within the onshore development area.

Soils and subsoils

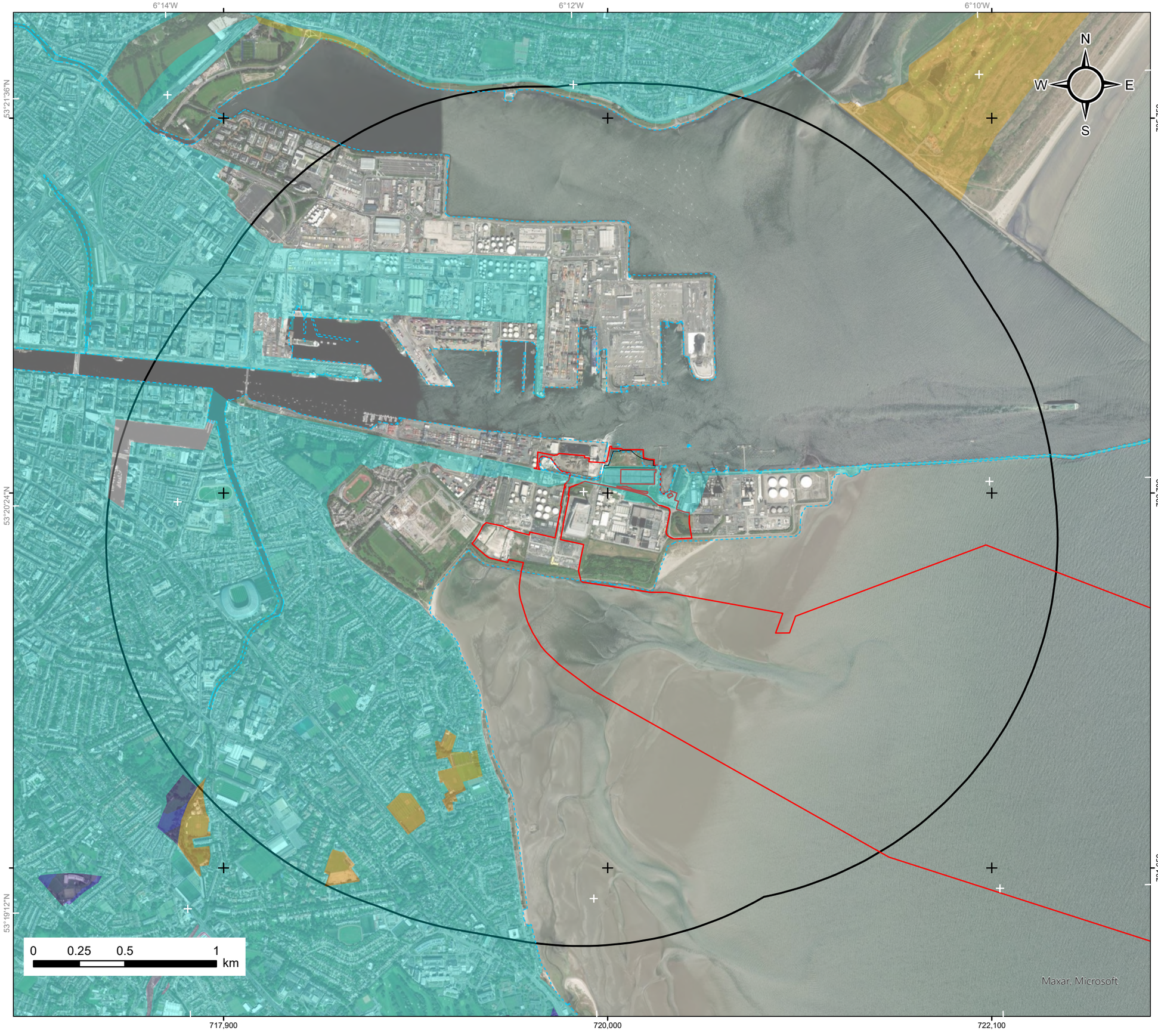
52. The indicative soils map completed by Teagasc in 2006, with input from the EPA and the GSI, classifies the soils of Ireland on a categorically simplified but cartographically detailed basis into 25 classes. The map indicates the dominant soil type within the study area is classified as Made Ground (i.e., material which has been imported to the area for construction and development purposes). There are isolated areas of undifferentiated alluvium and beach sand and gravel approximately 1 km southwest of the onshore development area (GSI, 2024). The soils in the study area are presented in **Figure 19-3**. The boundaries on the GSI maps represent the 1840s coastline. Where areas were reclaimed from the sea, these are not detailed on the GSI mapping but would be considered as Made Ground – see **Section 19.5** for reference. All soils within the onshore development area are Made Ground.

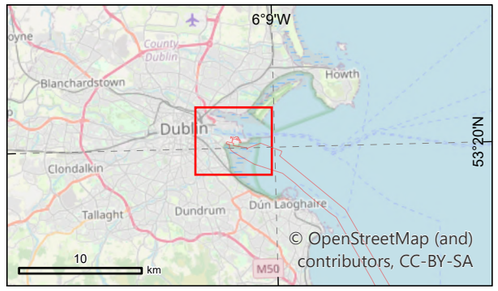
53. Subsoils consist of 'quaternary sediments' which is material that has been deposited over the past 2.6 million years and underlie the soils. Quaternary sediments are not classified for the majority of the Poolbeg Peninsula. A review of the OSI historical maps indicates that the peninsula was developed by reclaiming land from the sea, hence the quaternary sediments here are considered to be urban sediments (alternatively known as Made Ground). The centre of the study area is mapped as urban sediments, with marine beach sands and gravelly alluvium present to the southwest (Sandymount) and marine beach sands present in the north (North Bull Island). Till derived from limestones is the dominant subsoil type in the greater Dublin City area (GSI, 2024). The quaternary sediments within the study area are presented in **Figure 19-4**. All subsoils within the onshore development area are Made Ground.

54. The Strategic Environmental Assessment (SEA) Environmental Report accompanying the Poolbeg West Planning Scheme (DCC, 2019), states that much of the Poolbeg area is built on reclaimed land from the River Liffey and is underlain by silty clay and sandy gravel alluvial deposits, overlying stiff to hard gravelly clay (i.e., the Dublin Boulder Clay), which in turn overlies limestone bedrock. The description of the soils, as set out in the Environmental Report, is summarised as follows:

- Filled ground consisting of gravelly clay fill with fragments of glass, clay, brick, plastics, metal, timber, ash and ceramics between approximately 0 m to 5 mbgl (meters below ground level);
- Soft black silty clay consisting of alluvial deposits ranging from 1 m to 2 m thick; and
- Glacial boulder clay (i.e., Dublin boulder clay) consisting of stiff to hard clay with occasional interbedded gravel layers approximately 3 mbgl to 10 mbgl.

55. Deeper sediments are encountered within the onshore development area as detailed in **Section 19.6.2** and **19.6.3**. The GSI produced a modelled depth to bedrock for the greater Dublin area. This model indicates the bedrock is approximately between 30 mbgl to 45 mbgl within the OTI, indicating that the subsoils in this area are potentially up to 45 m thick in areas (GSI, 2024).





Legend

- Planning application boundary
- Onshore substation boundary (operational)
- 2 km buffer from the onshore development area
- High water mark

Soils

- AeoUND - Aeolian undifferentiated
- AlluvMIN - Mineral alluvium
- BminDW - Grey brown podzolics / Brown earths basic
- BminPD - Surface water gleys / Ground water gleys basic
- BminSW - Renzinas / Lithosols
- Made
- MarSands
- MarSed
- Water

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Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

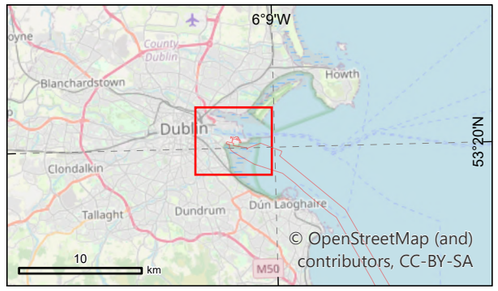
Figure 19.3
Teagasc soils

CWP doc. number: CWP-TOB-ENG-08-01-MAP-0986

Internal descriptive code:	*Size:*	*CRS:*
DU.BAY - ALL.RLB..SOILS.TEAGASC - EIAR.FIG.19.03	A3	EPSG 2157
	Scale: 1:20,000	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
00	Final for issue	2024/08/15	SP	DM/EA	ES

6°14'W
6°12'W
6°10'W
53°21'36"N
53°20'24"N
53°19'12"N
735,750
733,700
731,650
717,900
720,000
722,100
N
W
E
S
0 0.25 0.5 1 km
Maxar, Microsoft



Legend

- Planning application boundary
- Onshore substation boundary (operational)
- 2 km buffer from the onshore development area
- High water mark

Quaternary sediments

- A, Alluvium
- Ag, Alluvium (gravelly)
- Embankment
- GLs, Gravels derived from limestones
- Mbs, Marine beach sands
- Mesc, Esturine silts and clays
- Pier
- Rck, Bedrock outcrop or subcrop
- TLs, Till derived from limestones
- TdlMr, Tidal marsh
- Urban
- Water
- Ws, Windblown sands
- Wsd, Windblown sands and dunes

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Contractor: TOBIN
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Figure 19.4
Quaternary sediments

CWP doc. number: CWP-TOB-ENG-08-01-MAP-0987

Internal descriptive code: DU.BAY - ALL.RLB..QUATERNARY.SEDIMENTS - EIAR.FIG.19.04

Size: A3
Scale: 1:20,000

CRS: EPSG 2157

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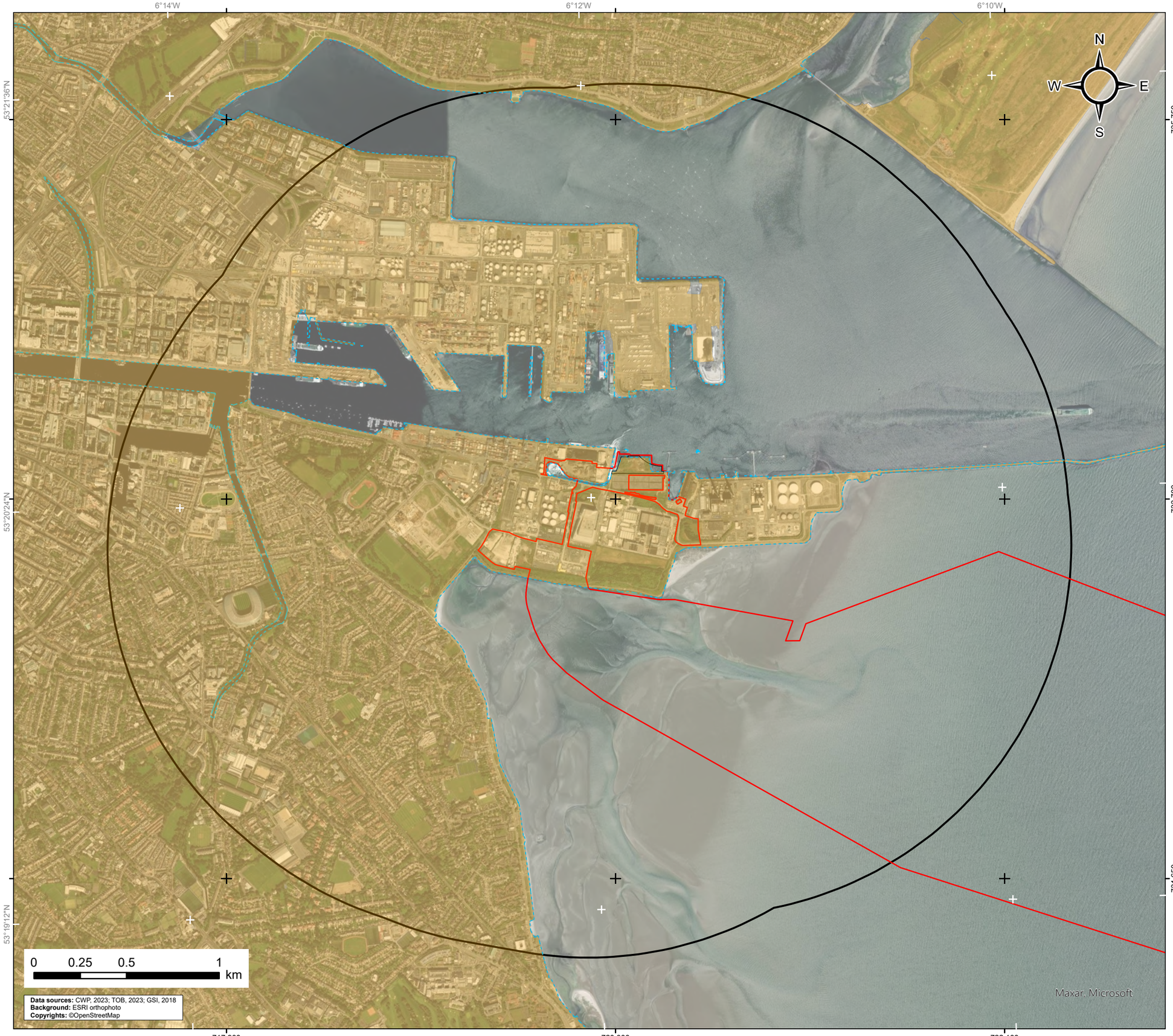
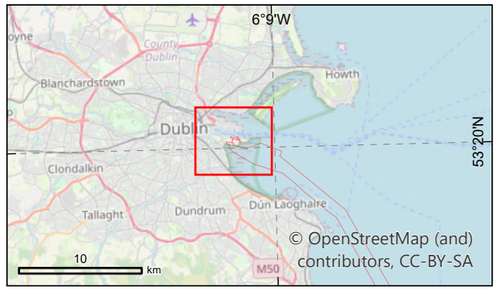
00	Final for issue	2024/08/15	SP	DM/EA	ES

Bedrock geology

56. The bedrock geology underlying the onshore development area is the Lucan Formation and is described as dark limestone and shale. The GSI database indicates there are no bedrock structural features, faults or bedrock outcrops within the study area. Additionally, there are no karst features identified within the study area (GSI, 2024). The bedrock map is presented in **Figure 19-5**.

