FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 11 Water Quality & WFD

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11 WATER QUALITY & WFD

11.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as "the Proposed Development") on Water Quality & WFD compliance. This chapter considers the potential impacts to Water Quality & WFD compliance from the Project during the construction and operational phases of the Proposed Development.

The main objectives of this assessment are to:

- Undertake a desktop study of the existing Water Quality and WFD compliance trends to assess current environmental baseline conditions locally and nationally;
- Assess the potential impact of the proposed construction and operation phases of the Proposed Development on Water Quality and WFD compliance; and
- Recommend mitigation measures in relation to the proposed construction and operational and phases, if necessary, and predict residual impacts.

The assessment presented is informed by the following key chapters of the ES

- Chapter 2: Project Description
- Chapter 9: Coastal Processes

Other aspects relevant to Water Quality and WFD compliance are addressed in the specific chapters of the ES, namely:

- Chapter 16: Soils, Geology and Geohydrology

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

11.2 Purpose of this chapter

The primary purpose of the ES chapter is to provide an assessment of the likely direct and indirect significant effects of the Proposed Development on Water Quality and WFD Compliance. In particular, this ES chapter:

- Presents the existing environmental baseline established from desk studies, relevant datasets and consultation (section 11.6.1 and section 11.5);
- Identifies any limitations encountered in compiling the environmental information (section 11.13);
- Presents an assessment of the potential likely significant effects on Water Quality and WFD compliance arising from the Proposed Development (section 11.9.2 and section 11.9.3) based on the information gathered and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in section 11.12.
- Highlights any necessary monitoring (section 11.10.4) and/or measures (see section 11.10.2 and section 11.10.3) to prevent, minimise, reduce or offset the likely significant environmental effects identified in the assessment (section 11.9).

11.3 Study Area

The location of the proposed development lies within Cardigan Bay South coastal water body (GB621009580000) in the Western Wales River Basin District (WWRBD). Within the development area there are no direct surface freshwater inputs from rivers or streams. Potential inputs of freshwater in the vicinity of the development are restricted to direct precipitation (rainfall) and the entry of two surface water drainage outfalls (one of 500mm diameter and the other of 900mm diameter pipes) at the southern end of the harbour. There are two rivers which ultimately flow into the Cardigan Bay South water body to the south of this development, namely Goodwick Brook (GB110061038490) and Gwan River (via Gwaun Estuary) (GB11061038460). As the rivers are upstream of the development, it is unlikely that they will be impacted in terms of water quality and therefore have not been included in this assessment. The Gwaun Estuary has been included in this assessment, as it is hydrologically connected to Cardigan Bay South.

11.4 Policy Context

11.4.1 EU legislation and policy

11.4.1.1 Water Framework Directive (WFD)

The key focus of the water quality assessment is to ensure that the proposed development is undertaken in a manner which is consistent with the objectives of the Water Framework Directive (2000/60/EC) (WFD).

The WFD (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) was adopted by the European Commission in December 2000. The WFD is transposed into law in England and Wales by The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (hereafter referred to as 'the 2017 WFD Regulations'). The WFD is retained EU legislation and is still applicable in England and Wales as set out in sections 2 and 3 of the European Union (Withdrawal) Act 2018 and the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019. The 2017 WFD regulations require Secretary of State (SoS), Welsh Ministers, the Environment Agency and NRW to exercise their 'relevant functions' so as to secure compliance with the WFD (Regulation 3). Under the regulations the SoS, the Welsh Ministers, NRW, and each public body have a specific duty to have regard to the relevant River Basin Management Plan (RBMP), and any supplementary plans made under it, in exercising their functions. 'Having regard to' river basin management plans includes taking account of and considering the environmental objectives and summary of measures contained within the plan when exercising any functions and the effects of those functions on the objectives and measures within the plan (Planning Inspectorate, 2018).

A key requirement of the WFD is that surface water bodies attain at least good, and that there should be no deterioration in existing status.

For groundwater, the objective is to achieve good groundwater status, requiring both quantitative status and chemical status to be at least good. Therefore a WFD assessment must be conducted to ensure that the proposed development does not compromise these fundamental requirement of the WFD. The aim of conducting a WFD Assessment is to determine if specific components or activities related to the proposed development will compromise the attainment of a WFD objective or result in the deterioration in the overall status of any water body. This will determine whether it is possible to proceed with the scheme or whether amendments or mitigation measures are necessary. A separate WFD Assessment has been prepared based on the NRW guidance note GN078 - Complying with the WFD Regulations 2017.

The WFD requires the preparation of a Programme of Measures (POMs) outlining the steps that will be taken to meet WFD objectives as applicable to each water body. This Programme is contained within an overarching River Basin Management Plan (RBMP). One RBMP is prepared for each RBD and also contains information on water body status, objectives, and timescales. The RBMPs were published in 2009 in Wales for the first river basin management cycle from 2009 – 2015. The third cycle of river basin management plans (2021 – 2027) are now finalised and available on the Natural Resources Wales website.

In the context of the RBMPs, this development concerns the Cleddau and Pembrokeshire Coastal Rivers Management Catchment within the Western Wales RBD. Natural Resources Wales is responsible for producing the RBMP, there are, however a number of public authorities and organisations that are required to undertake their functions with due regard for the RBMP and the requirements of the WFD. These include regulators, deliverers, experts, and organisations representing the public in particular the voluntary sectors though Non-Governmental Organisations.

The proposed development proposals have been scoped to determine potentially significant effects in terms of current status and the WFD objectives for the Cardigan Bay South Coastal water body to determine what elements of the project have the potential to have a significant effect on the water environment and the environmental objectives of the water bodies affected. If the assessment concludes, after taking account of the mitigation proposed, that the proposal may either reduce the quality of any of the contributing elements of the status of the water bodies or prevent the quality elements from achieving the standards required in the RBMP, then this represents a failure to achieve the WFD objectives and the proposal should not go ahead unless justification for the new modification is demonstrated under Article 4.7 of the Directive. The four objectives of the WFD compliance assessment are:

1. Objective 1: To prevent deterioration of any contributing quality element to the status of the water body

2. Objective 2: To prevent the introduction of impediment to the attainment of Good WFD status for the water body
3. Objective 3: To ensure the attainment of the WFD objectives for the water body are not compromised
4. Objective 4: To ensure the achievement of WFD objectives in other water bodies within the same catchment are not permanently excluded or compromised.

11.4.1.2 Marine Strategy Framework Directive (MSFD)

Marine Strategy Regulations 2010 transpose the requirements of the EU's (Marine Strategy Framework Directive) into domestic law requires the UK to put in place measures to achieve or maintain Good Environmental Status (GES) in the marine environment.

The overarching aim of the Directive is to protect Europe's marine waters by applying an ecosystem-based approach to the management of human activities while enabling the sustainable use of the marine environment for present and future generations. The Directive establishes a legal framework for the development of marine strategies designed to achieve GES in the marine environment by the year 2020 (EU, 2008). The marine strategy involves defining GES, setting environmental targets and indicators, implementing monitoring programmes for ongoing assessment, and developing and implementing programmes of measures to achieve or maintain GES.

GES is defined as 'the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations.'

The assessment of GES is undertaken by reference to qualitative descriptors which define overarching objectives in respect of key socio-economic or ecological aspects of the marine environment. Those relevant to water quality include:

- eutrophication; and
- contaminants.

11.4.2 National legislation and policy

11.4.2.1 The Environmental Permitting (England and Wales) Regulations 2016

These regulations were introduced to provide a framework for controlling activities that may affect the water environment including engineering activities, discharges, and abstractions.

11.4.2.2 The Bathing Water Regulations 2013

The Bathing Wate Regulations 2013 details quality standards for bathing water sites across Wales. It is a requirement for each bathing location and maintain a bathing water profile for each designated site to monitor water quality and to inform the public of water quality incidents that may arise at these locations.

11.4.2.3 The Urban Waste Water Treatment (England and Wales) Regulations 1994

The Urban Waste Water Treatment (England and Wales) Regulations 1994, these regulations implement the Urban Waste Water Treatment Directive (91/271/EC) in Wales aiming to protect the environment from the adverse effects of the collection, treatment, and discharge of urban waste water.

11.5 Consultation

The relevant consultee responses for this chapter of the EIAR is outlined in Table 11.1. Chapter 5: Scoping and Consultation provides details on the types of consultation activities undertaken for the Project between 6 December 2024 and 15 January 2025 and the consultees that were contacted.

Table 11.1: Summary of key consultation issues raised during consultation activities undertaken for the Project relevant to water quality and the WFD.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
31 January 2025	Natural Resource Wales (NRW) Inclusion of Water Resources in EIA	NRW agree that potential impacts on water and benthic environment from resuspension of sediment bound contaminants from dredging activities in construction and operation phase to be included in EIA	To be included in EIA Water Resources and WFD chapter

11.6 Methodology to inform the baseline

11.6.1 Desktop study

Information on water environment within the Water Resources and WFD Compliance Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 11.2: Summary of key desktop reports. These sources provide the most up to date data for this assessment.

Table 11.2: Summary of key desktop reports.

Title	Source
WFD Cycle 3 Coastal Waterbodies	Natural Resource Wales (NRW, 2021a)
WFD Cycle 3 Transitional Waterbodies	Natural Resource Wales (NRW, 2021b)
Dee and Western Wales River Basin Management Planning (RBMP) Measures and Objectives	Natural Resource Wales(NRW, 2021c)
RBMPs 2021-2027 Register of Protected Areas	Natural Resource Wales(NRW, 2022)
Abermawr Bathing Water Profile	Natural Resource Wales (NRW, 2024a)
Newport North Bathing Water Profile	Natural Resource Wales (NRW, 2024b)
Joint Nature Conservation Committee (JNCC) Natura 2000 Sites Conservation Management Objectives	JNCC (JNCC 2008, 2009a, 2009b, 2019)

11.6.2 Site-specific surveys

No site-specific water quality baseline surveys were undertaken as part of the assessment. The baseline data presented in this section is derived from Natural Resource Wales and JNCC and may be taken as representative of the background conditions.

Sediment sampling was undertaken as part of the agreed Sampling Plan for the development and analysed against actions levels. These Action Levels are used to determine the contaminant loading of the material and its suitability for disposal at sea.

11.7 Assessment Methodology

The methodology and associated impact assessment had regard to the general guidance regarding the undertaking of an EIA, as presented in Chapter 4: Environmental Impact Assessment Process and Methodology and the following specific guidance as follows:

- NRW Guidance Note (GN078);
- Institute of Environmental Management and Assessment (IEMA, 2015) Guidance for Environmental Impact Assessment.

11.7.1 Impact assessment criteria

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 4: Environmental Impact Assessment Process and Methodology.

The criteria for defining impact magnitude in this chapter are outlined in Table 11.3 below

Table 11.3: Definition of terms relating to the magnitude of an impact.

Magnitude of impact	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).

The criteria for defining receptor sensitivity in this chapter are outlined in Table 11.4 below.

Table 11.4: Definition of terms relating to the sensitivity of the receptor.

Sensitivity	Definition
High	High importance and rarity, national scale, and limited potential for substitution. Those affected will not be able to adapt to changes and continue to maintain-pre impact status.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution. Able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.
Low	Low or medium importance and rarity, local scale Those affected are able to adapt with relative ease and maintain pre-impact status.
Negligible	Very low importance and rarity, local scale Those affected are able to adapt easily and maintain pre-impact status.

The significance of the effect upon water resources is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 11.5. Where a range of significance of effect is presented in Table 11.5, the final assessment for each effect is based on calculated assessment and professional judgement.

For the purposes of this assessment, any effects with a significance level of minor or less have been concluded to be not significant in terms of the EIA process.

Table 11.5: Matrix used for the assessment of the significance of the effect.

Magnitude of Change		Sensitivity of Receptor / Receiving Environment to Change / Effect			
		High	Medium	Low	Negligible
	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

11.8 Baseline Environment

11.8.1 WFD Status

Cardigan Bay South coastal water is a large coastal water body of 163.84km^2 and is currently at Good ecological status and High chemical status. The typology of the Water Body is exposed mesotidal, which means the water body has an intermediate tidal range, where the difference in height between high and low waters is between 1 and 5 metres.