57. The SEA Environmental Report accompanying the Dublin Docklands Masterplan (2008), states that the limestone in the area varies from weak to very strong limestone bedrock.





Legend

- Planning application boundary
- Onshore substation boundary (operational)
- High water mark
- 2 km buffer from the onshore development area

Bedrock geology

- Lucan formation

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Figure 19.5
Bedrock geology

CWP doc. number: CWP-TOB-ENG-08-01-MAP-0988

Internal descriptive code: DU.BAY - ALL.RLB..GEOLOGY.BEDROCK.ONSH - EIAR.FIG.19.05

Size: A3

Scale: 1:20,000

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	SP	DM/EA	ES

Mineral/ aggregate resources

58. There are no active pits or quarries in the study area. The nearest active quarry is Huntstown Quarry located at North Road, Dublin 11, approximately 10.5 km northwest of the onshore development area. The quarry is operated by Roadstone Ltd. and produces fill and aggregates for concrete, hardcore and earthworks.

59. Based on the GSI data and recorded mineral register, a mineral deposit of lead (Mineral location No. 16) is present at Dublin Port, approximately 1.5 km northwest of the northern onshore development area. There is no further information available on this deposit. There are no active or historic quarries or pits identified in this area (GSI, 2024) and there is no photographic evidence from satellite imagery (Google Maps, 2022) to suggest there are activities ongoing in the area which may be associated with this deposit, such as mining.

Geological heritage sites

60. The GSI provides scientific appraisal and interpretive advice on geological and geomorphological sites and is responsible for the identification of important sites that should be designated as Natural Heritage Areas (NHA). There are no geological heritage areas within the study area.

61. The nearest geological heritage area is the North Bull Island which is located approximately 2.2 km northeast of the onshore development area. This site comprises sand flats and associated beach, dune, lagoon and slack features (GSI, 2024). The island was formed following the construction of the north quay wall in 1825.

Geohazards

62. According to the GSI landslides database (GSI, 2024), there are no recorded landslides within 2 km of the onshore development area. Additionally, the study area is classified as having a low susceptibility to landslides. There is no peat present within the onshore development area.

Potential for contaminated land

63. A review of the OSI historical maps (OSI, 2022) shows that the area has been developed from a large strand area comprising a small portion of developed land, sand banks and historical rivers and lakes. Over time, the Poolbeg Peninsula was developed by reclaiming land and industrial activities became commonplace in the area. The historical use of unregulated industry led to contamination of soils in the area. This is reflected in the Dublin Docklands Masterplan (2008) which states that:

> *"a desktop study of former land uses within the Docklands Area, together with site investigation data from development proposals within the Area, indicated that some sites have been contaminated by former industrial uses. This is consistent with Dockland areas throughout the world, reflecting the nature and character of such sites".*

64. The Tier 1 Environmental Risk Assessment for the Former Ringsend Urban Landfill was undertaken by Fehily Timoney on behalf of DCC. The former Ringsend Urban Landfill site is located on public land overlooking South Dublin Bay and Shelley Banks Beach and can be accessed from Pigeon House Road via a public walkway. The former Ringsend Urban Landfill site is primarily within Irishtown Nature Park; however, the precise boundaries are unknown. A site walkover by Fehily Timoney noted evidence of recent erosion of the former landfill clay barrier and exposure of the waste body along the

southern perimeter of the shore. This likely occurred when high tides breached the rock armour in recent years, causing waste to be released into the South Dublin Bay area. It is believed that this occurred to the east of the onshore development area.

65. This area of visible coastal erosion, where waste has been exposed, stretches for approximately 200 m. The types of waste encountered within the exposed clay berm included fragments of residual industrial, domestic and C&D waste (steel bars, plastic sheeting, glass bottles, steel sheeting & mesh, fabric, steel piping, plastic containers, rubber tubing, tin cans, etc.).

66. No obvious signs of hazardous waste were observed during the walkover; however, it was noted that asbestos could be present in the waste body given the visible evidence of industrial, domestic and C&D waste encountered, the majority of which was reportedly sourced from the redevelopment of Wood Quay during the 1970's. The assessment estimated that the landfill site contained 160,000 m^3 of waste.

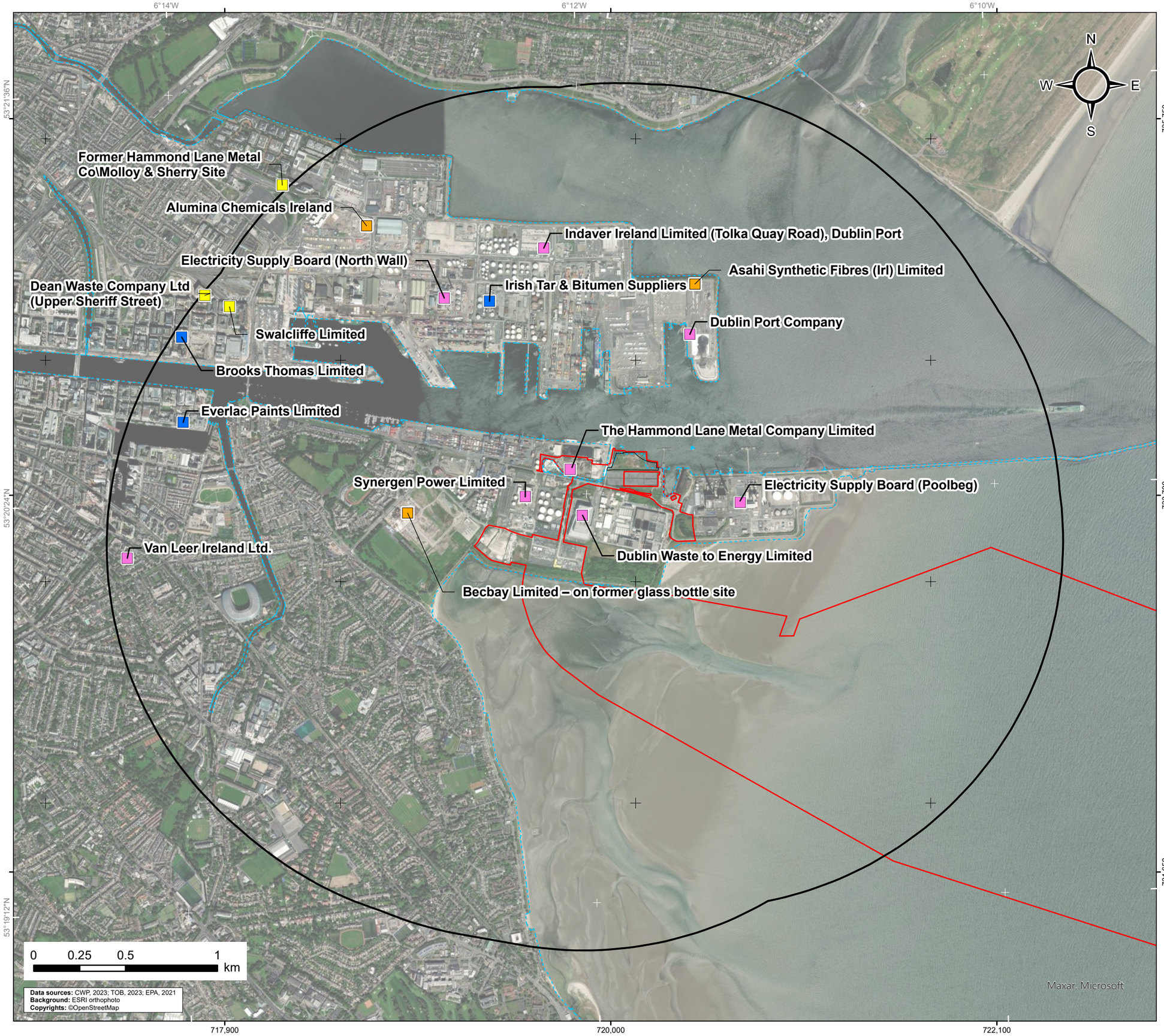
EPA licensed sites

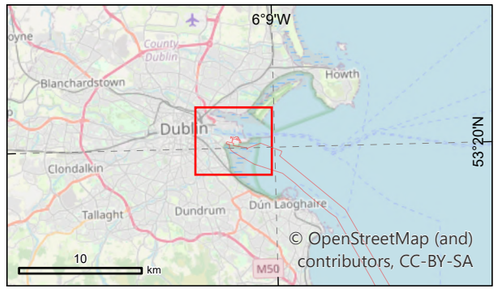
67. Based on the EPA Maps (EPA, 2023), 17 EPA licensed sites (IPC, IEL and Waste) were identified within the study area. These are listed in **Table 19-6** below; where a sites license status is surrendered or withdrawn, this is noted. The licensed sites within the study area are presented in **Figure 19-6**.

Table 19-6 List of EPA Licensed Sites within the study area

Industry	Licence Type	Location
Irish Tar & Bitumen Suppliers	IPC	Alexandra Road, Dublin 1
Indaver Ireland Limited (Tolka Quay Road), Dublin Port	IEL	Dublin Port, Dublin 1
Electricity Supply Board (North Wall)	IEL	North Wall Generating Station, Alexandra Road, Dublin 1
Dublin Port Company (DPC)	IEL	Port Centre, Alexandra Road, Dublin 1
The Hammond Lane Metal Company Limited	IEL	Pigeon House Road, Dublin 4
Synergen Power Limited	IEL	Dublin Bay Power Plant, Pigeon House Road, Ringsend, Dublin 4
Dublin Waste to Energy Limited	IEL	Pigeon House Road, Poolbeg Peninsula, Dublin 4
Electricity Supply Board (Poolbeg)	IEL	ESBN network cables Poolbeg Generating Station, Pigeon House Road, Ringsend, Dublin 4
Brooks Thomas Limited	IPC	Upper Mayor Street, Dublin 1, Dublin
Everlac Paints Limited	IPC	8 Hanover Quay, Dublin 2, Dublin
Van Leer Ireland Ltd.	IEL	Cranmer Lane, Beggars Bush, Dublin 4, Dublin
Asahi Synthetic Fibres (Irl) Limited	IE (Other/withdrawn)	Dublin Port Terminal, Alexandra Road Ext., North Wall, Dublin 1, Dublin

Industry	Licence Type	Location
Becbay Limited – on former glass bottle site	IPC (Surrendered)	South Bank Road, Ringsend, Dublin 4
Alumina Chemicals Ireland	IE (Surrendered)	Promenade Road, Tolka Quay, Dublin 3
Dean Waste Company Ltd (Upper Sheriff Street)	Waste	Upper Sheriff Street, Dublin 1, Dublin
Former Hammond Lane Metal Co\Molloy & Sherry Site	Waste (Surrendered)	Sir John Rogersons Quay to the North;, Britain Quay to the East;, Green Street East to the South; and Benson Street to the West,, Dublin 2, Dublin.
Swalcliffe Limited	Waste	116 Sheriff Street Upper, Dublin 1, Dublin





Legend

- Planning application boundary
- Onshore substation boundary (operational)
- High water mark
- 2 km buffer from the onshore development area

Licensed facilities

- IEL
- IPC
- Waste
- Other

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Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 19.6
Licensed facilities

CWP doc. number: CWP-TOB-ENG-08-01-MAP-0989

Internal descriptive code: DU.BAY - ALL.RLB..EPA.LICENSED.FACILITIES - EIAR.FIG.19.06

Size: A3

Scale: 1:20,000

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	SP	DM/EA	ES

19.6.2 Site specific information – landfall and onshore export cables

68. This section presents a desk study review of publicly available information undertaken to understand the site history. Additionally, a summary of the various site investigations (SI) carried out and the findings of these site investigation (SI) works are presented.

69. The reports associated with these site investigations are presented in **Appendix 19.2** to **19.4**. SI works were undertaken at the landfall and onshore export cable route in 2022, 2023 and 2024. The works were conducted in accordance with:

- British Standards Institute (2015) BS 5930:2015+A1:2020, Code of Practice for Ground Investigations;
- BS EN 1997-2: 2007: Eurocode 7 - Geotechnical Design - Part 2 Ground Investigation and Testing;
- Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland; and
- Laboratory testing was conducted in accordance with British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9.

70. The locations of SI undertaken by Causeway Geotech in the area of the landfall and onshore export cable in 2022, 2023 and 2024 are shown in **Figures 19-7** and **Figure 19-8**.

71. The 2022 landfall and onshore export cable SI comprised:

- 2 boreholes by sonic drilling methods;
- 2 standpipe installation in two boreholes; and
- Soil testing.

72. The 2023/2024 landfall and onshore export cable SI comprised:

- 12 boreholes – rotary drilling method;
- 5 groundwater and gas standpipe installations;
- 18 machine dug trial pits/silt trenches; and
- Soil and groundwater testing.

73. A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- Made Ground (gravel surface and C&D fill);
- Made Ground (C&D and historical organic waste);
- Marine beach deposits overlying Port Clay;
- Glacial Till: stiff to very stiff brown/grey sandy gravelly clay encountered across the site generally;
- Underlying port clay greater than 24 mbgl; and
- Bedrock (Limestone): Rockhead was encountered at depths > 24 m comprising dark grey limestone.