The Gwaun Estuary is a small transitional water body of only 0.18km^2 and is currently at Moderate ecological status and High chemical status. The typology is considered ‘Mixed, meso, extensive intertidal. The Nyfer Estuary is a transitional waterbody and is currently at Moderate ecological status and Moderate chemical status. The typology is considered ‘

Despite Port activities, no waterbody of the TraC (Transitional or Coastal) water bodies included in this assessment have been designated as Heavily Modified Water Bodies (HMWB). Table 11.6: WFD water body status classification 2021 and Figure 11.1 outline the WFD baseline data including current overall, ecological, and chemical status for 2021 and its supporting elements.

Table 11.6: WFD water body status classification 2021

WBID	GB521006110500	GB621009580000	GB5110066115200
Name	Gwaun Estuary	Cardigan Bay South	Nyfer Estuary
Country	Wales	Wales	Wales
RBD Description	Western Wales	Western Wales	Western Wales
WB Type	Transitional	Coastal	Transitional
Catchment	Cleddau and Pembrokeshire Coastal Rivers TraC	Cleddau and Pembrokeshire Coastal Rivers TraC	Cleddau and Pembrokeshire Coastal Rivers TraC
Region	WA South West	WA South West	WA South West
Area (km^2)	0.18	163.8	2.7
HMWB	No	No	No
Overall Status	Moderate	Good	Moderate
Chemical Status	High	High	Moderate
Ecological Status	Moderate	Good	Moderate
Mitigation Measures Assessment	N/A	N/A	N/A
Macroalgae	High	High	Good
Opportunistic Macro algae	High	High	Good
Invertebrates	Not Available	Not Available	Moderate
Morphology	Not High	Not High	High
Hydrological Regime	Not High	Not High	Not Available
Flow	Not Available	Not Available	Not Available
DO	Not Available	Not Available	High

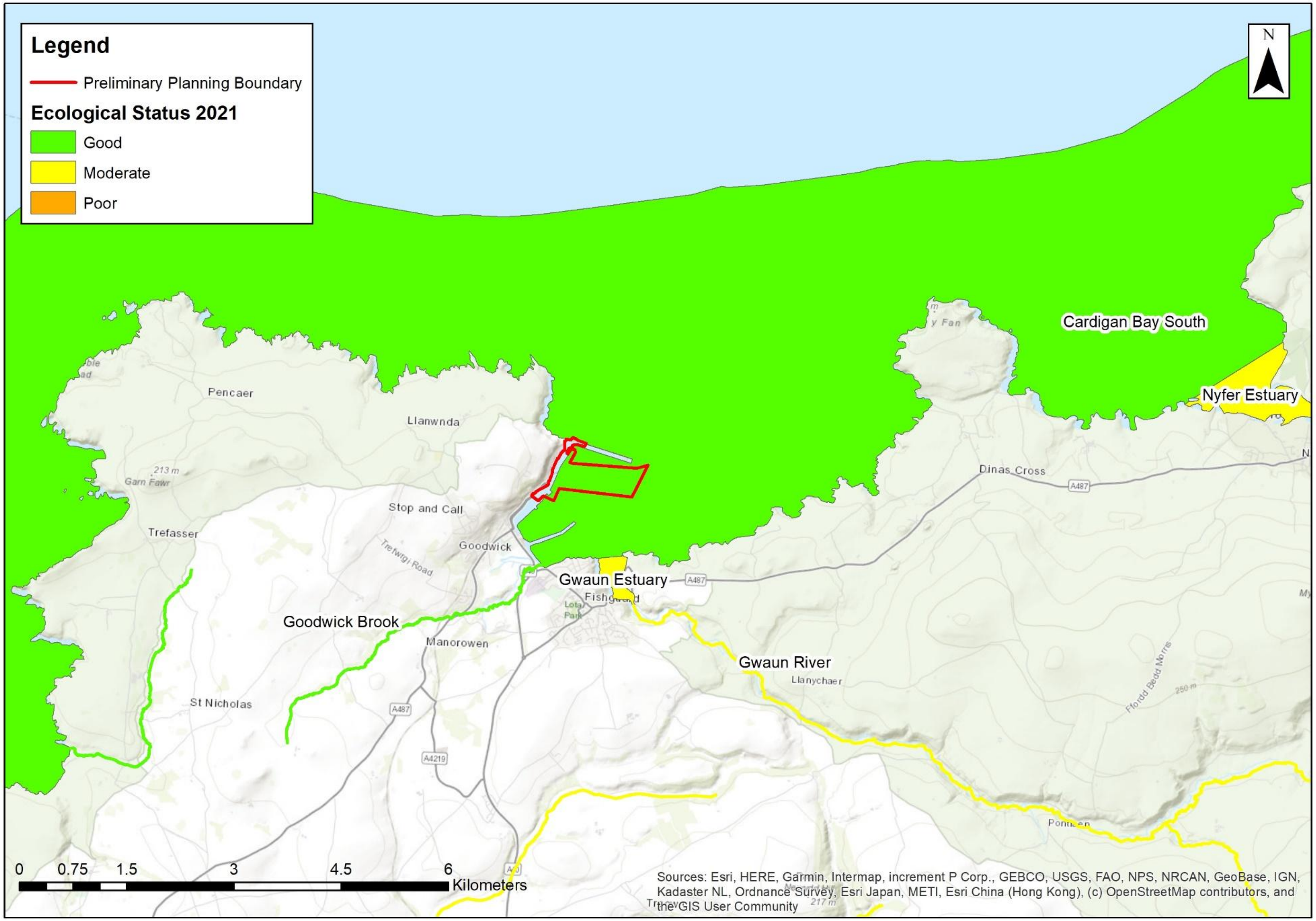

Figure 11.1: WFD water body status 2021

11.8.2 WFD Protected Areas

A significant proportion of waters in the Western Wales RBD are protected under existing EU legislation requiring special protection due to their sensitivity to pollution or their particular economic, social, or environmental importance (Figure 11.2). All these areas requiring special protection in the RBD have been identified by Natural Resources Wales, then mapped and listed in a register of protected areas (required under Article 5 of the WFD Directive). The register of protected areas includes:

- Drinking water protected areas;
- Economically protected areas;
- Recreational waters;
- Nutrient Sensitive areas;
- Special Protection Areas (SPAs); and
- Special Areas of Conservation (SACs).

A number of protected areas, listed on the register are located within or in water bodies adjacent to the Cardigan Bay South water body and therefore the proposed development site. These protected areas have their own monitoring and assessment requirements to determine their condition. They are often assessed for additional pollutants or requirements relevant to their designation. For example, faecal coliform levels are assessed within shellfish and bathing waters. It is important that proposed mitigation ensures the standards required for these protected areas are met, otherwise a water body which otherwise meets the requirements of the WFD, may have the status reduced to “less than good” as it is not meeting the protected area objectives.

11.8.2.1 Shellfish Water Protected Areas

Shellfish Waters Protected Areas are designated as a protected area under the WFD and all shellfish protected waters have an objective that ‘good’ water quality as defined by (Council Directive 2006/113/EC), is maintained within these areas to ensure the production of high-quality shellfish.

There are no shellfish areas designated under the Shellfish Water Directive (2006/113/EC) within 20km of Fishguard Bay.

11.8.2.2 Bathing Water Protected Areas

The closest designated EU bathing water beach is at Abermawr, 7.6km SW, and Newport North, 9km NE of the Proposed Development, respectively. Bathing water quality is monitored at Newport North which typically achieves a high water quality standard. Abermawr and Newport North bathing waters were classified as having ‘Excellent’ water quality in 2023 bathing water season.

11.8.2.3 National Sites Network (Special Areas of Conservation (SACs)/Special Protection Areas (SPAs))

The National Site Network for SACs and SPAs are included in the Register of Protected Areas included within the RBMP which helps to ensure that water bodies within these areas are managed and that they achieve the objectives required by the Water Environment (Register of Protected Areas) (Wales) Regulations (2017) to protect the Conservation Objectives of water dependant SACs and SPAs.

Cardigan Bay South hosts important protected areas such as the West Wales Marine/Gorllewin Cymru Forol SAC, Cardigan Bay SAC and the Pembrokeshire Marine/Sir Benfro Forol SAC. Ramsey and St David's Peninsula Coast SPA is also within the Cardigan Bay South water body. Table 11.7 outlines the distance from the proposed development to each protected area. The location of the protected areas close to the Proposed Development are illustrated in Figure 11.2: WFD Protected Areas.

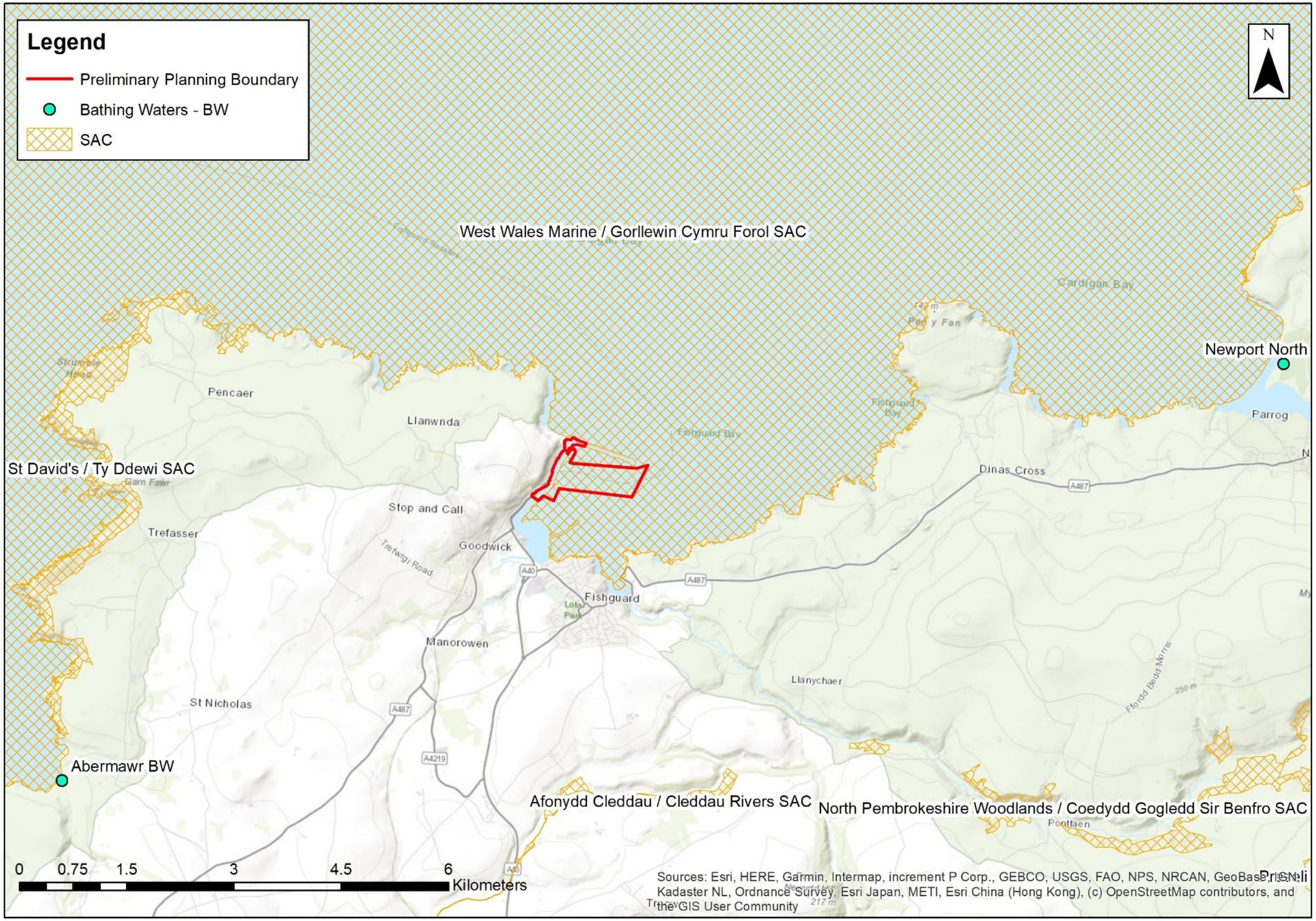

Figure 11.2: WFD Protected Areas

Table 11.7: SACs and SPAs in the context of Proposed Development

Protected Areas	Distance and Direction to the Proposed Development
West Wales Marine/Gorllewin Cymru Forol SAC	Proposed Development occurring within this waterbody
Afonydd Cleddau/Cleddau Rivers SAC	4 km SE
St David's/Ty Ddewi SAC	4.6 km W
North Pembrokeshire Woodlands/Coedydd Gogledd Sir Benfro SAC	4.6 km SE
Cardigan Bay SAC	15.4 km NE
Pembrokeshire Marine/Sir Benfro Forol SAC	16.7 km SW
Ramsey and St David's Peninsula Coast SPA	20.6 km SW

11.8.2.4 Marine Protected Areas (MPAs)

A marine protected area is any area of sea or shore that is protected by law for the conservation of habitats, species, or other natural features. The UK has signed up to international agreements that aim to establish an 'ecologically coherent network of Marine Protected Areas (MPAs).' This network will be made up of current MPAs as well as newly designated Marine Conservation Zones (MCZs). Each of the UK Administrations is responsible for designating Marine Conservation Zones, for the protection of nationally important habitats and species, in their territorial waters (out to twelve nautical miles). The Marine and Coastal Access Act 2009 allows for the designation of Marine Conservation Zones (MCZs) anywhere in English and Welsh territorial and UK offshore waters for the protection of nationally important marine wildlife, habitats, geology, and geomorphology.