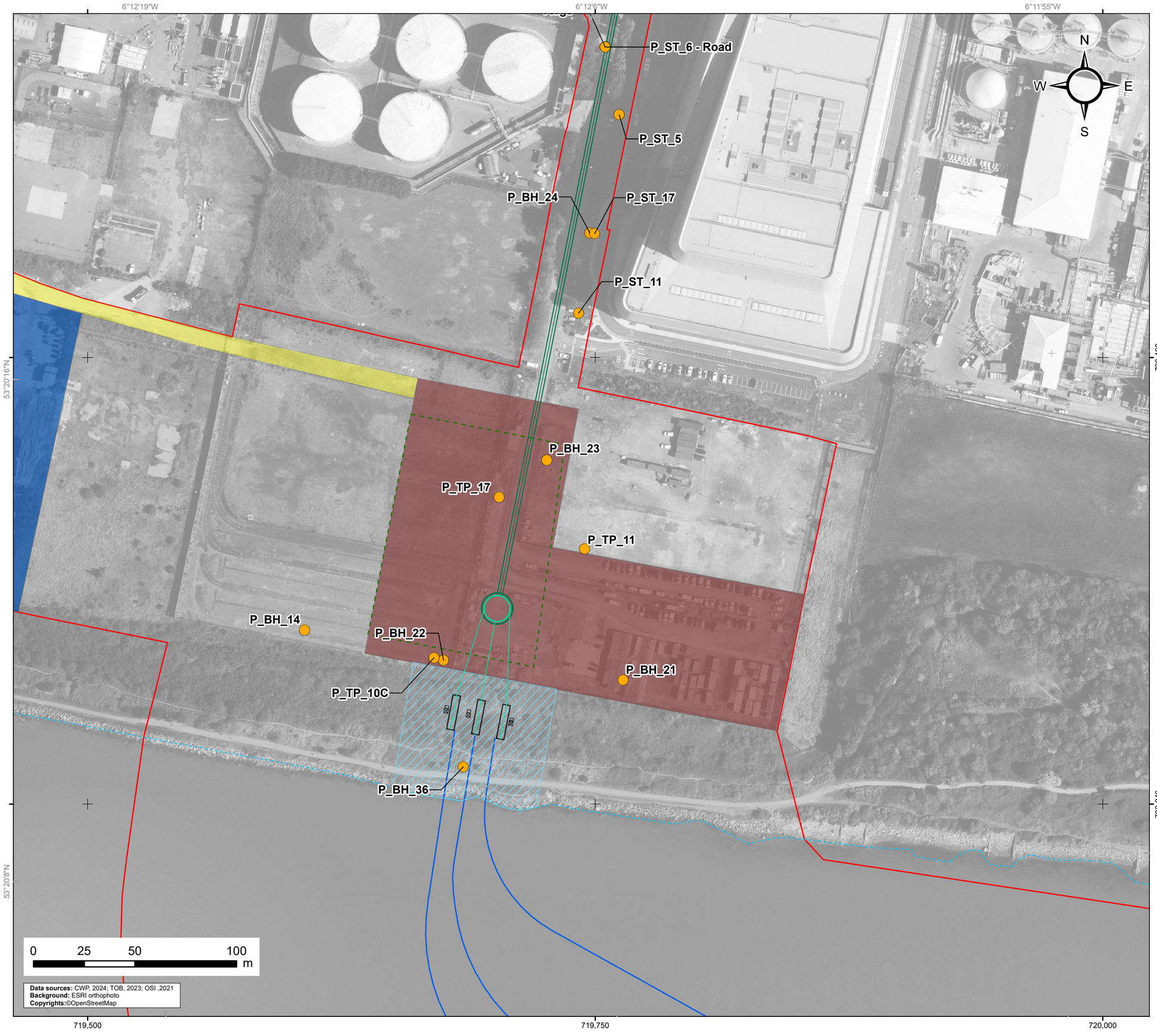
74. Japanese knotweed and other invasive species were identified on the landfall berm and further information in this regard is provided in **Chapter 21 Biodiversity** and in the **Onshore Invasive Species Management Plan** provided with the Planning Application.

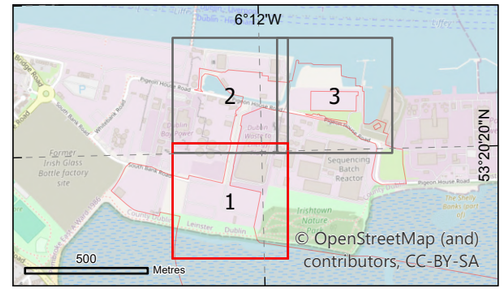
Landfall and Onshore Export Cable Route History

75. The site history was determined based on a review of publicly available historical maps and aerial photography from the OSI which are available to view on the OSI GeoHive Map Viewer (OSI, 2024).

76. The historical maps have been geo-referenced onto a base map using historical features which are still in the same location today. Although these hand drawn maps are considered to be highly accurate, the location of historical features should be considered indicative. The aerial photography imagery has also been geo-referenced onto a base map, but the position of features on these images is considered more accurate as the majority of them overlap with existing features.

77. The historical maps and aerial photography were reviewed and a summary of the site history is presented in **Table 19-7** below.





Legend

- Planning application boundary
- High water mark
- Geotechnical investigations - 2022/2023
- Offshore export cable
- Onshore export cable TJB connection
- Onshore export cable
- Landfall works above the HWM
- Transition joint bay (TJB)
- Temporary tunnel shaft compound

Construction compounds

- Construction compound A
- Construction compound B
- Temporary access route for construction compound A and B

codling wind park

Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 19.7
Geotechnical investigation within the onshore development area: landfall and onshore export cables
Page 1 of 3

CWP doc. number: CWP-TOB-ENG-08-01-MAB-0990

Internal descriptive code: DU.BAY - PAB..S.GEOTECH..INFRAS.PROP..LODs - EIAR.FIG.19.08

Size: A3

Scale: 1:1,800

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
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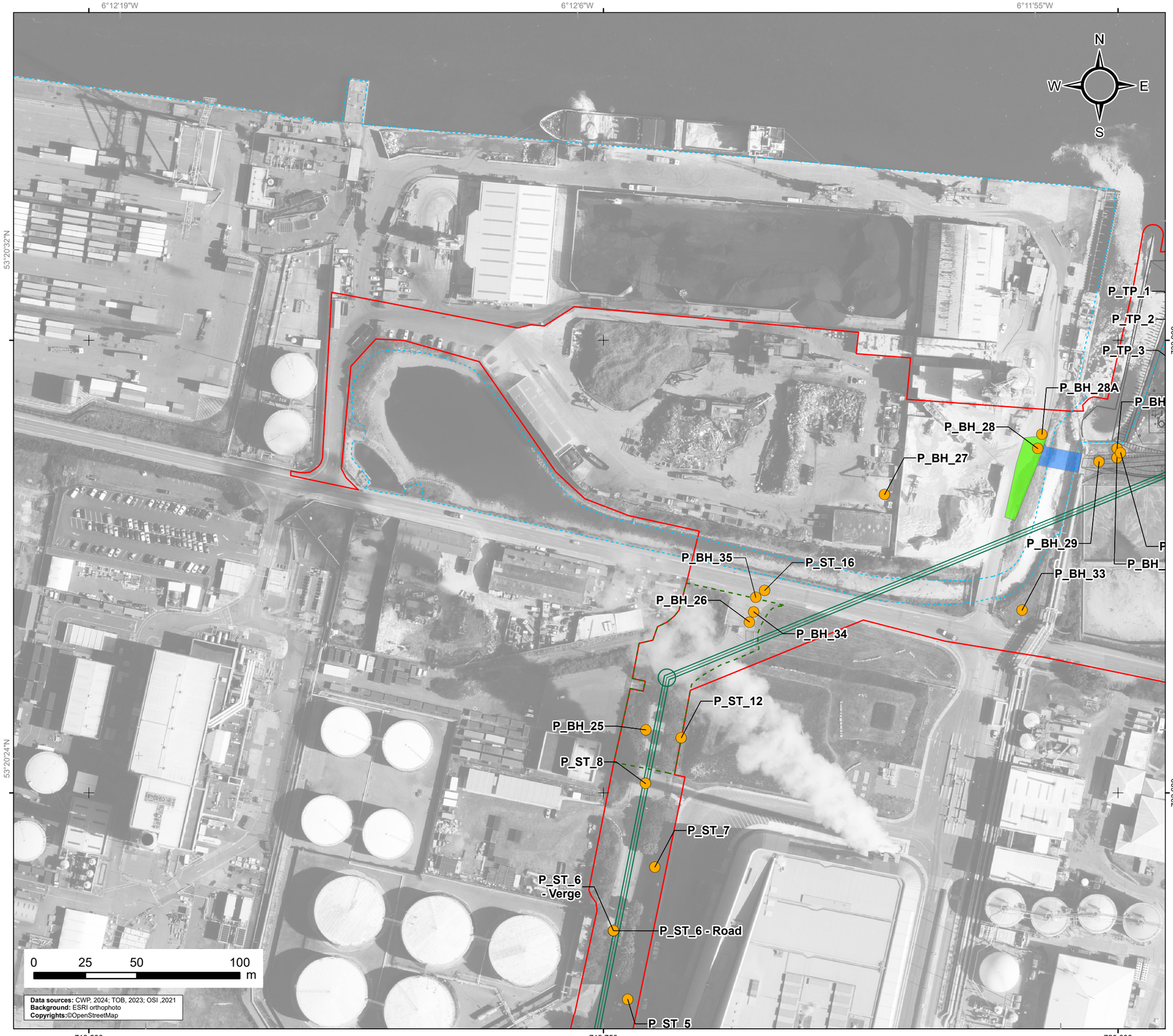

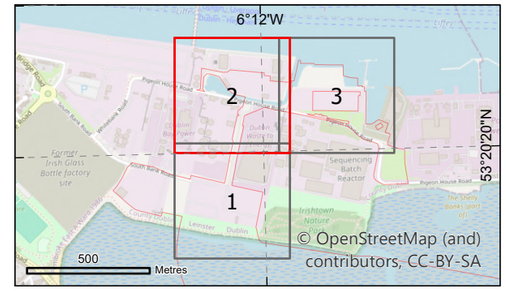

Legend

- Planning application boundary
- Onshore substation electrical layout
- High water mark
- Geotechnical investigations - 2022/2023
- Onshore export cable
- Access bridge to onshore substation
- Temporary tunnel shaft compound

Construction compounds

- Construction compound D

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Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 19.8
Geotechnical investigation within the onshore development area: onshore export cables
Page 2 of 3

CWP doc. number: CWP-TOB-ENG-08-01-MAB-0990

Internal descriptive code: DU.BAY - PAB..S.GEOTECH..INFRAS.PROP..LODs - EIAR.FIG.19.08

Size: A3

Scale: 1:1,800

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	SP	DM/EA	ES

Table 19-7 Summary of historical activities relative to the landfall and onshore export cable route

Date	Surrounding land use at the landfall	Surrounding land use at the onshore export cable
1837-1842 – OSI 6" maps	The site is located in a natural sandy area. A water feature is present between the site and a wall identified as South Wall. This wall connects the mainland with the harbour, Pigeon House Fort and Poolbeg Light House.	The overall area is predominantly sand and water with some features along the South Wall, namely the harbour and Pigeon House Fort which contains a barracks, officers' quarters and a hospital.
1897-1913	There is no change in the site use. The water feature has been redirected southwards and a part of it flows through the north-eastern section of the site.	The harbour has been reclaimed and used as outfall works operated by Dublin Corporation. Pigeon House Fort is more industrialised with tanks and chimneys present as well as the Electricity Works operated by Dublin Corporation. An isolation hospital and rifle range are located to the west of the Onshore Substation.
1830s -1930s	There is no change in the land use.	Additional buildings, including a convent and catholic chapel, are identified within the isolation hospital grounds, now identified as a tuberculosis hospital. The Dolphin cooling water intake is present north of the Electricity Works. The rifle range is not labelled on the map.
1995	The land has been reclaimed and appears to be colonised by vegetation.	The land on the peninsula is reclaimed, developed and predominantly industrialised.
1999 - 2003	The site appears to be used for construction material storage.	The outfall works to the south of the onshore substation was replaced by the overfill storm tanks for Ringsend WWTP.
2004 - 2006	The site is no longer used for storage and appears to be covered by hardcore.	There is no significant change in the surrounding land use.
2011 - 2013	Space has been cleared on the site and hardcore placed.	There is no significant change in the surrounding land use.
2013 - 2018	The southwest of the site is used as a carpark and the remainder is used for storage of construction material and vehicles.	There is no significant change in the surrounding land use.

Current land use

78. Findings from the site walkovers relative to the landfall and onshore export cable route are summarised below and reflect the site conditions on the day of the site walkover:

- The landfall site consists largely of existing hardstanding material. The lands for Compound A were being used as a construction storage area and temporary offices, while the lands for Compound B were being used as storage areas, with some existing building and industrial structures;

- The berm forms a boundary between the compound areas and the existing pedestrian pathway and coastal stone revetment along the shoreline. The shoreline forms the southern boundary of the landfall area; and
- Land use associated with the onshore export cable route is predominantly gravel hardstanding and tarmacadam with industrial land use to the north.

Topography

79. The topography of the landfall and onshore export cable route is recorded from various boreholes drilled and trial pits dug during the SI's carried out in 2022, 2023 and 2024, as outlined in

80. **Figure 19-7** and **Figure 19-8**.

81. A topographic survey and site walkover confirmed that the landfall varies in topography and this is largely due to the presence of the earth berm.

82. The maximum height recorded for the berm is 9.2 mOD, based on the available OSI open source lidar data. The OSI data is available from the GSI Open Topographic Data Viewer. The existing hardstanding areas to the north of the earth berm are between 2.9 mOD and 4.8 mOD.

Soils and subsoils

83. The 2022, 2023 and 2024 SI Reports indicate that the soils and subsoils at the landfall and onshore export cable route comprise of two dominant layers of Made Ground. These are:

- A layer encountered throughout the site up to a depth of 7.0 mbgl and consisting of light grey to greyish brown silty sand and gravel with brick and shell fragments, root and rootlets and occasional concrete and plastic pieces; and
- A second layer encountered in the centre of the landfall site (Compound A) up to a depth of 5 mbgl and overlying the first layer. It consists of landfilled waste with high organic content, fragments of plastic, glass, red brick, concrete, timber, steel wire, ceramic tile and bituminous macadam (bitmac).

84. Natural soils at the landfall site were identified through boreholes BH14, BH21, BH23 and BH36 ranging from a depth of 4.4 mbgl to >30.0 mbgl. A cross section is shown on **Plate 19-1**. Using Borehole 14 as an example, the soils in these boreholes consist of:

- A sand and gravel layer overlying a thick clay layer, with the sand and gravel layer located between 4.40 mbgl (0.09 mOD) to 15.85mbgl (-11.36 mOD). This layer is generally characterised as loose to medium dense brown to grey silty fine to coarse sand. The gravel is very dense yellowish brown very sandy silty subrounded fine to coarse gravel.
- The density of the sand and gravel increases with depth. The clay layer is described as firm to stiff greenish grey laminated clay which becomes very stiff with depth. The clay is present between 15.85 mbgl (-11.36 mOD) and 26 mbgl (-25.51 mOD).

85. BH21, BH23 and BH36 also reveal similar information about the soil composition at the landfall site.

Made ground - soil and gas analysis

86. Soil and gas analysis was carried out on samples from the landfall and onshore export cable during the 2022 and 2023 SI works. A Contaminated Risk Assessment (CRA) was completed, and further details are included in **Appendix 19.5**. The summary findings were as follows:

- Low concentrations of Asbestos were detected in two samples collected in the form of fibres or clumps of chrysotile and amosite. Asbestos concentrations are between 0.001% and 0.002%. Soil concentrations are considered non-hazardous (i.e. < 0.1%);
- Metals - Elevated metals (compared to natural material) were detected in soil samples and are likely to have originated from the historical industrial activities associated with the wider area. However, metal concentrations indicate that the soil samples are suitable for a Commercial end use when compared against screening levels (Suitable 4 Use Levels (S4ULs) for Commercial Site Use) (LQM and CIEH 2015);
- Hydrocarbons - Elevated hydrocarbon levels (compared to natural material) were detected in soil samples and are likely to have originated from the historical industrial activities associated with the wider area;
- No free-phase hydrocarbons were encountered at the landfall or along the onshore export cable.
- No elevated Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Semi-Volatile Organic Compounds (SVOCs) or Volatile Organic Compounds (VOCS) were encountered at the landfall or along the onshore export cable;
- Eight samples for Total Speciated Polycyclic Aromatic Hydrocarbons (PAHs) were above detection limits with site concentrations varying from <1 to 58 mg/kg (Sum total of 17 priority PAHs);
- Phenols – All Phenol concentrations were below their corresponding detection limits;
- Cyanides - Cyanide concentrations were below their corresponding detection limits;
- Gas - Gas monitoring was undertaken at 4(no.) gas monitoring points. The parameters monitored were oxygen, carbon dioxide, carbon monoxide and methane. Contamination indicator gases (methane, carbon dioxide, carbon monoxide) were elevated in BH22 and BH23 (which are located within Compound A);
- Ground gases were not encountered in BH25 or BH29.

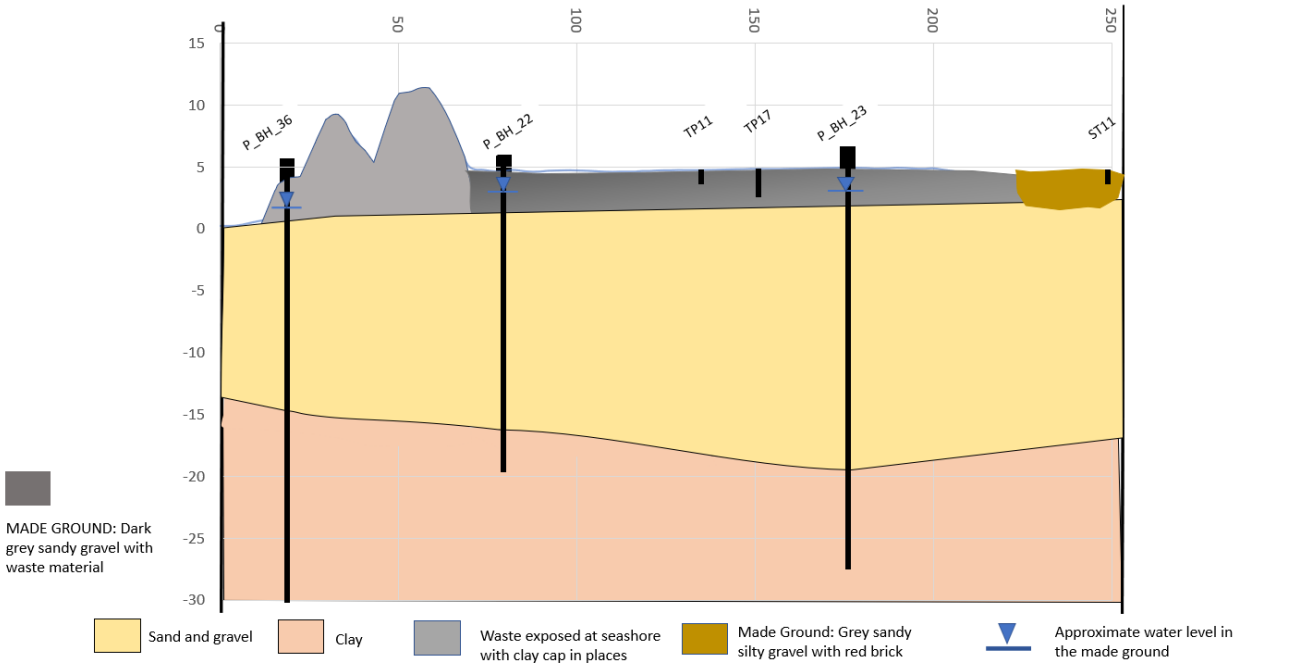


Plate 19-1 Conceptual Site Model - Landfall

19.6.3 Site specific information – Onshore substation and ESBN Network cable SI

87. This section presents a desk study review of publicly available information undertaken to understand the site history at the onshore substation site and ESBN network cable route.

88. Additionally, a summary of the various SI works carried out, as well as the findings of the SI works, are presented. The SI locations within and in direct proximity to the onshore substation site and ESBN network cables are presented in **Figure 19-9**.

89. The SI reports associated with these works are presented in **Appendix 19.2** to **19.4**. SI works were undertaken at the onshore substation site and along the ESBN network cable in 2018, 2022, 2023 and 2024. The works were conducted in accordance with the following:

- British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for ground investigations;
- BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing;
- Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

90. Laboratory testing was conducted in accordance with British Standards Institute BS 1377:1990 parts 2, 4, 5, 7 and 9.

91. The 2018 SI, were undertaken at the onshore substation site prior to the CWP Project and compromised:

- 5 boreholes by rotary drilling methods;
- 5 standpipe installations in five boreholes;
- 8 machine dug trial pits; and
- Soil testing.

92. The 2022 SI undertaken at the onshore substation site and ESBN network cable comprised:

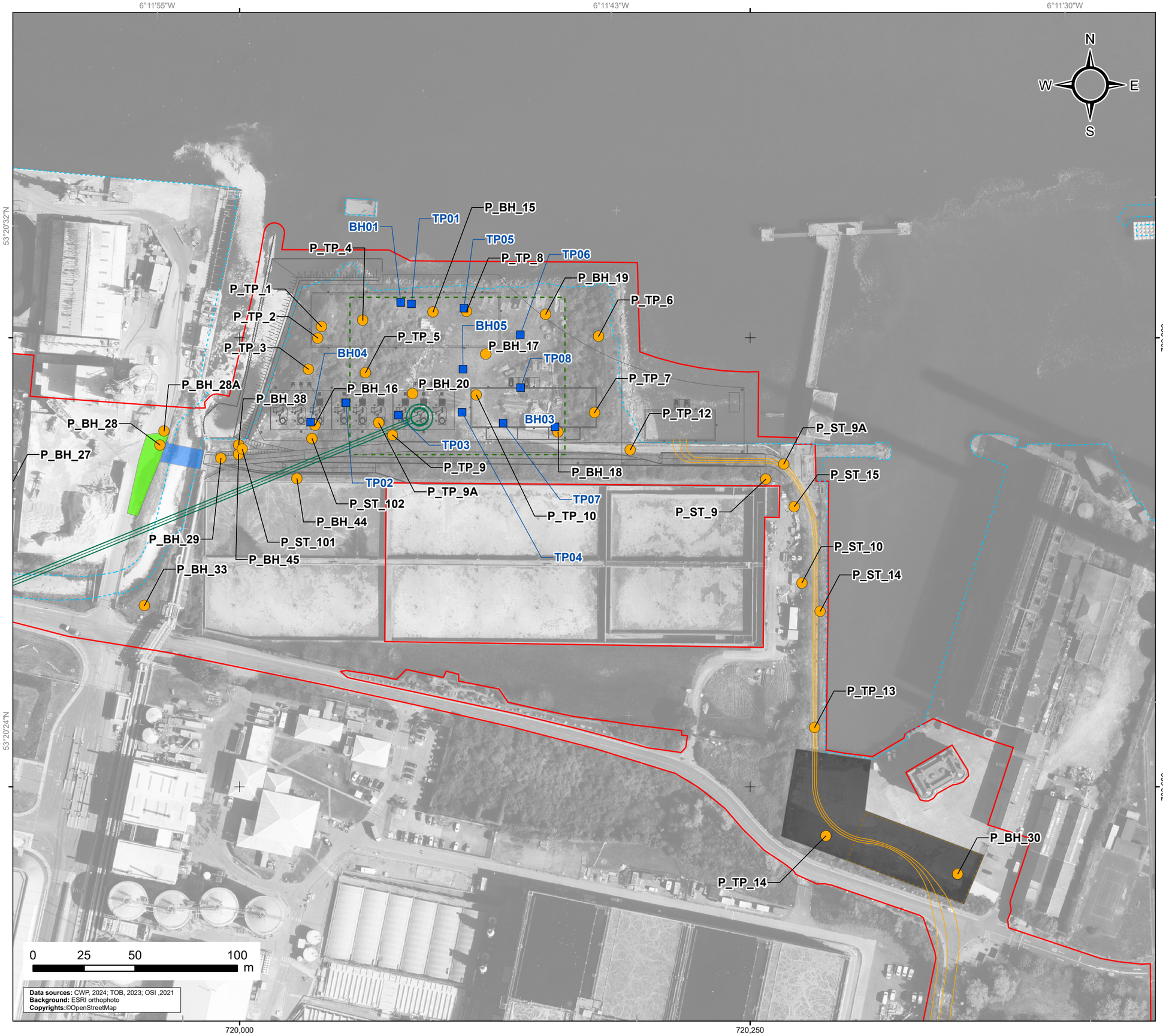
- 6 boreholes – light cable percussion method and sonic drilling method;
- 6 groundwater standpipe installation in six boreholes;
- 3 gas standpipe installations in three boreholes;
- 11 machine dug trial pits;
- Seasonal groundwater level monitoring;
- 3 rounds of groundwater quality monitoring; and
- Soil testing.

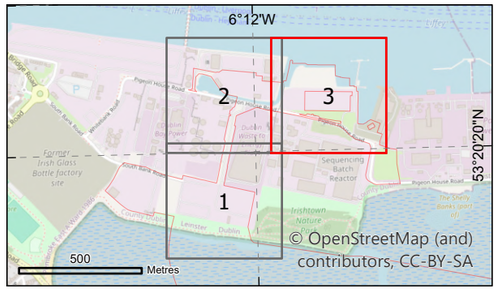
93. The 2023/2024 SI undertaken at the onshore substation site and ESBN network cable comprised:

- 4 boreholes – light cable percussion method and sonic drilling method;
- 10 machine dug trial pits/slit trenches;
- Seasonal groundwater level monitoring;
- 3 rounds of groundwater quality monitoring; and
- Soil testing.

94. A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- Made Ground (gravel surface and C&D fill);
- Marine beach deposits overlying Port Clay;
- Glacial Till: stiff to very stiff brown/grey sandy gravelly clay encountered across the site generally;
- Underlying port clay greater than 30 mbgl; and
- Bedrock (Limestone): Rockhead was encountered at depths > 37.50 m comprising dark grey limestone.





Legend

- Planning application boundary
- Onshore substation electrical layout
- High water mark
- Geotechnical investigations - 2018
- Geotechnical investigations - 2022/2023
- Onshore export cable
- ESBN network cable
- Access bridge to onshore substation
- Temporary tunnel shaft compound
- Temporary HDD compound (ESBN network cables)

Construction compounds

- Construction compound C
- Construction compound D

codling wind park

Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 19.9
Geotechnical investigation within
the onshore development area:
onshore substation and ESBN network cables
Page 3 of 3

CWP doc. number: CWP-TOB-ENG-08-01-MAB-0990

Internal descriptive code: DU.BAY - PAB..S.GEOTECH..INFRAS.PROP..LODs - EIAR.FIG.19.08

Size: A3

Scale: 1:1,800

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/15	SP	DM/EA	ES

Onshore Substation History

95. The site history was determined based on a review of publicly available historical maps and aerial photography from the OSI which are available to view on the OSI GeoHive Map Viewer (OSI, 2022).

96. The historical maps have been geo-referenced onto a base map using historical features which are still in the same location today. Although these hand-drawn maps are considered to be highly accurate, it must be noted that the location of historical features should be considered indicative. The aerial photography imagery has also been geo-referenced onto a base map, but the position of features on these images is considered more accurate as the majority of them overlap with existing features.

97. The historical maps of the onshore substation and landfall, available from the Glucksman Library, Trinity, and aerial photography were reviewed. A summary of the site history is presented in **Table 19-8** below. The onshore development area and wider port area show a phased reclamation since the 1930s.