In Wales there are a total of 132 MPAs which protect species and habitats including those already listed in the National Sites network. Proposed and Candidate SPAs and SACs are protected under MPA Legislation. The West Wales Marine SAC has been identified as an area of importance for harbour porpoise. The site is three times the size of Snowdonia National Park covering 7,376km^2. The SAC encompasses the entire Cardigan Bay South water body and thus the Proposed Development site. The area included within the site covers important summer habitat for harbour porpoise, while part of the site in Cardigan Bay was also identified as important during the winter.

11.8.3 MSFD Status

The Proposed Development is located within the Celtic Seas MSFD sub region. A summary of progress towards the achievement of Good Environmental Status (GES) under the MSFD is provided in Table 11.8.

Table 11.8: Progress Towards GES

Qualitative Descriptor	GES Achieved	Trend since Period 1	Commentary
Biodiversity – cetaceans	Partially achieved	Stable	The status of coastal bottlenose dolphin and minke whale are consistent with the achievement of GES in the Greater North Sea, but unknown/uncertain elsewhere.

Qualitative Descriptor	GES Achieved	Trend since Period 1	Commentary
Biodiversity - birds	Partially achieved	Improving	The UK has achieved GES for grey seals in Celtic Seas. The abundance of harbour seal is unknown in Celtic Seas.
Biodiversity - fish	Not achieved	Improving	Demersal fish communities are recovering from over-exploitation in the past, but GES has not yet been achieved in the Celtic Seas. A partial assessment of pelagic fish did not provide a clear result.
Biodiversity – pelagic habitats	Partially achieved	Stable	Prevailing environmental conditions are likely to be driving the observed changes in plankton communities but human activities cannot be ruled out and it is uncertain whether GES has been achieved
Biodiversity – benthic habitats	Not achieved	Stable	The achievement of GES is uncertain for intertidal and soft sediment habitats. The levels of physical damage to soft sediment habitats are consistent with the achievement of GES in UK waters to the West of the Celtic Seas, but not in the Celtic Seas. Sublittoral rock and biogenic habitats have not yet achieved GES.
Non-indigenous species (NIS)	Not achieved	Stable	The UK has not yet achieved its aim of GES for non-indigenous species (NIS). Our ability to detect new NIS has improved but there has been no significant change in the number of new records of NIS made between 2003 and 2014.
Commercially exploited fish and shellfish	Not achieved	Improving	The UK has achieved its aim of GES for some commercially exploited fish. In 2015, 53% of marine fish (quota) stocks were fished below maximum sustainable yield (MSY). Most national shellfish stocks have either not yet achieved GES or their status is uncertain. The percentage of quota stocks fished below MSY and the proportion of marine fish spawning stock biomasses capable of producing MSY have increased significantly since 1990.
Food webs	Achieved	Stable	The extent to which Good Environmental Status has been achieved is uncertain: plankton communities are changing; some fish communities are recovering, but others are not; breeding seabird populations are in decline; grey seal numbers are increasing and trends in cetacean populations are unclear. It is known that components of the marine food web are changing, but it is not clear how they are affecting each other.
Eutrophication	Achieved	Stable	The UK has largely achieved its aim of GES for eutrophication. A small number of eutrophication problems remain in coastal and estuarine waters, representing 0.03% of the UK Exclusive Economic Zone, and 0.41% of estuarine and coastal waters.
Changes in hydrographic conditions	Achieved	Stable	The UK continues to achieve its aim of Good Environmental Status for hydrographical conditions.

Qualitative Descriptor	GES Achieved	Trend since Period 1	Commentary
Contaminants	Achieved	Improving	The UK has largely achieved its aim of Good Environmental Status for contaminants. Concentration of hazardous substances and their biological effects are generally meeting agreed target thresholds. Highly persistent legacy chemicals are the cause of the few failures, mainly in coastal waters close to polluted sources.
Contaminants in seafood	Achieved	Improving	The UK has achieved its aim of Good Environmental Status for contaminants in seafood. There is a high level of compliance with agreed safety levels.
Litter	Not achieved	Stable	The UK has not yet achieved its aim of Good Environmental Status for litter. Beach litter levels in the Celtic Seas have remained largely stable since the assessment in 2012, whilst beach litter levels in the Greater North Sea have increased.
Introduction of anthropogenic sound	Partially achieved	Stable	The achievement of Good Environmental Status for underwater noise in the UK is uncertain. Research and monitoring programmes established since 2012 have provided an improved understanding of the impacts of sound on marine ecosystems

11.8.4 Sediment Sampling Plan

In the UK, chemical action levels (cAL) are used as part of a ‘weight of evidence’ (WOE) approach to licencing the disposal of dredged material. The NRW are advised on the application of action levels in marine licencing by their scientific advisors, the Centre for Environment, Fisheries and Aquaculture Science (Cefas). Contaminant levels in dredged material below chemical Action Level 1 (cAL1) are generally assumed to be of no concern and are unlikely to influence the licencing decision (MMO, 2015)

Grab sediment samples at shallow depths and vibrocore samples taken at depth were collected in 2025 at five locations within the footprint of the development in accordance with the sampling plan agreed with NRW. The sediment samples were analysed for several parameters and compared against the chemical action levels, namely;

- Arsenic, Mercury, Cadmium, Chromium, Copper Nickel, Lead, Zinc, Organotins (Tributyltin (TBT) and Dibutylin (DBT)), Polychlorinated biphenyls (PCBs, Organochlorine pesticides (OCPs) and Polybrominated diphenyl ethers (PBDEs).

The sediment analysis results of the samples taken from the proposed dredging areas within the development footprint Fishguard Bay area were below the cAL2 for all parameters considered by NRW in assessing the suitability of dredged material for dumping at sea, with the exception of Zinc at one vibrocore (VC003) at a depth of 3 metres within area of land reclamation which exceeds cAL2. This is thought to be associated with a coal layer found in the results as the port was used as a ‘coal bulking station’ in the 1920s and 1930s to transport coal to vessels off shore. Cadmium, mercury and lead were above cAL1 but below cAL2 at two locations, VC003 and VC009 with all other trace metals being below cAL1. All other parameters were below cAL2 and, for Organotins and PCBs the concentrations were all below cAL1.

11.9 Impact Assessment

11.9.1 Do Nothing Scenario

If the Proposed Development does not proceed as planned, there would be no impact upon water bodies achieving their water body objectives where the Fishguard ferry terminal is located. However, long term berthing of the Fishguard to Rosslare ferry service would not be possible which would negatively impact upon the operations and overall future development and expansion of the Fishguard Port.

11.9.2 Assessment of Construction Effects

Given the WFD Status of Cardigan Bay South, which is currently at good status and therefore must not be allowed to deteriorate, and the associated water dependent protected areas of international and national importance the sensitivity of the receiving environment is considered to be high based on the criteria outlined in Table 11.4 and therefore the significance of effect is assessed on this basis.

The key issues identified with regard to water quality are associated with the physical disturbance in the marine environment and adjacent lands due to, dredging, demolition and construction activities and the required removal of waste materials off-site. The potential impact arising from the physical disturbance includes sediment dispersal from dredging activities, concrete or fuel/chemicals entering the port. During the operational phase, the potential for the Proposed Development to impact on coastal processes and morphology of Fishguard Port is considered; additional pressures associated with sewage, storm water drainage and accidental spillages potentially impacting on water quality are also assessed.

11.9.2.1 Suspended Sediment and Dredging

Demolition of Structures

The RNLI Slipway, suspended slab and buffer dolphin structures are all reinforced concrete marine structures. The demolition arisings from these structures may be temporarily placed on the seabed in the immediate vicinity of the respective structure before being removed prior to the construction of the reclaimed area. All demolition arisings shall be disposed of to an appropriate offsite disposal facility.

Surface water quality could be impacted during the demolition works outlined above through the generation of sediment plumes during pile removal, or during site clearance by exposing soils/rubble to erosion by rainwater and drainage water run-off from the site.

Dredging

To enable the construction of the new reclamation area, dredging of soft material behind the new berth is proposed up to a depth of 4 metres across the reclamation area. To ensure sufficient depths for berthing, dredging to a depth of -9mCD is required for operation activities in Area A. Capital and Maintenance dredging will remove material to a range of depths of between -7.3mCD (Area B and C) and -6.8mCD (Area E) in the berth and channel and -5.5mCD (Area H) to the north of the harbour. In total, 50,000m^3 of material will be removed by capital dredging These activities have the potential to cause dispersal of sediment within and to adjacent water bodies in Cardigan Bay South coastal water body. Capital dredging will be conducted within the footprint of the proposed development and will be carried out using Trailer Suction Hopper Dredger (TSHD) and Backhoe Dredger.

Suspended sediment levels can hold potentially hazardous contaminants such as heavy metals. As outlined in Section 11.8.4 the sediment analysis results identified a pocket of heavy metal contamination (zinc) at a 3 metre depth at one of the vibrocore,(VC003) which is within the area of land reclamation

Coastal processes modelling outlined in Chapter 9 provides an assessment of the impact of the Proposed Development on coastal processes and includes sediment plume and deposition modelling undertaken for dredging during the construction phase of the proposed development. The modelling and studies for coastal processes have shown the proposed development will have no significant impact on coastal processes away from the immediate area around the site. In Areas A, B, C, E and H and the reclamation area where increased suspended sediment concentration will arise from dredging activities, there will be a negligible effect on the suspended solids concentrations where increased in suspended solids are very localised within the harbour area and do not extend into the wider coastal water body. The coastal processes chapter concluded that the effects on coastal process will not be significant. There will be limited change to the tidal current regime (current speed generally limited to +/- < 1cm/s) within Fishguard. Therefore there will no effect upon tidal regime during the operation of the Proposed Development.

Land Reclamation

The land reclamation area will be formed with imported crushed rock fill material protected by a rock armour revetment. The rock armour revetment will have a toe detail which will tie into the scour protection proposed to the dredged slope behind the berth. The placement of the rock armour and the crushed rock fill has the potential to increase suspended solids concentrations locally

Bankseat and guide pile construction

Pile installation operations have the potential to cause a temporary increase in suspended sediment due to disturbance of the riverbed materials causing the resuspension of sediments in the water column leading to localised reduction in water quality.

Impact Assessment

The magnitude of impact of increased suspended sediment from the demolition, construction and dredging activities on water quality is considered to be high given the localised contamination identified in the area of the land reclamation (vibrocore VC003). The significance of effect is therefore major adverse in the absence of mitigation measures based on a high sensitivity of the receiving environment. The impact duration is temporary and for short term.

11.9.2.2 Cement and Concrete Pollution

The impacts in relation to concrete for the Proposed Development are associated with demolition of existing concrete structures such as the buffer dolphin tower structure and the disused RNLI jetty. The construction of concrete bank seat structure and concrete piling works, the reconfiguration of the terminal and infilling/reclamation works can contribute to cement and concrete pollution.

Demolition works and construction works can generate high volumes of high alkaline dust and fresh cement and concrete can contribute to contaminant runoff in the absence of mitigation, which may be transported into the water column and pose detriment to the water environment, especially marine life. Therefore, it is essential that the use of wet concrete and cement in or close to any water body is carefully controlled so as to minimise the risk of any material entering water courses.

The magnitude of impact of concrete and cement is considered to be high. The significance of effect is therefore major adverse in the absence of mitigation measures based on a high sensitivity of the receiving environment. The impact duration is temporary and for short term.

11.9.2.3 Accidental Spillages of Oils, Fuels and Chemicals

During construction works, there is potential for accidental spillages of oils, fuels and chemicals from plant and equipment adjacent to the Cardigan Bay South coastal water body. There is potential for such substances to contribute to surface runoff and may enter the marine environment.

The magnitude of the potential impact arising from the accidental spillages of oils, fuels and chemicals is considered to be high. The significance of effect is therefore major adverse in the absence of mitigation measures based in a high sensitivity of the receiving environment. The impact duration is temporary and for short term.

11.9.3 Assessment of Operational Effects

11.9.3.1 Maintenance Dredging

Maintenance dredging is to be carried out to ensure the Port area is operational at all times. Maintenance dredging is proposed to carried out over the next 5 years subject to licence approval. It is anticipated that Stena Line’s existing regular maintenance dredging activities will continue. Any impact from such maintenance works associated with this new proposal can be considered negligible/imperceptible.

The magnitude of the potential impact arising from maintenance dredging is considered to be low. The significance of effect is therefore moderate adverse in the absence of mitigation measures based in a high sensitivity of the receiving environment. The impact duration is temporary and for short term.

11.9.3.2 Surface Water Drainage

Surface water drains installed in new hardstand areas in the reclaimed area and the reconfigured road network on the landside have the potential to provide pathways for a wide range of contaminants arising from general port operations to the aquatic environment. Direct pathways also exist within the immediate landside hinterland of facilities. Such pollutants may derive from spillages, vehicle operation, atmospheric deposition, erosional losses and leakages. The main potential pollutants from surface water drainage or direct run-off are sediment, hydrocarbons, and trace contaminants including metals and organics.

The magnitude of the potential impacts arising from contaminated surface water run-off from the new berthing, hardstanding areas and roads entering the aquatic environment directly or via the surface water drainage system would potentially have low adverse impacts on water quality in the area depending on the volumes released. The significance of the environmental effect is therefore moderate adverse in the absence of mitigation based on the high sensitivity of the receiving environment over the long term.

11.10 Mitigation

11.10.1 Dredging mitigation

The key mitigation for the dredging activities is to avoid the disturbance of the layer of contamination found at 3 metre depth (-3.43m to -3.53m C.D). The design has been developed to ensure that the contaminated sediments at 3 metre depth will not be disturbed when the land reclamation activities are being undertaken. The section in Figure 11.3 demonstrates that the design and the approximate extent of material to be removed will avoid this contamination at depth.

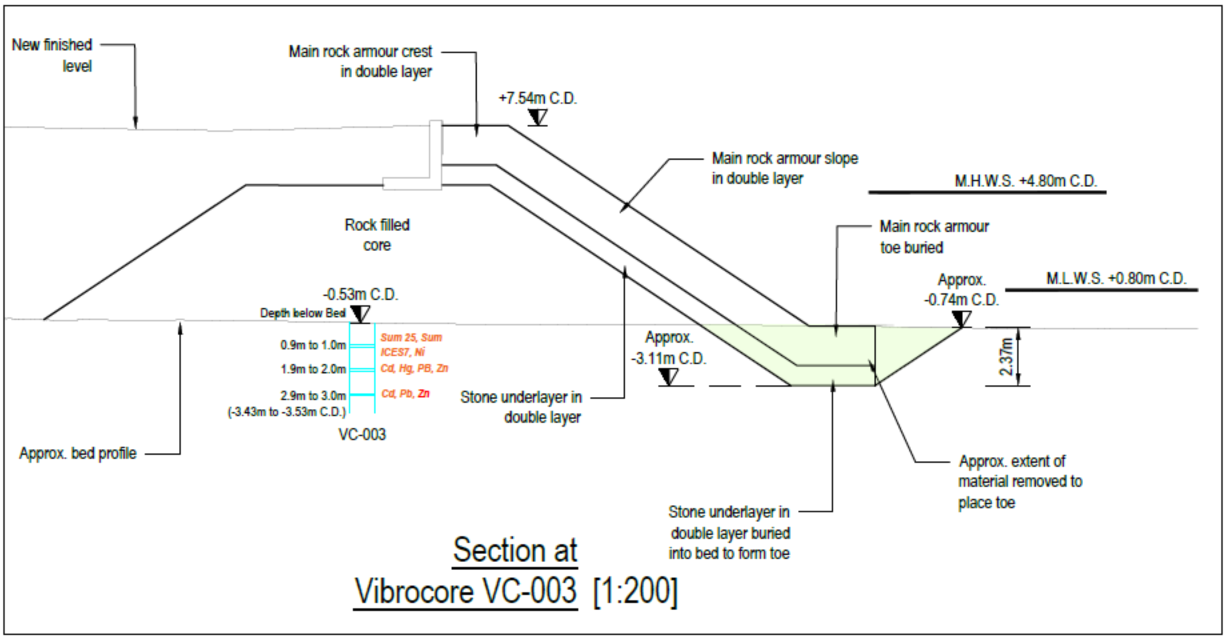

Figure 11.3: Cross section of land reclamation at Vibrocore VC003

The following key relevant mitigation measures will apply to each dredging campaign in the Project:

- Loading will be carried out by a backhoe dredger or trailing suction hopper dredger (TSHD).
- No over-spilling from the vessel will be permitted while the dredging activity is being carried out.
- The TSHD pumps will be switched off while the drag head is being lifted and returned to the bottom as the dredger turns between successive lines of dredging to minimise the risk of fish entrainment.
- A documented Accident Prevention Procedure will be put in place prior to commencement.
- A documented Emergency Response Procedure will be put in place prior to commencement.
- A full record of loading and dumping tracks and record of the material being dumped will be maintained for each trip.

- Dumping will be carried out through the vessel's hull.

Given the design and mitigation measures proposed there risk of chemicals causing deterioration of Cardigan Bay South coastal water body or adjacent waterbodies is not significant. The dredged spoil will be deposited within an approved, offshore licenced disposal site near Milford Haven (LU169) approximately 34.5 km SW of Fishguard Bay.

11.10.2 Construction Phase Mitigation Measures

The following mitigation measures have been considered to protect the water environment during construction:

A protocol for regular communication between the appointed contractor, the engineer's representatives, statutory agencies, such as Natural Resources Wales and Fishguard & Goodwick Town Council, and other third parties shall be established;

- Management and auditing procedures, including toolbox talks to personnel, shall be put in place to ensure that any works which have the potential to impact on the aquatic environment are being conducted in accordance with required, licences, certificates and planning permissions;
- Existing and proposed surface water drainage and discharge points shall be mapped on a site plan which should also include the location of existing and proposed measures such as monitoring points, sediment traps and oil receptors;
- A contingency plan for the construction works shall be prepared by the appointed contractor, in accordance with GPP 21 Pollution Incident Response Planning (Netregs, 2021) to be included in the oCEMP. The Plan should also detail the procedures to be followed if there is a breach in any licence conditions or non-compliance. The Environmental Manager should be notified in breaches in agreed environmental management procedures. Training should be provided to relevant personnel detailed within the Pollution Incident Response Plan to ensure that appropriate and timely actions will be taken; and,
- GPP 6 Working at demolition and construction sites (Netregs, 2023) shall be adhered to particularly in relation to safe and secure decommissioning of existing structures, onsite storage and minimising storage timing, wheel washing, placing of concrete and dealing with silty water. Other relevant guidance exists, including:
  - GPP 1: Understanding your environmental responsibilities – good environmental practises
  - GPP 2: Above Ground Oil Storage
  - GPP 5: Works and maintenance in or near water
  - GPP 8: Safe storage and disposal of used oils
  - GPP 13: Vehicle washing and cleaning
  - GPP 21: Pollution incident response planning
  - GPP 26: Safe storage – drums and intermediate bulk containers
- Concrete use and production shall adhere to control measures outlined in GPP 6 Working at demolition & construction sites (Netregs, 2023) particularly if on-site concrete production is proposed and careful initial siting of concrete mixing facilities is required with no production within a minimum of 50 metres from the aquatic zone.

Mitigation and control measures to address the impact of suspended sediments include;

Technical Guidance C648: Control of Water Pollution from Linear Construction Projects, (CIRIA, 2006);

Technical Guidance C532: Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors (CIRIA, 2001); and,

GPP 6: Working on construction and demolition sites.

Mitigation and control measures to address the impact of oils, fuels and chemicals;

- Fuel, oil and chemical storage must be sited on an impervious base with a bund and secured. The base and bund walls must be impermeable to the material stored and of adequate capacity. GPP 2 shall be implemented to ensure safe storage of oils and chemicals.
- The safe operation of refuelling activities shall be in accordance with GPP 8 Safe storage and disposal of used oils (Netregs, 2017)
- With regard to potential oil spills during construction, an emergency spill kit and oil spill containment equipment will be located at strategic locations adjacent to the works;
- The Port Authority have in place an Oil Spill Contingency Plan which is adhered to by all staff including those employed to carry out works on behalf of the Port Authority. This plan is provided to assist the Harbour Master, or in his absence the Deputy Harbour Master in dealing with an accidental discharge of oil and/or HNS (Hazardous Noxious Substances). Its primary purpose is to set in motion the necessary actions to stop or minimise the discharge and to mitigate its effects. Effective planning will ensure that the necessary actions are taken in structured, logical and timely manner.

11.10.3 Operational Phase Mitigation Measures

In order to ensure adequate protection of water environment during the operational phase, the following key mitigation measures are proposed;

- Compliance with oil spill contingency plan as outlined above to be deployed for the duration of the operational phase;
- Adequate bunding for any fuel, oils or chemicals stored on land in accordance with relevant GPPs and the Control of Pollution (Oil Storage) (Wales) Regulations 2016; and
- Regular inspection of the condition of chemical and fuel storage facilities along with routine maintenance to ensure the risk of leaks is minimised.

11.10.3.1 Maintenance Dredging

Similar mitigation to that applied for the capital dredging (see Section 11.10.1) will be applied to the maintenance dredging to ensure that the impact of maintenance dredging is not significant.

11.10.3.2 Surface Water Drainage

Storm water runoff will be collected in a dedicated storm water drainage system and will not be permitted to discharge directly to the marine environment from the reclamation are and hardstand areas. The surface water drainage system will consist, inter alia, of heavy-duty gullies with concrete pipes cast into the in-situ concrete deck structure. These pipes will carry the storm water to an appropriate full retention oil separator for the Port Operations which will trap oils and silt prior to being discharged into the harbour waters through a non-return flap valve. Sustainable Urban Drainage Systems (SuDs) are not proposed due to limited space and the industrial nature of the operations. A readily and safely accessible monitoring chamber will be provided on the storm water pipeline as appropriate to allow for inspection and sampling of the storm water being discharged.

The oil interceptors on the surface water drainage network will be selected and sized based on the pollution prevention guideline: “Use and design of oil separators in surface water drainage systems: GPP3 and BS EN 858 which is the European Standard for the design, performance, testing, marking and quality control of separators within the EU. All separators must comply with this standard. In accordance with GPP3 a class 1 bypass separator will be required for general road and car parking areas of the site whilst a class 1 full retention separator will be required for the HGV parking and loading areas.

11.10.4 Future Monitoring

Monitoring will be undertaken during the construction to ensure that the mitigation measures contained within the contractors construction environmental management plan are being effectively implemented. This monitoring protocols will be agreed with the contractor and the statutory bodies in advance of the construction commencing and will include visual checks by contractor’s staff and engineering representatives and water quality monitoring using water quality monitoring probes. The operational drainage will require monitoring to comply with any permitting for the discharge from the proposed development from the surface water drainage network.

11.11 Assessment of Residual Effects

In circumstances where the appropriate mitigation measures are fully implemented during the construction and operational phases as outlined in the previous section, the magnitude of the impact of the Proposed Development on the water quality in the area will be negligible as indicated in Table 11.9. Therefore given the highly sensitive nature of the receiving water bodies and the negligible magnitude of impact the overall significance of effect has been assessed to be negligible.