Table 19-8 Summary of historical activities relative to the onshore substation location (and immediate surrounds)

Date	Land Use at the onshore substation	Surrounding land use
1837-1842	The site is located in a natural sandy area which is bounded to the south by a harbour wall.	The overall area is predominantly sand and water with some features along the South Wall, namely the harbour and Pigeon House Fort which contains a barracks, officers' quarters and a hospital.
1869	The site is located in a natural sandy area which is bounded to the south by a harbour wall. The area is marked as an oyster bed and some areas are above the low tide mark	Quay wall to the south and harbour present
1897-1913	There is no change in the land use.	The harbour has been reclaimed and used as outfall works operated by Dublin Corporation. Pigeon House Fort is more industrialised with tanks and chimneys present as well as the Electricity Works also operated by Dublin Corporation. An isolation hospital and rifle range are located to the west and targets for the range are located to the north and east of Construction Compound C (Compound C).
1910s - 1930s	There is no change in the land use.	Additional buildings including a convent and catholic chapel are identified within the isolation hospital grounds, now identified as a tuberculosis hospital. The Dolphin cooling water intake is present north of the Electricity Works. The rifle range is not labelled on the map.

Date	Land Use at the onshore substation	Surrounding land use
1966	There is no change in the land use.	Additional buildings to the south and southwest which show the development of Dublin Port area.
1995	There is no change in the land use.	The land on the peninsula is reclaimed, developed and predominantly industrialised.
1999 - 2003	The site is being gradually reclaimed.	The outfall works to the south of the onshore substation have been replaced by the stormwater tanks for the Ringsend WWTP.
2004 - 2006	The site build is completed and appears to be hardstanding. A possible spoil heap is present along the eastern site boundary and a second on the western site boundary.	There is no significant change in the surrounding land use.
2011 - 2013	Plant colonisation of the site is established. Some scrub is observed and spoil heaps along the boundaries are increasing.	There is no significant change in the surrounding land use.
2013 - 2018	The site is representative of what it looks like at present. It appears to be used for storage of metal containers and other large industry related items. The site is greener. Scrub and small trees are more abundant.	There is no significant change in the surrounding land use.

Current Land Use

98. Site walkovers at the onshore substation site were undertaken 28 June 2022, 5 May 2023 and 1 August 2023. The onshore substation site has no defined use and consists of hardcore material which has partly become recolonised by grass, various plants and scrub. It is a rectangular, predominantly flat, c. 1.4 ha reclaimed site which has abandoned materials and C&D waste present throughout the site. Soil stockpiles were also present and included two large, raised stockpiles in the north-western quadrant and north-eastern quadrant of the site which comprised both natural and man-made materials.

99. Compound C will be located southeast of the onshore substation site adjacent to the former Pigeon House Hotel.

Topography

100. The topography of the onshore substation and ESBN network cables is recorded from various boreholes and trial pits undertaken in 2018, 2022, 2023 and 2024. A topographic survey of each SI location shows that the area varies in topography due to the presence of the stockpiles at onshore substation site. The maximum height recorded for the stockpiles in the west and east of this area is 8.14 mOD and 7.38 mOD, respectively. The remainder of the onshore substation location lies between 2.95 mOD and 3.68 mOD.

Soils and Subsoils

101. The 2018, 2022, 2023 and 2024 SI Reports indicate that the soils and subsoils at the onshore substation and ESBN network cables comprise of two dominant layers.

102. The Made Ground material was identified in the onshore substation site to a depth of 6 mbgl and consists of grey to brownish grey, loose to medium dense sandy gravel overlying firm to stiff dark brown to black gravelly sandy clay. Anthropogenic material comprising pieces of wood, plastic, rubber, concrete, cardboard and plastic sheets was identified within or below the Made Ground clay layer.

103. Natural soils at the onshore substation site were identified from the boreholes up to a depth of 39 mbgl in BH15 in the north of the site and up to a depth of 37.5 mbgl in BH20 in the centre of the site. They consist of:

- A thick sand and gravel layer overlying a thick clay layer. The sand and gravels were generally described as loose to medium dense brown to grey silty fine to coarse sand and gravel with seashell fragments in the upper sections of the layer and bands of silt at deeper depths. The sand and gravels become dark grey and denser with depth and had a thickness of approximately 8.6 m to 16.0 m; and
- The clay layer was described as firm to stiff greyish to dark brown laminated clay which becomes very stiff with depth. The clay has a proven thickness of approximately 16.4 m to 22.5 m.

Bedrock Geology

104. The 2022 SI Report identified bedrock at a depth of 39.25 mbgl (-36.18 mOD) in BH15, in the north of the onshore substation site and at a depth of 37.50 mbgl (-34.43 mOD) in BH20 in the centre of the onshore substation site. The bedrock comprised distinctly weathered medium strong, indistinctly thinly laminated, dark grey argillaceous limestone with widely spaced thin beds of weak mudstone. The bedrock in BH20 was identified as highly weathered to totally destructed and overlies 2.25 m of clay, which in turn overlies partially weathered, medium strong, indistinctly thinly bedded dark grey limestone bedrock at 42.15 mbgl (-39.08mOD).

105. A conceptual cross section across the onshore substation is detailed below in **Plate 19-2**.

Made Ground - Soil and Gas Analysis

106. Soil and gas analysis was carried out on samples at the onshore substation during the 2018 and 2022 SI works. Results are included in **Appendix 19.2 to 19.4**.

107. Soil samples were collected from TP02, TP04, TP09, TP10 and BH20 from the onshore substation site for geo-environmental testing. A review of the test results did not identify any contaminants at or near levels of concern for the environment or public health (See **Appendix 19.5**).

108. Further details are included in **Appendix 19.5**. The main findings are as follows:

- Trace concentrations of Asbestos were detected in two of the 26 samples collected in 2022 in the form of fibres or clumps of chrysotile and amosite. Asbestos concentrations were low, between 0.001% and 0.002%. The two asbestos detections were from the stockpile samples;
- Soil concentrations are considered non-hazardous (i.e., < 0.1%). No asbestos was detected during the 2018 SI or outside of the stockpiles at the onshore substation;

- Elevated metals (i.e., compared to natural material) were detected in soil samples and are likely to have originated from the historical industrial activities associated with the wider area. However, metal concentrations indicate that all soil samples are suitable for a Commercial end use when compared against soil screening values (i.e., Suitable 4 Use Levels (S4ULs) for Commercial Site Use) (LQM and CIEH 2015) – See **Appendix 19.5**;
- Elevated hydrocarbon levels (i.e., compared to natural material) were detected in soil samples and are likely to have originated from the historical industrial activities associated with the wider area;
- No free phase hydrocarbon contamination was encountered at the onshore substation;
- No elevated BTEX, SVOCs or VOCs were encountered at the onshore substation;
- Eight samples of Total PAHs (sum of 17 PAHs) were above detection limits with site concentrations varying from <1 to 58 mg/kg;
- Phenols – All Phenol concentrations were below their corresponding detection limits;
- Cyanides - All Cyanide concentrations were below their corresponding detection limits; and
- Gas - Gas monitoring was undertaken at 4 (no.) gas monitoring points in 2022. The parameters monitored were oxygen, carbon dioxide, carbon monoxide and methane. None of the contamination indicator gases (methane, carbon dioxide, carbon monoxide) were elevated.

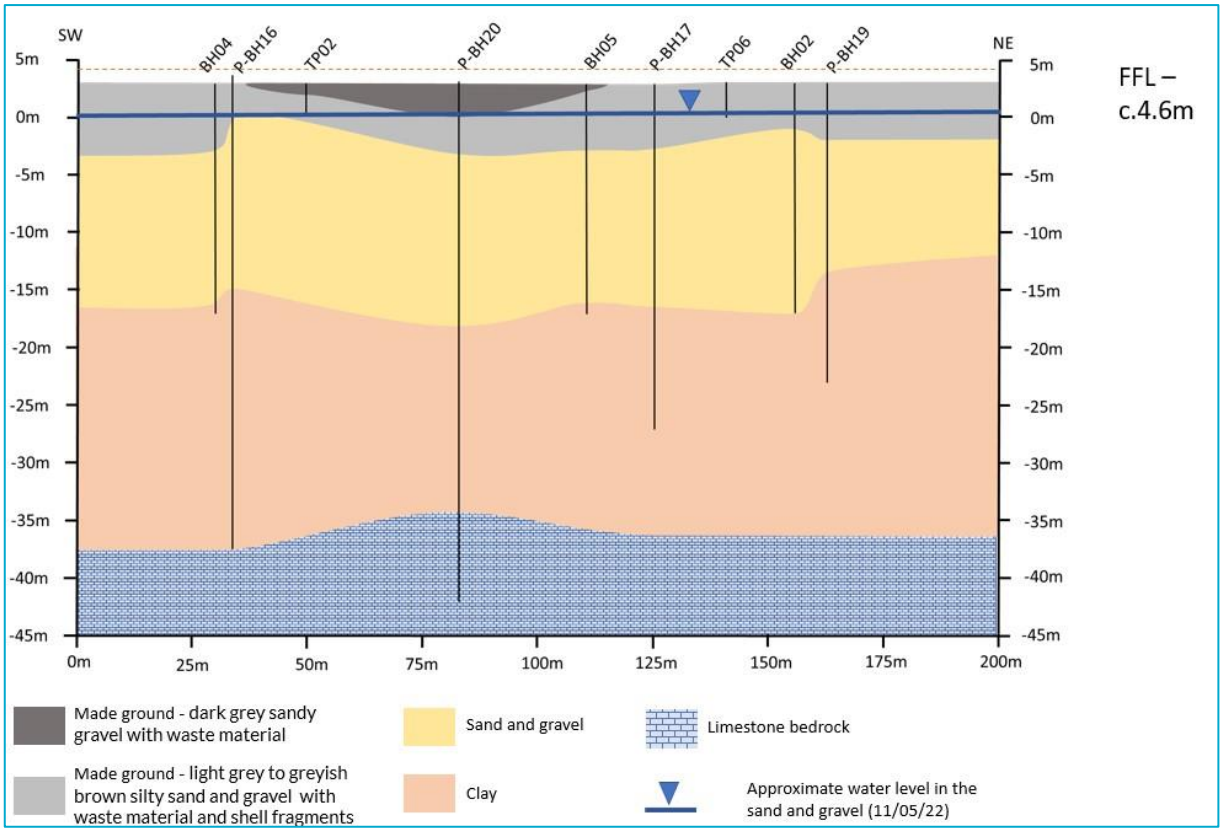


Plate 19-2 Conceptual Site Model - Onshore Substation

19.6.4 Predicted future baseline

109. Without the implementation of the CWP Project, the predicted future baseline is expected to remain the same as the existing baseline, with no disturbance to the land, soils and geology environment.

110. Based on a review of the baseline environment, it is unlikely that climate change and natural trends will have an impact on the land, soils and geology environment. Coastal erosion may result in minor changes to the shoreline; however, these are discussed in the Offshore EIAR **Chapter 6 Marine Geology, Sediments and Coastal Processes**.

111. It is noted that the onshore development area falls into the lands subject to development by DPC as part of their Masterplan programme. Additionally, the northern part of the Poolbeg Peninsula, on which the onshore substation is located, is zoned Employment (Heavy) – Zone Z7 in the Dublin City Development Plan 2022-2028 and part of the landfall area falls into the Poolbeg West Strategic Development Zone (SDZ). On this basis, the onshore development area could see some development and interaction with the land, soils and geology environment in future years, subject to planning permissions.

19.7 Scope of the assessment

112. An EIA Scoping Report for the OTI was published on 6 May 2021. The Scoping Report was uploaded to the CWP Project website and shared with regulators, prescribed bodies and other relevant consultees, inviting them to provide relevant information and to comment on the proposed approach being adopted by the Applicant in relation to the onshore elements of the EIA.

113. Based on responses to the Scoping Report, further consultation and refinement of the CWP Project design, potential impacts to land, soils and geology scoped into the assessment are listed below in **Table 19-9**.

Table 19-9 Potential impacts scoped into the assessment.

Impact No.	Description of impact	Notes
Construction		
Impact 1	Excavation of contaminated land	Excavation works may disturb existing pockets of contamination, including C&D waste.
Impact 2	Potential for release of ground gas	Excavation works may disturb existing pockets of ground borne gas.
Impact 3	Soil settlement	Localised soil settlement can occur as a result of construction activities such as tunnelling, HDD and large excavations.
Impact 4	Risk of leaks or spills impacting on land and soils	Construction phase activities could give rise to leaks/ spills of material, such as cement, fuels, oils, or bentonite slurry.
Operation and Maintenance		
N/A	N/A	N/A
Decommissioning		
Impact 1	Excavation of contaminated land	Excavation works may disturb existing pockets of contamination, including C&D waste.

Impact 2	Potential for release of ground gas	Excavation works may disturb existing pockets of ground borne gas.
Impact 3	Soil settlement	Localised soil settlement can occur as a result of construction activities such as large excavations.
Impact 4	Risk of leaks or spills during decommissioning works impacting surrounding land and soils	Decommissioning phase activities could give rise to leaks/ spills of material, such as cement, fuels, oils, or bentonite slurry.

114. Based on responses to the Scoping Report, further consultation and refinement of the CWP Project design, the potential impacts to land, soils and geology scoped out of the assessment are listed below in **Table.19-10**.

Table.19-10 Potential impacts scoped out of the assessment.

Description of impact	Justification for scoping out
Impacts on geological heritage sites (construction, O&M and decommissioning phases)	There are no geological heritage sites within or in the vicinity of the onshore development area.
Damage to or loss of topsoil and subsoil (construction, O&M and decommissioning phases)	The dominant soil type within the onshore development area is classified as Made Ground (i.e., material which has been imported to the area for construction and development purposes). In addition, given the industrial and commercial nature of the area, there would only be minor instances of encountering topsoils during the construction phase. Overall, the soils would have a low geological significance. The damage or loss to topsoils and subsoils is not predicted to have significant effects and therefore has been scoped out of the assessment.
Change of land use (construction, O&M and decommissioning phases)	The OTI is situated within areas of existing port infrastructure, commercial and industrial operations. Future land uses within the peninsula are not predicted to change significantly. Overall, it is considered that due to the existing nature of the peninsula, and the nature of the OTI, there will be no measurable impact on land in terms of land use change. The change in land use is not predicted to have significant effects and therefore has been scoped out of the assessment.
Cross Contamination between soils and bedrock due to piling operations for the onshore substation and TJBs (construction and decommissioning phases)	Tubular piles at the onshore substation site will be installed to a depth of approximately 30 m, which could create a pathway between the soils and bedrock. However, given that no significant sources of soil contamination were identified at the onshore substation during the desk studies and SI's, it was considered that the potential for cross contamination to occur was minimal. Piles for the installation of the TJB's are approximately 2.5 m long and would not create a pathway to the bedrock environment, which is at depths of approximately 24 m at landfall.

Description of impact	Justification for scoping out
	Piling operations are not expected to take place in the decommissioning phase as they are generally used to facilitate the installation of structures, rather than removal. The potential for cross contamination into the bedrock is not predicted to have significant effects and has been scoped out of the assessment
Potential for release of ground gas (O&M phase)	No below ground confined spaces will be accessed by maintenance staff during the O&M phase. Tunnel shafts associated with the installation of the onshore export cables will be backfilled. There are no underground structures associated with the onshore substation that will be accessed during the O&M phase. Overall, it is considered that the potential for encountering accumulated ground gas, during the O&M phase is not significant, and therefore has been scoped out of the assessment.
Alteration in geological setting surrounding contaminated land (O&M phase)	During the installation of the landfall and onshore export cables, some contaminated land will be removed off-site and then replaced with clean imported materials i.e. such as the excavation and subsequent backfill of the tunnel shafts. On this basis, the geological setting will be permanently altered to contain clean, uncontaminated soils. Overall, it is considered that this alteration would have localised beneficial effects. However, it is not predicted to have significant effects, and therefore has been scoped out of the assessment.
Maintenance of the OTI which could result in leaks / spills of fuels and oils (O&M phase)	The onshore substation will be generally unmanned during the O&M phase. Some maintenance activities will involve the use of fluids / oils and fuels, which have the potential to cause contamination of land and soils should leaks/ spills occur. However the onshore substation will be constructed in accordance with the relevant design standards. The site will be capped with imported fill to build up the platform level during the initial construction phase and this fill will largely be covered with hardstanding material for the O&M phase. For equipment and tanks containing hazardous fluids, secondary containment in form of sufficiently sized bunds will be provided to prevent spillage and escape into the environment Spill kits will be in place and equipment will be appropriately maintained. Any potential spills are likely to be contained within the onshore substation buildings or would access the site drainage systems, which will include a Class 1 bypass separator and Class 1 full retention interceptor. Overall, the potential for contamination of land and soils during the O&M phase is not predicted to have significant effects and therefore has been scoped out of the assessment.
Impact on soils contaminated with onshore invasive and non-native species	Onshore invasive and non-native species are addressed in **Chapter 21 Onshore Biodiversity** and in the **Onshore Invasive Species Management Plan** provided with the planning application. Therefore they have been scoped out of the assessment.

19.8 Assessment parameters

Background

115. Complex, large-scale infrastructure projects with a terrestrial and marine interface such as the CWP Project, are consented and constructed over extended timeframes. The ability to adapt to changing supply chain, policy or environmental conditions and to make use of the best available information to feed into project design, promotes environmentally sound and sustainable development. This ultimately reduces project development costs and therefore electricity costs for consumers and reduces CO_2 emissions.

116. In this regard the approach to the design development of the CWP Project has sought to introduce flexibility where required, among other things, to enable the best available technology to be constructed and to respond to dynamic maritime conditions, whilst at the same time to specify project boundaries, project components and project parameters wherever possible, whilst having regard to known environmental constraints.

117. **Chapter 4 Project Description** describes the design approach that has been taken for each component of the CWP Project. Wherever possible the location and detailed parameters of the CWP Project components are identified and described in full within the EIAR. However, for the reasons outlined above, certain design decisions and installation methods will be confirmed post-consent, requiring a degree of flexibility in the planning consent.

118. Where necessary, flexibility is sought in terms of:

- Up to two options for certain permanent infrastructure details and layouts such as the WTG layouts;
- Dimensional flexibility; described as a limited parameter range i.e. upper and lower values for a given detail such as cable length; and
- Locational flexibility of permanent infrastructure; described as Limit of Deviation (LoD) from a specific point or alignment.

119. The CWP Project had to procure an opinion from An Bord Pleanála to confirm that it was appropriate that this application be made and determined before certain details of the development were confirmed. An Bord Pleanála issued that opinion on 25th March 2024 (as amended in May 2024) and it confirms that the CWP Project could make an application for permission before the details of certain permanent infrastructure described in **Section 4.3** of **Chapter 4 Project Description** is confirmed.

120. In addition, the application for permission relies on the standard flexibility for the final choice of installation methods and O&M activities.

121. Notwithstanding the flexibility in design and methods, the EIAR identifies, describes and assesses all of the likely significant impacts of the CWP Project on the environment.

Options and dimensional flexibility

122. Where the application for permission seeks options or dimensional flexibility for infrastructure or installation methods, the impacts on the environment are assessed using a representative scenario approach. A “representative scenario” is a combination of options and dimensional flexibility that has been selected by the author of this EIAR chapter to represent all of the likely significant effects of the project on the environment. Sometimes, the author will have to consider several representative scenarios to ensure all impacts are identified, described and assessed.

123. For land, soils and geology, the infrastructure design and installation techniques with potential to give rise to land, soils and geology impacts have been confirmed in the planning application and consequently the assessment is confined to a single scenario for all construction and O&M phase impacts.

124. Design parameters relevant to the assessment of Land Soils and Geology are outlined in **Table 19-11**.

Limit of deviation

125. Where the application for permission seeks locational flexibility for infrastructure, the impacts on the environment are assessed using a LoD. The LoD is the furthest distance that a specified element of the CWP Project can be constructed.

126. LoD within the onshore development area (landward of the high-water mark) are noted below in **Table 19-12**. This chapter assesses the specific preferred location for permanent infrastructure, however, the potential for the LoD to give rise to any new or materially different effects compared to those presented in **Section 19.10** of this chapter has been considered.

127. For land, soils and geology, a conclusion is provided in **Table 19-12** which confirms that the LoDs for the permanent infrastructure relevant to land, soils and geology will not give rise to any new or materially different effects. The LoDs are therefore not considered further within this assessment.

Table 19-11 Design Parameters relevant to assessment of land, soils and geology

Impact	Detail	Value	Notes / Assumptions
Construction			
Impact 1: Excavation of contaminated land	**Landfall**		Excavation works may disturb existing pockets of contamination, including C&D waste.
	Temporary Infrastructure		
	Dimensions of the temporary access ramp to the intertidal area for plant and equipment (including route from compound A) (L x W) (m)	60 x 10	
	Typical duration of temporary access ramp (months)	24	
	Duration of temporary footpath diversion (weeks)	8	
	Installation methods and effects		
	Area of site clearance at the TJBs (m^2)	2,200	
	Area of site clearance between TJBs and the High Water mark (HWM) (m^2)	2,200	
	Area of site clearance for temporary access ramp (m^2)	600	
	Permanent Infrastructure		
	Number of TJBs	3	
	TJB chamber dimensions (L x W x D) (m)	18 x 4 x 3	
	Number of link box chambers	6	
	Link box dimensions (L x W x D) (m)	2 x 2 x 3	
	Onshore Export Cables		
	Temporary Infrastructure		
	Number of tunnel shafts and temporary tunnel compounds	3	

	Combined area for temporary tunnel compounds for the onshore export cable route (m^2) *note: temporary tunnel compounds 1+3 are located within Compound A and the onshore substation site respectively*	20,215
	Installation methods and effects	
	Tunnel internal diameter (ID) (m)	3.0
	Tunnel outer diameter (OD) (m)	3.6
	Tunnel invert level (m) below ODM	-25.30
	Main compound launch shaft dimensions (m) below ODM	27.5
	Shellybanks road reception shaft dimensions (m) below ODM	27.5
	Onshore substation launch shaft dimensions (m) below ODM	28.63
	Overall duration to complete tunnel construction and cable duct installation (months)	21
	Number of tunnel shafts	3
	Onshore Substation	
	Installation methods and effects	
	Total footprint of temporary site clearance inc. access roads (m^2)	20,090
	ESBN Network Cables	
	Temporary Infrastructure	
	Number of temporary HDD compounds	2
	Combined area for temporary HDD compounds (m^2)	3,434

	note: temporary HDD compound 1 is located within Compound C & temporary HDD compound 2 is located within the Poolbeg 220kV substation site		
	Installation methods and effects		
	Number of open cut sections	1	
	Number of HDD Sections	1	
	Total Length of Open Cut/HDD trenching	400	
	Total Length of open cut section (m)	265	
	Total Lenth of HDD section (m)	135	
	Construction Compounds		
	Compound A area (m^2)	19,800	
	Compound B area (m^2)	32,300	
	Compound C area (m^2)	3,350	
	Compound D area (m^2)	360	
	Excavated materials – estimated volume of excavated materials		
	Volume of excavated material generated during the construction phase of the OTI and landfall (tonnes)	164,443	
Impact 2: Potential for release of ground gas	Refer to details for **Impact 1**		Excavation works may disturb existing pockets of ground borne gas.
Impact 3: Soil settlement	Refer to details for **Impact 1**		Localised soil settlement can occur as a result of construction activities such as tunnelling, HDD and large excavations.

Impact 4: Risk of leaks or spills impacting on land and soils	Refer to details for **Impact 1**	Construction phase activities could give rise to leaks/ spills of material, such as cement, fuels, oils, or bentonite slurry.
Operational		
N/A	N/A	N/A
Decommissioning		
Impact 1: Excavation of contaminated land **Impact 2:** Potential for release of ground gas **Impact 3:** Soil settlement **Impact 4:** Risk of leaks or spills during decommissioning works impacting surrounding land and soils	It is recognised that legislation and industry best practice change over time. However, for the purposes of the EIA, at the end of the operational lifetime of the CWP Project, it is assumed that all OTI will be removed where practical to do so. In this regard, for the purposes of an assessment scenario for decommissioning impacts, the following assumptions have been made: • The TJBs and onshore export cables (including the cable ducting) shall be completely removed. • The landfall cable ducts and associated cables shall be completely removed. • The underground tunnel, within which the onshore export cables will be installed shall be left in situ and may be reused for the same or another purpose. • The onshore substation buildings and electrical infrastructure shall be completely removed. • The reclaimed land, substation platform, perimeter structures and the new access bridge at the onshore substation site will remain in situ and may reused for the same or another purpose. • The ESBN network cables (including the cable ducting) shall be completely removed. The general sequence for decommissioning is likely to include: • Dismantling and removal of electrical equipment; • Removal of ducting and cabling, where practical to do so; • Removal and demolition of buildings, fences, and services equipment; and • Reinstatement and landscaping works. Closer to the time of decommissioning, it may be decided that removal of certain infrastructure, such as the TJBs, landfall cable ducts and associated cables, onshore export cables and ESBN networks cables, would lead to a greater	

	environmental impact than leaving the components in situ. In this case it may be preferable not to remove these components at the end of their operational life. In any case, the final requirements for decommissioning of the OTI, including landfall infrastructure, will be agreed at the time with the relevant statutory consultees. It is anticipated that for the purposes of an assessment scenario, impacts will be no greater than those identified for the construction phase

Table 19-12 Limit of deviation relevant to assessment of land, soils & geology

Project component	Limit of deviation	LoD impact summary
TJBs	0.5 m either side (i.e. east / west) of the preferred TJB location	No potential for new or materially different effects
Landfall cable ducts	Defined LoD boundary (see **Chapter 4 Project Description**)	No potential for new or materially different effects
Location of onshore substation revetment perimeter structure	Defined LoD boundary	No potential for new or materially different effects

19.9 Primary mitigation measures

128. Throughout the evolution of the CWP Project, measures have been adopted as part of the evolution of the project design and approach to construction, to avoid or otherwise reduce adverse impacts on the environment. These mitigation measures are referred to as 'primary mitigation'. They are an inherent part of the CWP Project and are effectively 'built in' to the impact assessment.

129. Primary mitigation measures relevant to the assessment of land, soils and geology are set out in **Table 19-13**. Where additional mitigation measures are proposed, these are detailed in the impact assessment in **Section 19.10**. Additional mitigation includes measures that are not incorporated into the design of the CWP Project and require further activity to secure the required outcome of avoiding or reducing impact significance.

Table 19-13 Primary mitigation measures

Project Element	Description
Construction	
Onshore export cable: tunnel installation	The construction of the tunnel and shafts may lead to some settlement of the ground above the tunnel. The following measures will be implemented as part of the installation works: • Specialist tunnelling contractors with a proven track record in delivering work of the scope required by the works will be appointed. • In advance of construction, further ground investigations will take place for the length of the tunnel. This will further inform existing ground information and ground models for the area. • The appointed contractor will implement good tunnelling practice to mitigate the potential for settlement impacts. These would include continuous working once the tunnelling operations commence, management of tunnel face pressure, groundwater control, spoil volume control and monitoring of ground levels above the tunnel throughout the tunnelling operation. • Assessments to address the potential sensitivity of services in proximity to the tunnel will be undertaken in advance of the tunnel construction commencing. Any required measures to support built services during tunnelling will be consulted on and agreed with the relevant utility service providers.
OTI: site selection	In general, the CWP Project has sought to specify the location, scale and extents of permanent and temporary infrastructure, however in some cases a degree of locational flexibility is required. Locational flexibility of permanent infrastructure is described as a Limit of Deviation (LoD) from a specific point or alignment. LoDs, described in **Chapter 4 Project Description**, are required to take account of additional ground condition data acquired during pre-construction site investigation surveys and results from pre-construction surveys.