Accordingly, the Proposed Development will not have a significant effect on the water quality of the receiving waters or make a significant change to the existing hydromorphology of the Cardigan Bay South coastal waterbody and adjacent waterbodies.

In all the circumstances as outlined, it can therefore be concluded that the proposed works are compliant with the requirements and environmental objectives of the EU Water Framework Directive and the other relevant water quality objectives for this water body.

Table 11.9:Residual Impacts (with mitigation)

Significance of Environmental Effect			
Construction Phase	**New reclaimed area**	**Buildings and structures in reconfigured terminal**	**Demolition of buffer dolphin structure and disused RNLI structure**
Suspended Sediment and Dredging	Negligible	Negligible	Negligible
Cement and Concrete Pollution	Negligible	Negligible	Negligible
Accidental Spillages of Oils, Fuels and Chemicals	Negligible	Negligible	Negligible
Operational Phase	**New Reclaimed area**	**Buildings and structures in reconfigured terminal**	**Berth Operation**
Maintenance Dredging	Negligible	Negligible	Negligible
Surface Water Drainage	Negligible	Negligible	Negligible

11.12 Cumulative Effects

Other proposed developments within the Fishguard harbour area have been considered in the context of cumulative impacts on Water Quality. Other relevant projects taking place with Cardigan Bay South coastal water body and adjacent coastal waterbodies have been included within this assessment (Table 11.10).

Table 11.10: Projects included in the Cumulative Assessment

Application Reference	Description	Status	Location	Coordinates	EIA submitted?	Distance from Proposed Development (km)
NP/24/0164/OBS	Shellfish Farm expansion	Decision made (outcome unknown) 03/04/2024	Câr Y Môr, Ocean Farm, St Brides Bay, Pembrokeshire	E – 172504 N – 223350	Environmental Impact Statement submitted in 2021	28.8

There is one other project located within the adjacent Pembrokeshire South coastal water body (GB611008590003) which is the proposed expansion of an existing shellfish farm; Câr Y Môr which involves construction of new seaweed processing facility and the provision of a three hectare site located in Ramsay South, north of St. Brides Bay.

The environmental impact statement submitted by Câr Y Môr (Câr Y Môr, 2021) states effects from the development will not contribute to those from other developments. The following are water quality effects that are likely to arise from the shellfish expansion project:

- **Deposition of sediment and particulate organic matter (POM)**

  The introduction of new infrastructure into the marine environment creates suspended sediments within the water column which may contain contaminants. Organic matter derived from shellfish may be deposited on the seabed which increases the risk of nutrients causing eutrophication. Coastal processes within the Ramsey Sound demonstrate suspended sediment is subject to high tidal flow patterns. The area has medium-high suspended sediment transport (>1m^{2}s^{-1}) meaning deposition of potential organic matter and suspended sediment is unlikely to impact upon the Proposed Development in Fishguard Bay. In addition, any sediment disturbed will be deposited within the confines to the boundary where the works are taking place. Therefore, there will be no cumulative effects relating to contaminant bound sediment from this project.

- **Introduction of Invasive Non-Native Species (INNS)**

  The environmental impact statement has indicated that there is a low risk of diseases associated with seaweed and shellfish being introduced. It notes that a previous study conducted by M.J. Phillips (1990) where pathogens have arisen from finfish, crustacean and mollusc culture. However, according to these studies, seaweed cultivation does not carry pathogens. The risk will be reduced through stringent cleaning regular inspection of infrastructure and equipment used onsite to ensure INNS will not be introduced to marine environment. In the event that any INNS is detected, they will be removed. Therefore there will be no cumulative effects from INNS.

11.12.1 In-combination effects

There will be no in-combination effects between these developments.

11.12.2 Effects interactions

There will be no interactions from the Proposed Development and the shellfish farm development due to the size of the proposed expansion of the shellfish farm and the considerable the distance from Fishguard Bay to the shellfish farm in the Ramsey sound (approximately 28.8 km). There will be no significant effect between these projects.

11.13 Limitations of the Assessment

There were no limitations that would affect the robustness of the assessment for EIA purposes.

11.14 Summary of Effects and Conclusion

The baseline environment has been established for the Proposed Development within the Cardigan Bay south coastal waterbody. The likely significant effects from the Proposed Development have been described and with the implementation of mitigation measures, the effects to water quality will be negligible as outlined in section 11.11.

11.15 References

Axis, (2011) Fishguard Harbour Marina Development Environmental Statement

Câr Y Môr, (2021) An application for Câr Y Môr’s 3 hectare seaweed &shellfish IMTA site in Ramsey Sound, Environmental Impact Statement and Document to inform a Habitats Regulation Assessment.

Phillips M.J. (1990) Environmental aspects of seaweed culture. Institute of Aquaculture, University of Stirling, Scotland

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Natural Resources Wales (2024b) Newport North Bathing Water Profile. Available at: https://environment.data.gov.uk/wales/bathing-waters/profiles/profile.html?site=ukl1403-38600. Accessed: 08/11/2024

Netregs (2017) GPP 8 Safe storage and disposal of used oils. Guidance for Pollution Prevention. Available at: https://www.netregs.org.uk/media/1900/guidance-for-pollution-prevention-8-2022-update.pdf. Accessed 8/11/2024

Netregs (2021) GPP 21 Pollution Incident Response Planning. Guidance for Pollution Prevention. Available at: https://www.netregs.org.uk/media/1436/gpp-21-final.pdf. Accessed 8/11/2021.

Netregs (2023) GPP 6 Working at demolition and construction sites. Guidance for Pollution Prevention. Available at: https://www.netregs.org.uk/media/tsybv2y3/gpp6-working-on-construction-and-demolition-sites.pdf. Accessed 8/11/2024.

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 12 Flood Risk

794-NI-POR-00886R
May 2025

12 FLOOD RISK

12.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as "the Proposed Development") on flood risk. This chapter considers the potential impacts to flood risk from the Project during the construction and operational phases of the Proposed Development.

The main objectives of this assessment are to:

- Undertake a desktop study of the existing flood risk to assess current environmental baseline conditions locally and nationally;
- Assess the potential impact of the proposed construction and operation phases of the Proposed Development on flood risk; and
- Recommend mitigation measures in relation to the proposed construction and operational and phases, if necessary, and predict residual impacts.

The assessment presented is informed by the following key chapters of the ES:

- Chapter 2: Project Description

Other aspects relevant to flood risk are addressed in the specific chapters of the ES, namely:

- Chapter 10: Coastal Processes

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

12.2 Purpose of this chapter

The primary purpose of the ES chapter is to provide an assessment of the likely direct and indirect significant effects of the Project on flood risk. In particular, this ES chapter:

- Presents the existing environmental baseline established from desk studies, relevant datasets and consultation (section 12.7);
- Identifies any limitations encountered in compiling the environmental information (section ref 12.12);
- Presents an assessment of the potential likely significant effects on flood risk arising from the Proposed Development (section 12.8) based on the information gathered and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in section 12.11.
- Highlights any necessary monitoring (section 12.9.3) and/or measures (see section 12.9.1 and section 12.9.2) to prevent, minimise, reduce or offset the likely significant environmental effects identified in the assessment.

12.3 Study Area

The Study Area is the area within the planning boundary.

12.4 Policy Context

Planning Policy Wales sets out the land use planning policies of the Welsh Government. Planning Policy Wales is supplemented by a series of Technical Advice Notes (TAN). **Technical Advice Note (TAN) 15 'Development, flooding and coastal erosion'** ensures that flooding is accorded appropriate consideration in plan making and development management decisions. A key requirement of TAN 15 is that a Flood Consequence Assessment (FCA) must be produced for any development at risk of river or coastal flooding. The results of the FCA should be used to inform the final design of a development and to demonstrate that all risks have been identified and appropriately mitigated for. This is vital to ensure that the development will be safe for people to live in or use for all its proposed lifetime. TAN 15 is supported by the **Flood Map for Planning**, which shows how climate change will affect flood risk extents over the next century and indicates the potential extent of flooding assuming no defences are in place. The Flood Map for Planning represents the best available information on flood risk and is the framework for assessing risks to and from new development.

12.5 Methodology to inform the baseline

12.5.1 Desktop study

Information on flood risk within the Flood Risk Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 12-1 Summary of key desktop reports. These sources provide the most up to date data for this assessment.

Table 12-1 Summary of key desktop reports

Title	Source	Year
Flood Map for Planning	Natural Resources Wales	2024
Coastal Flood Boundary Conditions for the UK Study	Environment Agency	2018
Flood Consequences Assessments: Climate change allowances	Welsh Government	2021

12.5.2 Site-specific surveys

No site-specific baseline surveys were undertaken as part of the assessment for flood risk. The baseline data presented in this section is derived from published flood maps as representative of the background conditions.

12.6 Assessment Methodology

The following tasks will be implemented to complete the assessment:

- identify and assess the hazard from all sources of flooding to the Proposed Development;
- consideration of the consequences of flooding on the Proposed Development;
- consideration of the consequences of the Proposed Development on flood risk elsewhere;
- identification of any mitigation measures that can be incorporated into the design of the Proposed Development to ensure that the risk to life, damage to property and disruption to people is minimised;
- assessment of any residual impacts;
- demonstrate that the Proposed Development complies with planning policy and guidance.

12.6.1 Impact assessment criteria

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 4: Environmental Impact Assessment Process and Methodology.

The criteria for defining impact magnitude in this chapter are outlined in Table 12-2 Definition of terms relating to the magnitude of an impact.

Table 12-2 Definition of terms relating to the magnitude of an impact

Magnitude of impact	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).

The criteria for defining receptor sensitivity in this chapter are outlined in Table 12-3 Definition of terms relating to the sensitivity of the receptor.

Table 12-3 Definition of terms relating to the sensitivity of the receptor

Sensitivity	Definition
High	High importance and rarity, national scale, and limited potential for substitution. Those affected will not be able to adapt to changes and continue to maintain-pre impact status.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution. Able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.
Low	Low or medium importance and rarity, local scale Those affected are able to adapt with relative ease and maintain pre-impact status.
Negligible	Very low importance and rarity, local scale Those affected are able to adapt easily and maintain pre-impact status.

The significance of the effect upon flood risk is determined by correlating the magnitude of the impact and the sensitivity of the receptor. Where a range of significance of effect is presented in Table 12-4 Matrix used for the assessment of the significance of the effect, the final assessment for each effect is based on calculated assessment and professional judgement.

For the purposes of this assessment, any effects with a significance level of slight or less have been concluded to be not significant in terms of the EIA Regulations.

Table 12-4 Matrix used for the assessment of the significance of the effect

		Sensitivity of Receptor / Receiving Environment to Change / Effect			
Magnitude of Change		High	Medium	Low	Negligible
	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

12.7 Baseline Environment

12.7.1 Fluvial Flood Risk

There are no watercourses in the vicinity of the site so there is no risk from fluvial sources. An extract from the Flood Map for Planning (River) is shown in Figure 12-1 Extract from Flood Map (Rivers).