19.10 Impact assessment

19.10.1 Construction phase

130. The potential environmental impacts arising from the construction of the CWP Project are listed in **Table 19-9** along with the parameters against which each construction phase impact has been assessed. A description of the potential effect on land, soils and geology receptors caused by each identified impact is given below.

Impact 1: Excavation of contaminated land

131. This impact relates to the excavation of potentially contaminated materials during the construction phase.

132. It is estimated that approximately 164,443 tonnes of soil materials will be excavated within the onshore development area, to facilitate construction works. The key activities requiring the management of excavated soil materials are the:

- Initial site clearance and site-preparation activities;
- Open-cut excavations through the berm at the landfall and installation of the landfall cable ducts;
- Excavation of the three temporary tunnel shafts;
- Arisings from the tunnel boring works for the onshore export cables;
- Preparation of the platform level at the onshore substation site, including management of existing stockpiles at this site;
- Excavation of the DPC turning circle at the onshore substation site;
- Open-cut excavations for the ESBN network cables; and
- HDD works for the ESBN network cables.

133. Made Ground is recorded across the landfall site and on the route of the onshore export cables up to 7.0 meters below ground level (mbgl). The main potential to mobilise contamination in these areas is associated with the disturbance of made ground to the north of the berm and in proximity to the TJBs, the open cut trench from the TJBs to the tunnel shaft and the tunnel shaft itself. The excavation of tunnel shaft will go through the Made Ground, finishing in the clay horizon, from where the tunnel will then be installed. The waste material observed in this area, at the shallower Made Ground levels, consisted of domestic and light industrial waste (e.g., paper, newspaper, plastic, bottles, timber).

134. The soils at the onshore substation site consist of Made Ground and this is described as light grey to greyish brown silty sand and gravel with occasional C&D fragments. The main risk of contaminated land is in the management of C&D material (e.g., concrete, brick, timber) associated with the existing stockpiles.

135. Fragments of suspected cemented asbestos were noted in trial pits within the onshore development area (See **Section 19.6.2** and **19.6.3**). Samples were taken from each trial pit location, and asbestos fibres were only found to be present at low concentrations (i.e., <0.01%) in four samples within the onshore development area.

136. A **Contamination Risk Assessment (CRA)** was undertaken for the OTI and is included in **Appendix 19.5.** Further details on the excavation management are provided in **Chapter 31 Waste and Resource Management** and the **Construction and Demolition Waste Management Plan (CDWMP)** submitted as part of the planning application.

Receptor sensitivity

137. The receptors are the underlying soils, which could be impacted from exposure to buried contaminated material and also construction workers due to the potential for dermal contact, ingestion or inhalation of impacted soil materials.

138. The waste material at the landfall site was placed at the site over 50 years ago and is largely degraded. The receptor sensitivity of the underlying soils and construction workers at the landfall site is Medium.

139. The receptor sensitivity of the underlying soils and construction workers at the onshore substation site and along the onshore export cables and ESBN network cables is Low.

Magnitude of impact

140. Whilst the risk of contaminated land is not uniform across the onshore development area, based on the criteria set out in Section 19.4 and Table 19-4, overall the magnitude of impact is considered Medium. This is taking account of the excavations required at the landfall site, where domestic and light industrial waste has been recorded.

- Based on the criteria set out in **Section 19.4** and **Table 19-4**, pre-mitigation potential effects are:
- Negative – effects will likely reduce the quality;
- Medium – the effects may change existing baseline conditions;
- Certain – Disturbance of the waste area will be generated by the construction works;
- Short term – construction is carried out across a 36-month period; and
- Reversible – potential effects can be mitigated and managed.

Significance of the effect

141. The sensitivity of the receptors at the landfall site is considered 'Medium' and the magnitude of impact is assessed as Medium. Therefore (as per the matrix in Table 19-5), the significance of effect at the landfall site is **Moderate**, which is considered significant in EIA terms due to the waste materials encountered at the landfall site during the SI's.

142. The sensitivity of receptors at the onshore substation site and onshore export cables is considered Low and the magnitude of the impact is assessed as Medium. Therefore (as per the matrix in **Table 19-5**), the significance of effect is **Slight/Not Significant,** which is considered not significant in EIA terms.

Additional mitigation

143. Clearance and land take will be kept to a minimum during the construction phase. The proposed construction work areas will be demarcated prior to the construction works commencing. All disturbed ground will be fully reinstated/backfilled following the completion of construction works.

144. Prior to construction, the **Appendix 19.5 CRA** and any subsequent information from SI's and ground gas/groundwater monitoring will be used to inform detailed risk assessments and the selection of appropriate construction procedures for the OTI. These risk assessments will also be used to inform the materials management strategy for the OTI (refer to the CDWMP provided with this planning application)

145. During excavation works, a watching brief will be implemented to identify the potential presence of previously unidentified contamination. Personnel appointed by the appointed contractor will be

appropriately trained for these activities. Any instances of previously unidentified contamination will be recorded, and appropriate measures developed to manage the identified risks as appropriate.

146. The risk to construction workers from asbestos fibres is considered low. The appropriate use of personal protection equipment (PPE) and the during earthworks dust suppression measures will mitigate this risk to construction workers. Refer to **Chapter 25 Air Quality** for dust suppression mitigation measures.

147. The **CDWMP** has been prepared in accordance with the Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects, published by the EPA in November 2021. The CDWMP outlines the approach for onsite and offsite waste management during the construction phase of the CWP Project. The CDWMP outlines key principles for the management of excavated soils during the construction phase. These include:

- Ensure that excavated material proposed for recovery/disposal off-site will be subject to contamination testing, to confirm it meets the acceptance criteria for an appropriate waste management facility;
- Ensure that those who remove excavated materials from site have the appropriate authorisation (i.e., are registered waste carriers); and those facilities that receive waste from the site hold a valid environmental permit or authorised exemption;
- All wastes that are removed off-site would be described on a waste transfer note or hazardous waste consignment note (as appropriate) that tracks the movement of the waste to the specified disposal or recovery facility;
- Should any asbestos-containing materials be encountered, these will be removed by a specialist asbestos removal contractor and disposed of as asbestos waste. All asbestos removal work must be carried out in accordance with the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations, 2006 (S.I. No. 386 of 2006) and Safety, Health and Welfare at Work (Exposure to Asbestos) (Amendment) Regulations 2010 (S.I. No. 589/2010);
- The appointed contractors should identify appropriate staff that are responsible for waste management and ensure that all contractor staff are aware of the appropriate reuse, recovery, or disposal routes for each waste.

148. It is currently assumed that the excavated material at the landfall site and the onshore substation site will not be suitable for re-use and will therefore be taken off-site for disposal. However, during the detailed design stage, maximising beneficial re-use of the excavated material on site will be prioritised over off-site disposal. The re-use of material will be subject to testing to confirm suitability in terms of composition and characteristics.

Residual effect

149. With the adoption of the additional mitigation measures, the magnitude of effect will be Low.

150. The significance of the residual effect at the onshore substation site and onshore export cables is therefore predicted to be **Not Significant** and the significance of the residual effect for the landfall site is predicted to be **Slight**, both of which are not significant in EIA terms.

Impact 2: Potential for release of ground gas

151. This impact relates to the release of ground gas to the environment during the construction phase.

152. The SI works indicate that only two locations P_BH22 and P_BH23 (landfall site) encountered landfill gas within the onshore development area. As the landfall site is an historical waste disposal area, the generation of gases would have reduced over the last 50-60 years. The natural geology is conducive to the breakdown of organic material and gas movement. The variability of the strata and the presence

of sand and gravel layers cannot be defined to the level required to consider the risk of migration through specific routes. It must be assumed that without suitable gas controls, there is a risk of off-site gas migration.

Receptor sensitivity

153. The receptors are the construction workers due to the potential for inhalation of ground gas from impacted soil materials.

154. The waste material at the landfall site was placed at the site over 50 years ago and is largely degraded. The receptor sensitivity of the construction workers at the landfall site is Medium.

155. The closest residential receptors to the landfall area are approximately 450 m from the landfall area (to Strand/Beach Road). There is no risk of ground gas to these receptors during the excavation works for the construction phase.

Magnitude of impact

156. For surface excavation works, any ground gas released to the surface will dissipate in open air and therefore the risk to construction workers is negligible.

157. The installation of the tunnel for the onshore export cable will require the use of a tunnel shaft at landfall, to facilitate the tunnel drive to temporary tunnel compound 2 (reception). The depth of the tunnel shaft will be 27.50 m below ODM.

158. Contamination indicator gases (methane, carbon dioxide, carbon monoxide) were elevated in BH22 and BH23 at landfall and there is potential that ground gas may accumulate in the tunnel shaft.

159. The magnitude of impact is considered Medium. Based on the criteria set out in Section 19.4 and Table 19-4, pre-mitigation potential effects are:

- Negative – effects will likely reduce the quality;
- Medium – the effects may change existing baseline conditions;
- Certain – Disturbance of the waste area will be generated by the construction works;
- Short term – construction is carried out across a 36-month period, with an approximately 21 month period for tunnel installation works; and
- Reversible – potential effects can be mitigated and managed.

Significance of the effect

160. The sensitivity of the receptor is considered Medium and the magnitude of impact is assessed as Medium. Therefore (as per the matrix in Table 19-5), the significance of effect at the landfall site is **Moderate**, which is considered Significant in EIA terms due to the waste materials encountered at the landfall site during the SI's.

Additional mitigation

161. The appointed contractor for the tunnel installation works will produce risk assessments to address ground gas during construction, for approval with the Applicant. The appointed contractor will also ensure that any necessary PPE is in place to avoid the exposure of construction workers to ground

gases in the tunnel shafts. This may include monitoring of gas levels within tunnel shafts and the use of portable gas analysers.

Residual effect

162. With the adoption of the additional mitigation measures the magnitude of effect will be Low. The significance of the residual effect is therefore predicted to be **Slight**, which is not significant in EIA terms.

Impact 3: Soil settlement

163. Localised soil settlement can occur as a result of construction activities including tunnelling for the onshore export cables, open cut at the landfall and the open cut / HDD at the ESBN network cables.

164. There is Made Ground of various material present across the onshore development area up to 7.0 mbgl, underlain by a sand and gravel deposit up to 20.7 mbgl at the substation and 17.8mbgl at the landfall, which in turn is underlain by firm to stiff clay (referred to as Dublin Boulder Clay).

165. The excavation of the three tunnel shafts will go through each of these soil horizons, all reaching the Dublin Boulder Clay, from where the tunnel will then be installed. The HDD installation for the ESBN network cables will be located in the sand and gravel deposits at its deepest level.

Receptor sensitivity

166. Potential receptors include existing infrastructure (i.e., utilities, buildings, roads and footpaths) that could be impacted by localised soil settlement.

167. Overall, this infrastructure is considered to have Medium sensitivity. This takes account of the level of underground utilities and infrastructure present within and in direct proximity to the onshore development area. Refer to **Chapter 26 Material Assets: Built Services** for more details.

Magnitude of impact

168. The primary mitigation measures associated with the tunnel installation are designed to manage the potential for soil settlement in proximity to the route. There are no open cut excavations, HDD installations or tunnelling within 5 m of any buildings. Based on the criteria set out in **Section 19.4** and **Table 19-4,** the magnitude of impact across the onshore development area is considered to be Low.

Significance of the effect

169. The sensitivity of the receptor is considered to be Medium and the magnitude of impact is assessed as Low. Therefore (as per the matrix in **Table 19-5**) an effect of **Slight**, sensitivity is predicted in terms of impact or damage to soil stability, which is not significant in EIA terms.

Additional mitigation

170. Based on the predicted level of effect additional mitigation is not required beyond the primary mitigation described in **Section 19.9**. However, the measures outlined below will also be implemented during the construction phase of the OTI and are proposed as a matter of good practice.

171. Measures to avoid or otherwise minimise impacts to existing utility asset owners / services providers within the onshore development area are described in the **Construction Environmental Management Plan (CEMP)**, submitted as part of this planning application and are summarised as follows:

- Utility assets / services (underground and overhead) will be identified and clearly marked prior to any pre-construction (site clearance) / construction / demolition activity occurring;
- Any proposed building works will require a minimum clearance distance of 1 m to either side of electrical cables;
- No excavations will take place without prior consultation with relevant utility asset owners / service providers;
- Prior to any mechanical excavation taking place, ESBN will be consulted with and the exact locations of all underground electricity cables established and verified;
- All works undertaken in the vicinity of underground assets will be carried out in accordance with current HSA guidance, namely the HSA 'Code of Practice for Avoiding Danger from Underground Services'; and
- All works will be undertaken in accordance with the exclusion and safe operating distances around electricity infrastructure as set out in the ESB Code of Practice, as well as the current HSA guidance. Liaison with asset owners / service providers will continue / be ongoing as required throughout the construction phase.

172. The contractor will ensure that excavations are carried out in accordance with recognised good practice guidelines (i.e., HSA – Health and Safety in Excavations and CIRIA Publication R97 – Trenching Practice).

173. The following mitigation applies to HDD installation methods along the ESBN network cables:

- Excavation works and activities shall be monitored and engineered to take account of soil properties in order to ensure any slopes will remain stable;
- Works which may have an impact on the stability of the soils in the area will also be taken into account (e.g., removal of contaminated soil, the use of imported soils and the subsequent changes to soil properties); and
- A Method Statement will detail the proposed method of construction to ensure the safety and stability of neighbouring properties/structures and land throughout the installation phase.
- Monitoring of adjacent buildings/structures and land will be undertaken during construction.

Residual effect

174. With the adoption of the additional mitigation measures outlined above, the magnitude of effect will be Negligible. The significance of the residual effect is therefore predicted to be **Imperceptible**, which is not significant in EIA terms.

Impact 4: Risk of leaks or spills impacting on land and soils

175. This relates to risk of consumables such as cement, fuels, oils, or bentonite slurry impacting the underlying soil environment.

176. A number of consumables such as oils, fuels and cement will be used during the construction phase.

177. Additionally, bentonite be used as part of the installation of the onshore export cables (associated with installation of the tunnel shafts and the tunnel boring) and ESBN network cables (use of HDD). For the tunnel and HDD works, a bentonite suspension will be used to help convey the soil cuttings out of the excavations. The bentonite and excavated material will be separated in a treatment plant, located in the temporary compounds. The bentonite will then be reused in the tunnelling/HDD process. It is noted that bentonite slurry used for the tunnelling and HDD installations is chemically inert and poses a low environmental hazard to the surrounding environment.

Receptor sensitivity

178. The dominant soil type within the onshore development area is classified as Made Ground (i.e., material which has been imported to the area for construction and development purposes) and the soils are located within an industrial area. Additionally, evidence of historically landfilled material has been recorded within the onshore development area. Overall, the soils would have a low geological significance and are classified as being a Low sensitivity receptor.

Magnitude of impact

179. Construction activities will be undertaken over a 36-month period. Leaks or spills could occur during this phase and depending on the scale of the incident, there may negative impacts on the underlying soil environment.

180. Based on the criteria set out in **Section 19.4** and **Table 19-4**, the magnitude of the potential impact is considered to be Low as it is considered that any spill/leaks that may occur would be small volumes and localised.

Significance of the effect

181. The sensitivity of land and soil receptor in the study area is considered to be Low and the magnitude of the impact is assessed as Low in the case of small, localised leaks and spills. Therefore (as per the matrix in **Table 19-5**), an effect of **Not Significant** is predicted, which is considered not significant in EIA terms.

Additional Mitigation

182. Based on the predicted level of effect, additional mitigation is not required beyond the primary mitigation described in **Section 19.9**. However, the measures outlined below will also be implemented during the construction phase of the OTI and are proposed as a matter of good practice. The measures are not intended to address the significance of effects.

183. The Applicant's contractors will adopt specific measures relevant to the prevention of discharge of contaminant material to water bodies. These are secured in the CEMP and will prevent immediate discharge of contaminated water and sediment from the onshore construction works. The measures include:

- Situating concrete and cement mixing and washing areas at least 10m away from the nearest water body. These areas will incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment will take place in a contained area and the water collected for disposal offsite;

- Storing all fuels, oils, lubricants and other chemicals in impermeable bunds with at least 110% of the stored capacity, with any damaged containers being removed from site. Refuelling would take place in a dedicated impermeable area, using a bunded bowser, located at least 10m away from the nearest water body, where practicable to do so;
- Ensuring that spill kits are available on site at all times as well as sandbags, stop logs and spill containment booms/socks for deployment on the outlets from the site drainage system in case of emergency spillages; and
- Foul drainage (e.g., wastewater from construction welfare facilities) will be collected through mains connection to an existing mains sewer (if such a connection is available) or collected in a waterproof alarmed holding tank located within the planning application boundary. The collected wastewater will be collected by a permitted haulier and transported off site for disposal at a licensed wastewater facility with appropriate treatment capacity within its existing permit.

184. In the event of a widespread leak or spill, the following measures shall be implemented in addition to the most up to date standard practices at the time of the event:

- The source of the leak or spill shall be cut off as soon as possible;
- Fuel/ oil shall be bunded immediately using spill containment booms/socks to prevent further spread;
- The relevant authorities shall be contacted including those who will be able to assist in the clean-up of the leak or spill; and
- A remediation plan shall be implemented to monitor and remediate the leak or spill.

Residual effect

185. With the adoption of the additional mitigation measures the magnitude of effect in terms of spills/leaks will be Negligible. The significance of the residual effect is, therefore, predicted to be **Imperceptible** which is considered not significant in EIA terms.

19.10.2 Decommissioning phase

186. It is recognised that legislation and industry best practice change over time. However, for the purposes of the EIA, at the end of the operational lifetime of the CWP Project, it is assumed that all OTI will be removed where practical to do so. In this regard, for the purposes of an assessment scenario for decommissioning impacts, the following assumptions have been made:

- The TJBs and onshore export cables (including the cable ducting) shall be completely removed.
- The landfall cable ducts and associated cables shall be completely removed.
- The underground tunnel, within which the onshore export cables will be installed shall be left in situ and may be reused for the same or another purpose.
- The onshore substation buildings and electrical infrastructure shall be completely removed.
- The reclaimed land, substation platform, perimeter structures and the new access bridge at the onshore substation site will remain in situ and may reused for the same or another purpose.
- The ESBN network cables (including the cable ducting) shall be completely removed.

187. The general sequence for decommissioning is likely to include:

- Dismantling and removal of electrical equipment;
- Removal of ducting and cabling, where practical to do so;
- Removal and demolition of buildings, fences, and services equipment; and
- Reinstatement and landscaping works.

188. Closer to the time of decommissioning, it may be decided that removal of certain infrastructure, such as the TJBs, landfall cable ducts and associated cables, onshore export cables and ESBN networks cables, would lead to a greater environmental impact than leaving the components in situ. In this case it may be preferable not to remove these components at the end of their operational life. In any case, the final requirements for decommissioning of the OTI, including landfall infrastructure, will be agreed at the time with the relevant statutory consultees.

189. The impacts of activities associated with decommissioning are not predicted to exceed those assessed for the construction phase. Furthermore, in most cases the impacts in terms of land, soils and geology receptors are expected to be of a shorter duration and of lesser magnitude than during construction.

19.11 Cumulative impacts

190. A fundamental component of the EIA is to consider and assess the potential for cumulative effects of the CWP Project with other projects, plans and activities (hereafter referred to as 'other development').

191. **Appendix 19-1 Cumulative Effects Assessment** presents the findings of the CEA for land, soils and geology, which considers the residual effects presented in **Section 19.10** alongside the potential effects of other proposed and reasonably foreseeable other development.

192. Only potential impacts assessed as 'not significant' or above are included in the CEA (i.e. those assessed as 'imperceptible' are not taken forward as there is no potential for them to contribute to a cumulative effect). Impacts associated with the excavation of contaminated land and the potential release of ground gas during the construction phase were taken forward for assessment in the CEA.

193. All residual impacts considered with the 'other developments' were predicted to be not significant.

19.12 Transboundary impacts

194. Article 7 of the consolidated EIA Directive 2011/92/EU provides the basis for consultation between Member States in relation to the likely significant effects of proposed development in one Member State on the environment in another Member State. The principal obligation is in respect of information and consultation and is imposed by Article 7(1).

195. There are no transboundary impacts with regard to land, soils and geology. The onshore development area will not be sited in proximity to any international boundaries. Transboundary impacts are, therefore, scoped out of this assessment and are not considered further.

19.13 Inter-relationships

196. The inter-related effects assessment considers the potential for all relevant effects across multiple topics to interact, spatially and temporally, to create inter-related effects on a receptor group. This includes incorporating the findings of the individual assessment chapters to describe potential additional effects that may be of greater significance when compared to individual effects acting on a receptor group.

197. The term 'receptor group' is used to highlight the fact that the proposed approach to the inter-relationships assessment has not assessed every individual receptor considered in this chapter, but instead focuses on groups of receptors that may be sensitive to inter-related effects.

198. **Chapter 5 EIA Methodology** provides a matrix to show at a broad level where across the EIAR interactions between effects on different receptor groups have been identified

199. The potential inter-related effects that could arise in relation to land, soils and geology are presented in **Table 19-14**.

Table 19-14 Inter-related effects (i.e., phase effects) assessment for land, soils and geology

Impact / Receptor	Related chapter within this EIAR	Phase Assessment
Impact 1: Excavation of contaminated land	**Chapter 27 Traffic & Transport**	Potential changes to ground conditions during the construction phase will generate excavated material for disposal off-site. The material will require disposal by HGVs, using the public road network, to appropriate waste management facilities. The effect of traffic movements associated with excavated material is assessed in **Chapter 27 Traffic &Transport**. Mitigation measures for the management of construction traffic are also presented within **Chapter 27 Traffic and Transport**. As a result of these mitigation measures the assessment predicts no significant effects on traffic-related receptors. Therefore, it is not anticipated that any inter-related effects, associated with excavated material will be produced that are of greater significance than those already identified.
Impact 1: Excavation of contaminated land	**Chapter 31 Waste & Resource Management**	Potential changes to ground conditions during the construction phase will generate excavated material for disposal off-site. This material will require disposal at appropriate waste management facilities. Waste management impacts are assessed **in Chapter 31 Waste and Resource Management**. Mitigation measures associated with waste management and disposal are also presented within **Chapter 31 Waste and Resource Management** and the **CDWMP**. As a result of these mitigation measures the assessment predicts no significant effects associated with the disposal of excavated materials at appropriate waste management facilities. Therefore, it is not anticipated that any inter-related effects, associated with excavated material will be produced that are of greater significance than those already identified.
Impact 1: Excavation of contaminated land	**Chapter 25 Air Quality** **Chapter 30 Human Health**	Potential changes to ground conditions during the construction phase could affect

Impact / Receptor	Related chapter within this EIAR	Phase Assessment
Impact 2: Potential for release of ground gas		the air quality by the mobilisation of dust and aerosols. The greatest potential effect is likely to occur during the construction phase, however mitigation measures to prevent impacts to air quality are presented in **Chapter 25 Air Quality** and **Chapter 30 Human Health**. As a result of these mitigations, the assessment predicts no significant effects to air quality or human health receptors. The IAQM Guidance used in the air quality chapter, assesses the potential for (i) dust soiling, (ii) human health and (iii) impacts on ecological receptors. Therefore, is not anticipated that any inter-related effects associated with excavated material will be produced that are of greater signi cance than those already identi ed. **Chapter 25 Air Quality** concludes that there will be no signi cant impact on any of these receptors
Impact 1: Excavation of contaminated land **Impact 4**: Risk of leaks or spills impacting on land and soils	**Chapter 7 Marine Water Quality** **Chapter 20 Hydrology and Hydrogeology**	Potential changes to ground conditions (including chemical quality) during construction could affect the quality and quantity of groundwater and any connected offshore land, soils and geology receptors. The greatest potential effect is likely to occur if contamination is encountered during the construction phase, however mitigation measures to prevent impacts to groundwater bodies are presented in **Chapter 20 Hydrology and Hydrogeology**. Similarly, the greatest potential effect is likely to occur if contamination is encountered during the construction phase at the marine /terrestrial land interface however mitigation measures to prevent impacts at the marine/ terre rial interface are presented in **Chapter 7 Marine Water Quality**. As a result of these mitigation measures outlined, the assessment predicts no significant effects to the quality and quantity of groundwater or marine water quality. Therefore, it is not anticipated that any inter-related effects to land, soils and geology receptors will be produced that are of greater significance than those already identified.

19.14 Potential monitoring requirements

200. No monitoring is required in relation to land, soils and geology.

19.15 Impact assessment summary

201. The potential effects on land, soils and geology were assessed for the construction, operation and maintenance and decommissioning phases of the CWP Project. Cumulative, transboundary and inter-related effects were also considered.

202. With the implementation of primary and additional mitigation measures, there will be no significant residual effects on the land, soils and geology environment.

203. A summary of the potential impacts and the residual effects are detailed in **Table 19-15**.

Table 19-15 Summary of potential impacts and residual effects

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance	Additional Mitigation	Residual effect
Construction						
Impact 1: Excavation of contaminated land	Underlying soils and construction workers	Low (At the onshore substation and along the onshore export cable) Medium (Landfall)	Medium	**Slight/Not Significant** (Onshore Substation and along onshore export cable) (not significant) **Moderate** (Landfall) (significant)	Yes, additional mitigation will be implemented as detailed in **Section 19.10.1**	**Not Significant** (Onshore substation and along onshore export cable) **Slight** (landfall) (not significant)
Impact 2: Potential for release of ground gas	Construction workers	Medium (Landfall)	Medium	**Moderate** (Landfall) (significant)	Yes, additional mitigation will be implemented as detailed in **Section 19.10.1**	**Slight** (Landfall) (not significant)
Impact 3: Soil settlement	Infrastructure & utilities	Medium	Low	**Slight** (not significant)	Additional mitigation is not required beyond the primary mitigation described in **Section 19.9**. However, the additional measures outlined in **Section 19.10.1** will be implemented as a matter of good practice.	**Imperceptible** (not significant)
Impact 4: Risk of leaks or spills	Underlying soils	Low	Low (small, localised	**Not Significant** (not significant)	Additional mitigation is not required beyond the primary mitigation described in **Section 19.9**. However, the measures	**Imperceptible** (not significant)

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance	Additional Mitigation	Residual effect
impacting on land and soils			leaks and spills)		outlined in **Section 19.10.1** will also be implemented as a matter of good practice.	
Operation and Maintenance						
Impacts associated with this phase were scoped out the assessment						
Decommissioning						
Impact 1: Excavation of contaminated land	The impacts of activities associated with decommissioning are not predicted to exceed those assessed for the construction phase. Furthermore, in most cases the impacts in terms of land, soils and geology receptors are expected to be of a shorter duration and of lesser magnitude than during construction. (not significant)					
Impact 2: Potential for release of ground gas						
Impact 3: Soil settlement						

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance	Additional Mitigation	Residual effect
Impact 4: Risk of leaks or spills during decommissioning works impacting surrounding land and soils						

19.16 References

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