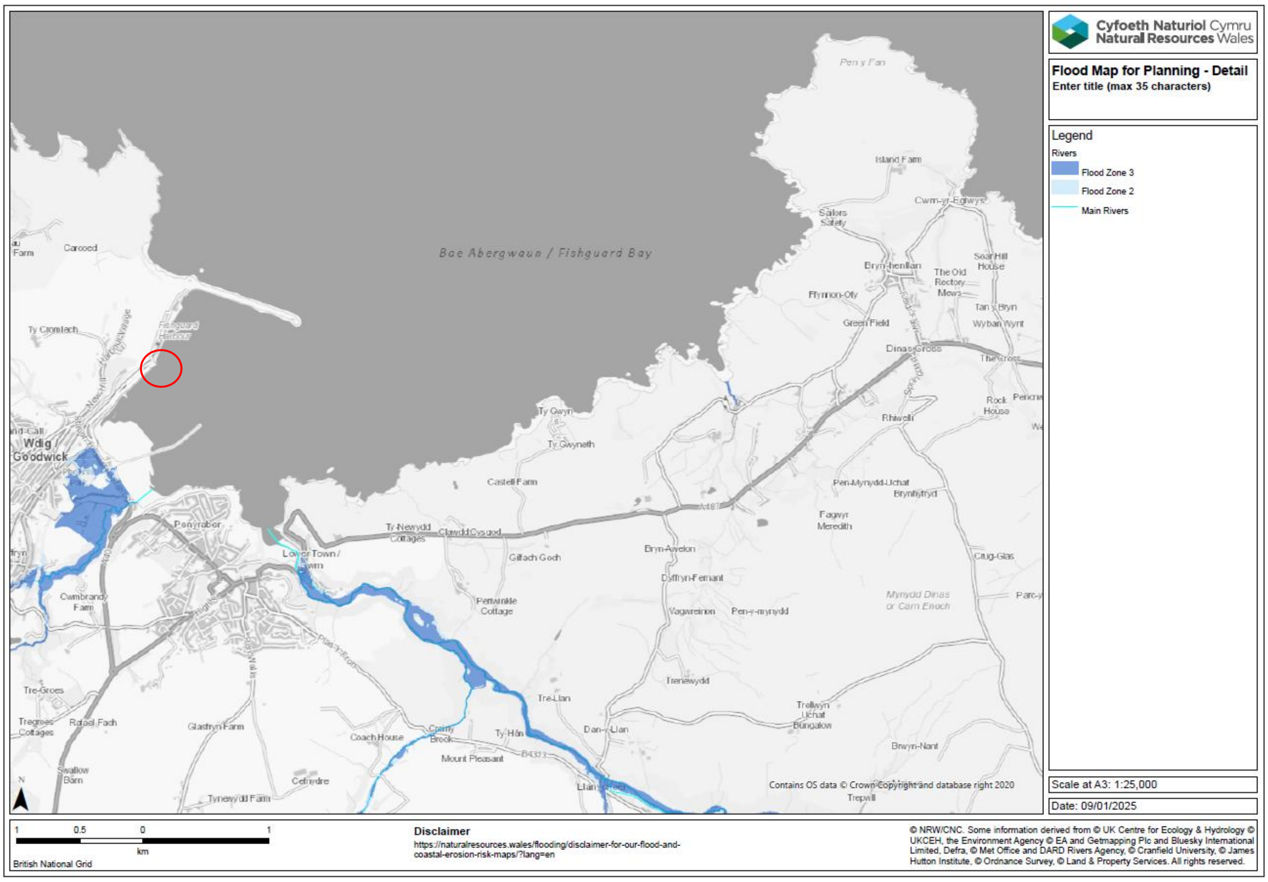

Figure 12-1 Extract from Flood Map (Rivers)

12.7.2 Coastal Flood Risk

The site is located adjacent to and within Fishguard Harbour in Fishguard Bay.

An extract from the Flood Map for Planning (Sea) is shown in Figure 12-2. The map shows that the Proposed Development lies within Zone 3 - areas with more than 0.5% (1 in 200) chance of flooding from the sea in a given year, including the effects of climate change.

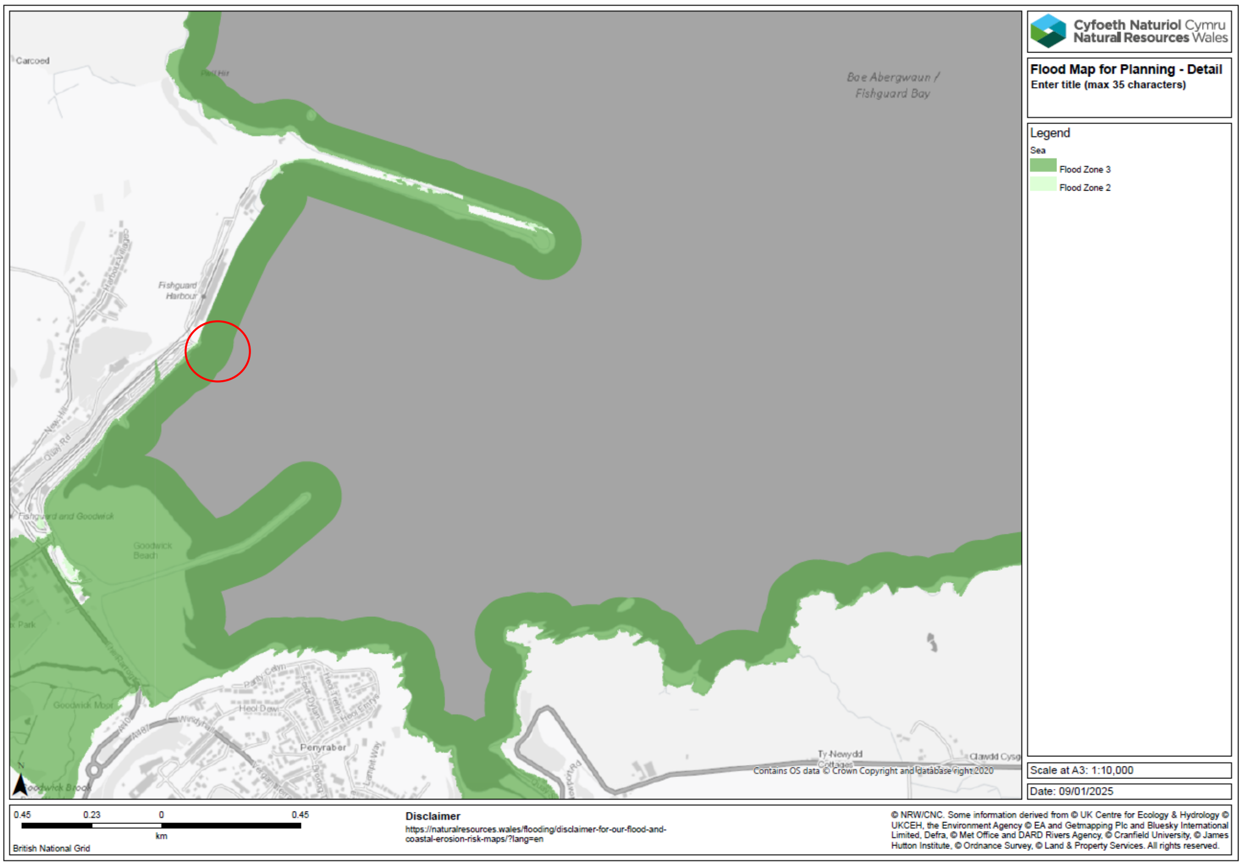

Figure 12-2 Extract from Flood Map (Sea)

The map in Figure 12-2 Extract from Flood Map (Sea) shows the potential extent of flooding assuming no defences are in place. Flood Map for Planning shows that there is a private flood defence (wall) along the quay although there is no defended area attributed to the defence. The location of the flood defence is shown in Figure 12-3 Extract from Flood Map (Flood Defence locations).

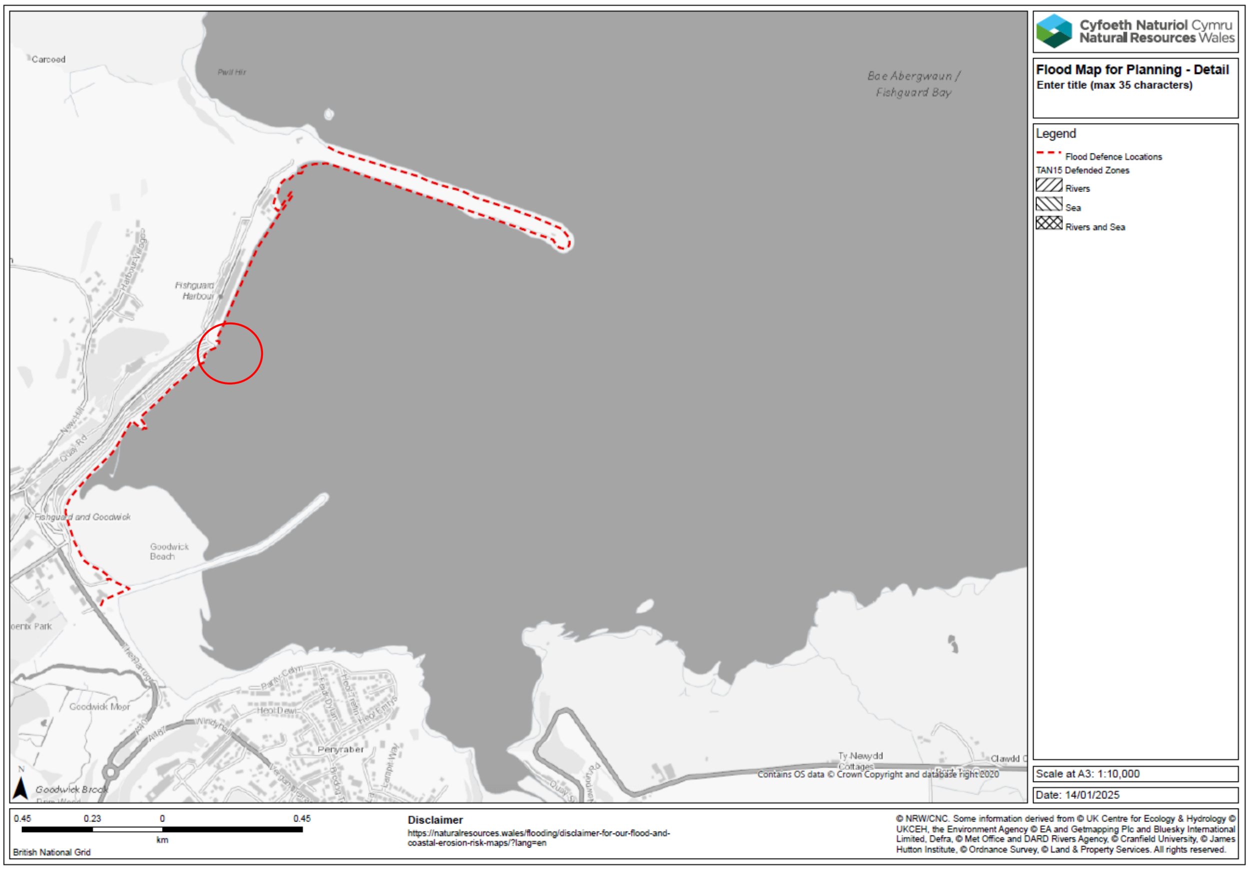

Figure 12-3 Extract from Flood Map (Flood Defence locations)

Extreme sea levels were obtained from the Coastal Flood Boundary Conditions for the UK Study. The latest study was published in 2018, and extreme sea levels are available as an online dataset which provides extreme sea level and typical surge information around the coast of Wales under present day conditions. The extreme sea levels (to Ordnance Datum) are shown in Table 12-5 Extreme Sea levels at Fishguard at the point closest to Fishguard Harbour which is Chainage 714. The location of this point is shown in Figure 12-4 Locations of extreme water levels. For infrastructure of this type a 0.5% AEP tidal event should be considered, so a tidal level of 3.62m OD (6.06m Chart Datum).

Table 12-5 Extreme Sea levels at Fishguard

Tidal event	Water level (mOD)
1 in 100 year (1% AEP)	3.55
1 in 200 year (0.5% AEP)	3.62
1 in 1000 year (0.1% AEP)	3.77

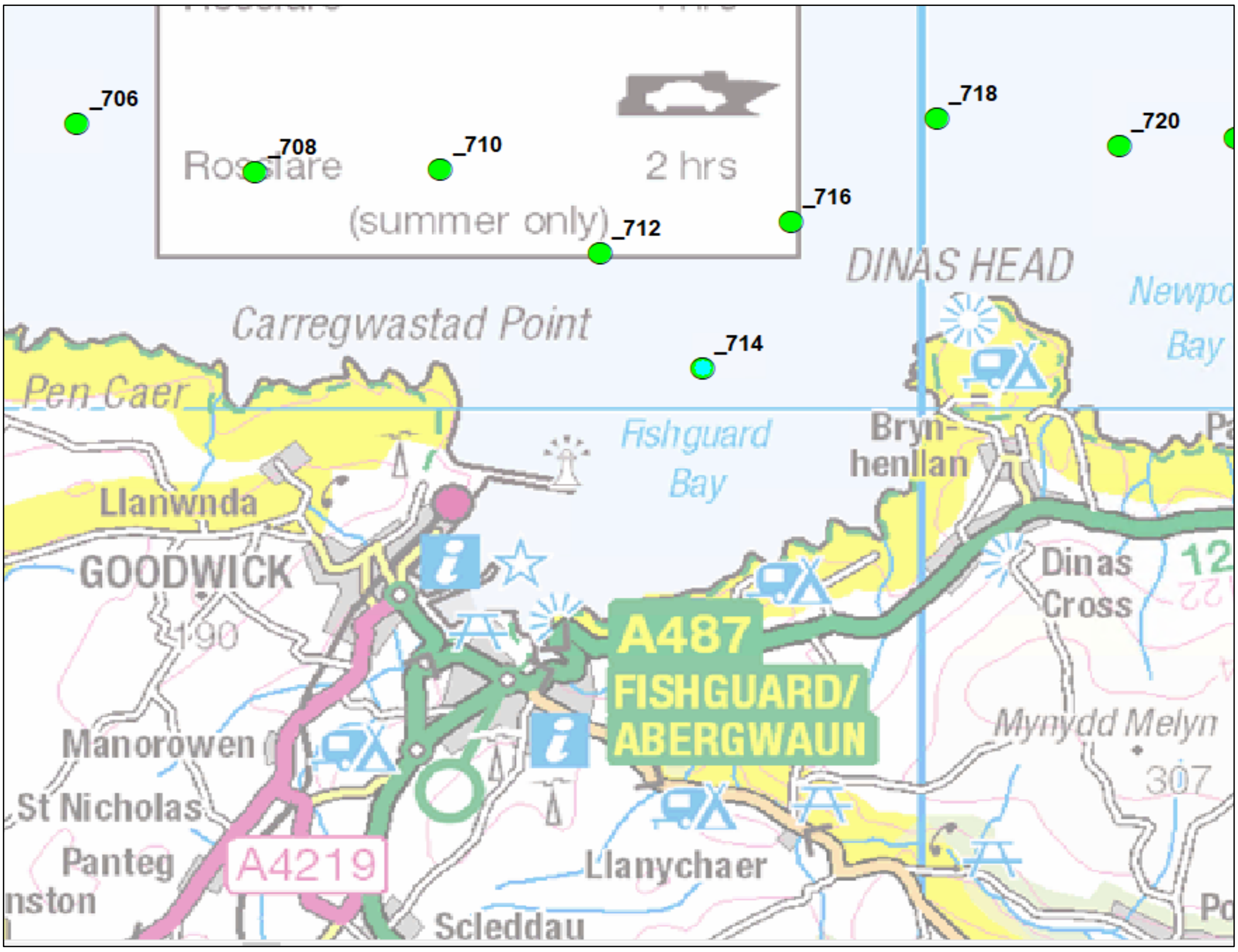

Figure 12-4 Locations of extreme water levels

An allowance must be made for the effect of future climate change on tidal flood risk. 'Flood Consequences Assessments: Climate change allowances' published by Welsh Government (September 2021) describes how climate change allowances should be considered. The Guidance sets out estimates of cumulative sea level rise for each local authority area to 2100 and 2120. The allowances are derived using the UKCP18 2100 dataset. The allowances for Pembrokeshire are shown in Table 12-6 Estimates of mean sea level rise for Pembrokeshire.

Table 12-6 Estimates of mean sea level rise for Pembrokeshire

Allowance (percentile)	Mean sea level rise by 2100(m)	Mean sea level rise by 2120(m)
70th	0.83	0.99
95th	1.10	1.31

The Proposed Development has a range of design life periods for different elements, so the 2120 value has been used in this assessment as a worst-case scenario. The Guidance states that as a minimum, development should be assessed against the relevant regional 70th percentile to inform design levels. This would equate to a 0.5% AEP level of 4.61m OD (7.05m CD). The Guidance also states that an assessment should be made against the 95th percentile to inform mitigation measures, access and egress routes and emergency evacuation plans. This would equate to a 0.5% AEP level of 4.93m OD (7.37m CD).

12.7.3 Surface Water Flood Risk

An extract from the Flood Map for Planning (Surface water) is shown in Figure 12-5 Extract from Flood Map (Surface Water). The map shows that there is some flood risk from surface water close to the site of the Proposed Development, but not at the site itself.

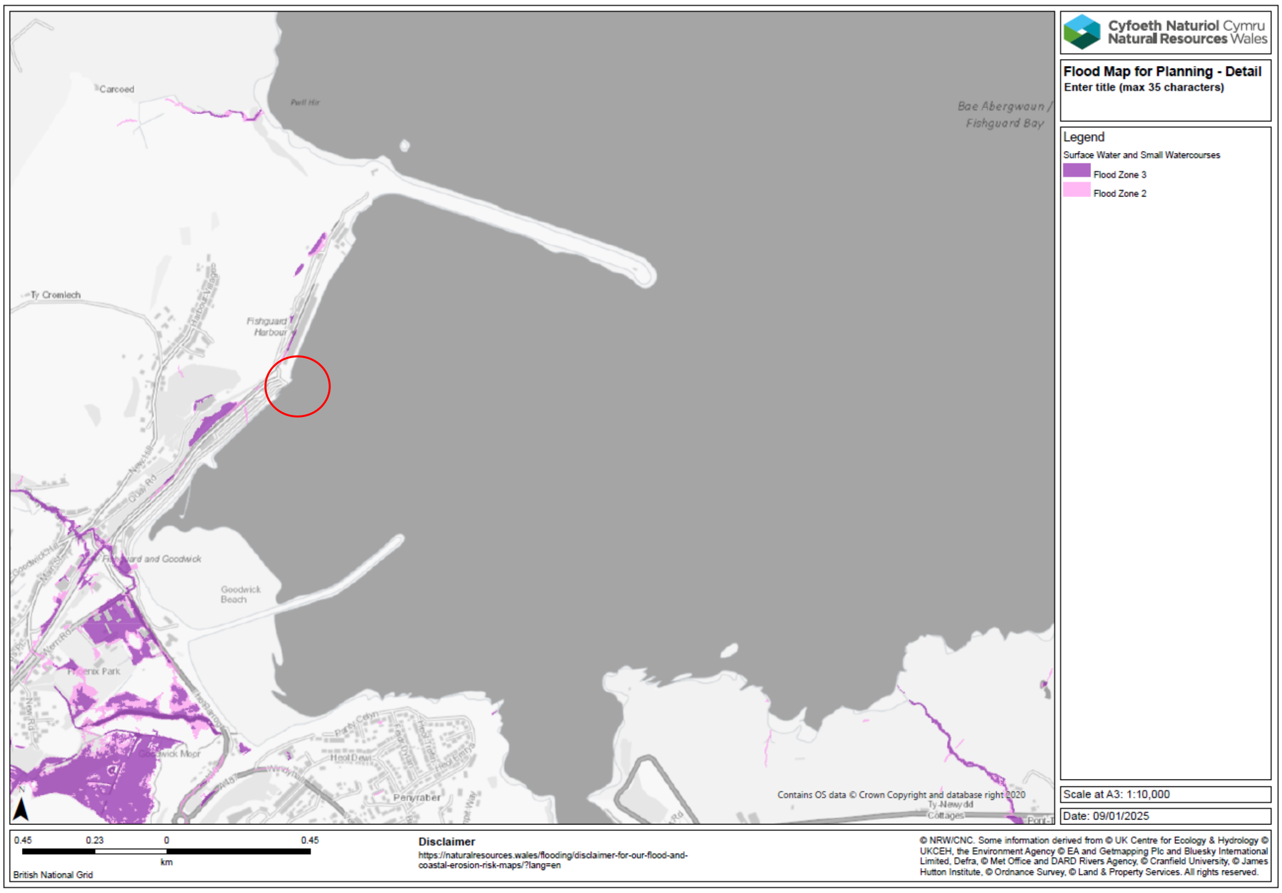

Figure 12-5 Extract from Flood Map (Surface Water)

12.7.4 Reservoir Flood Risk

Flood Map for Planning shows that the site is not located within an area potentially at risk of reservoir flooding.

12.7.5 Recorded Flood Events

Flood Map for Planning does not show any recorded flood events in the vicinity of the site.

12.7.6 Summary of Flood Risk

RPS have assessed the flood risk to the Proposed Development and determined the predominant source of flood risk emanates from coastal flooding from Fishguard Bay. This will be considered further in the following sections.

12.8 Impact Assessment

12.8.1 Do Nothing Scenario

As per EIA protocol, the likelihood of flooding risk within Fishguard Harbour in the absence of the Proposed Development (i.e. the ‘Do Nothing Scenario’) has been assessed. Given that the Proposed Development is located within an active harbour adjacent to the sea, it is likely that the current arrangements to prevent flooding will continue under a Do Nothing Scenario.

12.8.2 Assessment of Construction Effects

As the construction works will be at sea, there is a risk of flooding to the works from extreme tidal events that will need to be managed. Impacts would include flooding of the works, flooding of plant and machinery, and a risk to construction workers.

The vulnerability of the construction works to flooding is High and the recoverability of any affected receptors is High. The impacted receptors are of High value/ importance. The overall sensitivity is therefore **High**. The duration of impacts are only expected in the short-term during the construction phase. The effects are not expected to occur often, and any longer-term impacts are reversible. The overall magnitude of effects is likely to be **Negligible**. Therefore, according to the matrix in Table 12-4, the overall significance of effects on settlement is **Negligible.**

12.8.3 Assessment of Operational Effects

As shown in the Flood Map for Planning, the Proposed Development lies within Zone 3. TAN 15 identifies the vulnerability of different land uses to flooding, and development has been sub-divided into three categories in Figure 4 of TAN 15. ‘Boatyards, marinas and essential works required at mooring basins’ are classified as ‘Water compatible development’. TAN 15 describes ‘Water compatible development’ as developments which are required to be located near water by virtue of their nature, and developments which are resilient to the effects of occasional flooding (Paragraph 9.4). The description covers the Proposed Development. TAN 15 states that water compatible development is acceptable in all flood zones (Paragraph 10.24).

Consequences of flooding to the Proposed Development

The Proposed Development must be set at specific levels to enable access from the quay to the ship. The new reclaimed area which will have a level of approximately 5.30m OD (7.74m CD). This is well above the minimum level required for design of 4.61m OD (0.5% AEP). The existing quay is at a level of approximately 6m OD (8.44m CD). This is above the minimum level required for mitigation of 4.93m OD (0.5% AEP level). The consequences of flooding are at an acceptable level and therefore no mitigation measures are required.

A preliminary storm water drainage design has been completed for the new area. It is proposed to use ACO channels and connect to the existing storm water drainage network. The closest outfall will be encompassed by the new reclamation works, and so the drainage will connect to this, and the outfall will be extended out. There is no increase in storm water runoff to the Port because of the development. An application will be made to the SuDs Approving Body (SAB) as part of the planning application.

Consequences of the Proposed Development on flood risk elsewhere

Modelling of the Proposed Development on coastal processes is described in Chapter 10. This has demonstrated that there is a limited spatial change to tides, waves, and sedimentation processes within Fishguard Harbour as a result of the Proposed Developments' bathymetric changes, including the reclamation area within the water column. The change in risk of potential coastal flooding due to the Proposed Development at neighbouring sites is considered to be negligible and no mitigation is required.

The sensitivity of the coastal floodplain to an increase in flood risk is **Low**. The extent of the potential effect is relatively small as areas impacted by the Proposed Development only cover a small geographical area and the duration of impacts are short-term. The effects are not expected to occur often, and any longer-term impacts are reversible. Therefore, the overall magnitude of effects is likely to be **Negligible**. Therefore, according to the matrix in Table 12-4 Matrix used for the assessment of the significance of the effect, the overall significance of effects on river flood risk is **Negligible**.

12.9 Mitigation

12.9.1 Construction Phase Mitigation Measures

Temporary works may be required to prevent coastal waters interacting with works activities throughout the duration of the construction period. The temporary works design to ensure the method of temporary flood protection is stable and avoids seepage will be the responsibility of the appointed Contractor.

Met Office and Natural Resources Wales both provide a weather warnings alert service. The Pembrokeshire Coast is a Flood Alert Area for Natural Resources Wales. These warnings can be used during construction to manage the risk of flooding to the works from extreme events.

12.9.2 Operational Phase Mitigation Measures

The Proposed Development has been designed for extreme tidal events. There will be no damage caused to the replacement linkspan if it is flooded, and there will be no major clean up required. Therefore, no mitigation measures are proposed to manage flood risk to the development itself.

The impact of the Proposed Development on the existing tidal regime is determined to be negligible and no mitigation measures are required to avoid an increase in flood risk elsewhere.

There is an existing linkspan in place and the site currently operates in a similar manner, so the flood risk exists at present. If an extreme event is forecast, any sailings from the port are likely to be cancelled meaning that the replacement linkspan will not be in operation so there will be no risk to life. The entire port area will be at risk, so it is likely to have been closed and evacuated in accordance with any existing emergency plans. Tidal warning will be the key mitigation measure for the operation of the site.

As required by TAN 15, it has been demonstrated that there is:

- minimal risk to life;
- minimal disruption to people living and working in the area;
- minimal potential damage to property;
- minimal impact of the Proposed Development on flood risk generally; and
- minimal disruption to the sustainable management of natural resources.

12.9.3 Future Monitoring

Following an extreme tidal event, the Proposed Development will be checked for damage and any repairs will be made as soon as possible.

12.10 Assessment of Residual Effects

Residual flood risk is the risk that remains after all mitigation measures have been taken to reduce the frequency of flooding. The main residual risk is for coastal flood events in excess of the design conditions. If an extreme event is forecast, any sailings from the port are likely to be cancelled meaning that the linkspan will not be in operation. The entire port area will be at risk, so it is likely to have been closed. Safe access/ egress from the port area is available. The Proposed Development is resilient to flooding in that no damage will be caused by extreme tidal events. The overall residual risk is low.

12.11 Cumulative Effects

To gain planning permission, all new developments must show that they do not increase flood risk elsewhere to comply with TAN 15. There will therefore be no cumulative impacts on flood risk because of neighbouring developments.

12.12 Limitations of the Assessment

There were no limitations that would affect the robustness of the assessment for EIA purposes.

12.13 Summary of Effects and Conclusion

The Proposed Development because of its nature requires a waterfront location. The main source of flood risk for the Proposed Development site is from coastal flooding.

Temporary works may be required to prevent coastal waters interacting with works activities throughout the duration of the construction phase. The temporary works design to ensure the method of temporary flood protection is stable and avoids seepage will be the responsibility of the appointed Contractor. Met Office and Natural Resources Wales both provide a weather warnings alert service. The Pembrokeshire Coast is a Flood Alert Area for Natural Resources Wales. These warnings can be used during construction to manage the risk of flooding to the works from extreme events.

The Proposed Development has been designed for extreme tidal events. There will be no damage caused to the replacement linkspan if it is flooded, and there will be no major clean up required. Therefore, no mitigation measures are proposed to manage flood risk to the development itself. The impact of the Proposed Development on the existing tidal regime is determined to be negligible and no mitigation measures are required to avoid an increase in flood risk elsewhere. There is an existing linkspan in place and the site currently operates in a similar manner, so the flood risk exists at present. If an extreme event is forecast, any sailings from the port are likely to be cancelled meaning that the replacement linkspan will not be in operation so there will be no risk to life. The entire port area will be at risk, so it is likely to have been closed and evacuated in accordance with any existing emergency plans. Tidal warning will be the key mitigation measure for the operation of the site.

This assessment has shown that the consequences of flooding resulting from the Proposed Development are acceptable, therefore meeting the TAN 15 flood risk and development requirements.

Table 12-7 Assessment of Impact

Description of impact	Phase C	Phase O	Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Coastal flooding	✓	✓	Yes	C: Negligible O: Negligible	C: High O: Low	C: Negligible O: Negligible	None	Extreme coastal event	Tidal warning. Visual inspection of infrastructure following extreme event

12.14 References

Environment Agency Coastal Flood Boundary Extreme Sea Levels: https://www.data.gov.uk/dataset/73834283-7dc4-488a-9583-a920072d9a9d/coastal-design-sea-levels-coastal-flood-boundary-extreme-sea-levels-2018

Flood Map for Planning: https://flood-map-for-planning.naturalresources.wales/

Flood Consequences Assessments: Climate change allowances. Welsh Government, 2021: https://www.gov.wales/climate-change-allowances-and-flood-consequence-assessments

Met Office UK weather warnings: https://www.metoffice.gov.uk/weather/warnings-and-advice/uk-warnings#?date=2024-10-17

Natural Resources Wales Flood warnings and alerts: https://flood-warning.naturalresources.wales/

Technical Advice Note 15 (TAN 15) Development, flooding and costal erosion. Planning Policy Wales, 2025: https://www.gov.wales/technical-advice-note-tan-15-development-flooding-and-coastal-erosion

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 13 – Noise and Vibration

794-NI-POR-00886R
May 2025

13 NOISE AND VIBRATION

13.1 Introduction

This chapter assesses the potential impacts and likely significant effects of noise and vibration associated with the construction of the Proposed Development. As stated in Chapter 2, Project Description, the Proposed Development is located within Fishguard Port, a privately run Port, owned by Stena Line who is the sole ferry operator at Fishguard Harbour providing two daily Ro Ro (roll off roll on) ferry crossings to Rosslare, Ireland all year round on the Stena Nordica.

Access to the ferry is currently via a single land linkspan (access ramp to ship from a fixed land structure), installed in the early 1970's supplemented by a temporary jack up structure. This existing linkspan pontoon and jack up barge does not provide a long-term solution for the ferry at the berth as it is approaching its practical end of life. Stena Line wish to remedy this by providing a replacement linkspan pontoon and associated civil and marine infrastructure to allow the continuation of ferry service from the Fishguard Port.

The Proposed Development will provide ongoing conventional ferry service to and from Fishguard in Wales and Rosslare in Ireland, the need for the Proposed Development is established in terms of continuing to operate the ferry route from the Port.

The specific objectives of the noise and vibration assessment are to:

- Describe the existing noise baseline;
- Define the assessment methodology and significance criteria used in completing the noise and vibration impact assessment;
- Describe the potential effects, including direct, indirect and cumulative effects of construction noise and vibration;
- Describe the mitigation measures proposed to address the likely significant effects; and,
- Assess the residual effects remaining following the implementation of mitigation.

The assessment presented is informed by the following chapters:

- Chapter 2: Project Description
- Chapter 8: Traffic and Transport

This Chapter is supported by Volume II Figures:

- Figure 13.1: Noise and Vibration Study Area
- Figure 13.2: Construction Noise Receptors
- Figure 13.2: Noise Monitoring Locations

This Chapter is supported by Volume III Technical Appendices:

- Appendix 13.A Noise Monitoring Survey;
- Appendix 13.B Noise Sensitive Receptors;
- Appendix 13.C Construction Noise Assessment;

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

13.2 Purpose of this chapter

The primary purpose of the ES chapter is to provide an assessment of the likely direct and indirect significant effects of the Project on noise and vibration.

In particular, this ES chapter:

- Presents the existing noise and vibration baseline established from desk studies (Section **Error! Reference source not found.**);
- Presents an assessment of the potential likely significant effects on noise and vibration arising from the Proposed Development (Section **Error! Reference source not found.**) based on the information gathered and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in Section **Error! Reference source not found.**
- Highlights any necessary measures (Section 13.10) to minimise the likely significant noise and vibration effects identified in the assessment (Section 13.9).

13.2.1 Potential Effects Scoped In

The noise and vibration effects of the construction stage and all operations associated with the proposed development has been assessed at the nearest construction noise receptors.

Construction phase includes:

- Construction noise from on-site activities affecting nearby sensitive receptors and
- Construction vibration from piling affecting nearby sensitive receptors

13.2.2 Potential Effects Scoped Out

Having considered the proposed works, it was concluded that several factors could be scoped out of the detailed assessment including:

- Operational Noise - This has been scoped out as there is no inclusion of new significant noise sources likely to generate perceptible noise levels when the Proposed Development is operational;

The traffic flows generated by Fishguard Port relate to the number vessel sailings and the times of the sailings. Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel sizes will not increase above existing levels, therefore the number of vehicle movements generated by the Port are also not expected to increase above existing levels, resulting in a negligible traffic impact in the operational phase of the Proposed Development.

- Construction noise from construction traffic affecting nearby sensitive receptors. Chapter 2 Project Description states “Transport by road will be minimal – there is no estimated impact on the road transport network”. Therefore, there is no construction traffic noise impact associated with the proposed development and scoped out of the assessment; and
- Operational vibration - This has been scoped out as there shall be no new significant vibration sources likely to generate perceptible levels of vibration when the proposed development is operational.

13.3 Study Area

The assessment of noise and vibration impact includes several elements, each with an associated study area, as dictated by the relevant guidance documents. The study area for each aspect of the noise and vibration assessment relevant to the Proposed Development is described in this section.

A map of the study area for each element of the noise and vibration impact assessment, please refer to Volume III Figure 13.1: Noise and Vibration Study Area.

13.3.1 Construction Noise and Vibration Study Area

The primary study area for construction noise is based upon guidance detailed in DMRB LA111 Noise and Vibration:

> *“A construction noise study area shall be defined, where the need for further assessment has been established to include all noise sensitive receptors: 1) that are potentially affected by construction noise;*

in areas where there is a reasonable stakeholder expectation that a construction noise assessment will be undertaken."

DMRB LA111 Noise and Vibration guidance 2019 suggests that "a study area of 300m from the closest construction activity is normally sufficient to encompass noise sensitive receptors."

With regard to construction vibration, DMRB LA 111 notes that

"*A Study Area of 100m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive Receptors*".

Therefore, the Study Area for construction vibration is limited to 100m from any significant source of vibration associated with the construction of the Proposed Development. The only potential source of vibration associated with the construction of the Proposed Development is the proposed piling.

The study area for the construction noise and vibration assessment encompasses of the Proposed Development extended to include noise sensitive receptors within 500m radius.

13.3.2 Operational Noise and Vibration Study Area

As there are no new noise or vibration sources associated with the proposed development therefore there are no additional noise or vibration impacts. Therefore, an operational noise and operational vibration study area has not been included.

13.4 Policy Context

13.4.1 National Legislation and Policy

13.4.1.1 National Planning Policy Framework (NPPF)

In Paragraph 180, the NPPF states that planning policies and decisions should aim to: *"mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.*"

Noise Policy Statement for England

The Revised NPPF states that the significance of adverse impacts should be determined in accordance with the NPSE (2010). The NPSE policy aims are as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life.

The NPPF advises that significant adverse impacts on health and the quality of life as a result of noise from new development should be avoided. It also advises that other adverse impacts on health and quality of life arising from noise from new development should be reduced to a minimum.

Paragraph 174 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst other considerations): "Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability".

The NPPF goes on to state in Paragraph 185 that "Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: A) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; B) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."

13.4.1.2 Noise Policy Statement for England (NPSE)

The NPSE introduces concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

- NOEL – No Observed Effect Level This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level This is the level above which adverse effects on health and quality of life can be detected. Extending these concepts for the purpose of the NPSE leads to the concept of a significant observed adverse effect level.
- SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur. It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations.

Consequently, the SOAEL is likely to be different for different noise sources, for different Receptors and at different times.

The first aim of the NPSE is: "Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development." The second aim is: "Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development." The third aim of the NPSE is: "Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development."

13.4.1.3 National Planning Policy (Wales)

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation. PPW promotes action at all levels of the planning process to maximising its contribution to the well-being of Wales and its communities. It encourages a wider, sustainable and problem-solving outlook which focuses on integrating and addressing multiple issues rather than an approach which is fragmented, uncoordinated and deals with issues in isolation.

13.4.1.4 Technical Advice Note (Wales) 11:1997 Noise

The Technical Advice Note (Wales) (TAN) provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account in drawing up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources.

13.4.1.5 Future Wales: The National Plan 2040

Future Wales – the National Plan 2040 is the national development framework, setting the direction for development in Wales to 2040. It is a development plan with a strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of our communities.

13.4.1.6 Planning Policy Wales (Edition 12 February 2024)

Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. The policy is supplemented by Technical advice notes, circulars and policy clarification letters.

Paragraph 6.7.26 refers specifically about construction noise: "*Planning Authorities must consider the potential for temporary environmental risks… arising during the construction phases of development… Where appropriate planning authorities should require a construction management plan covering pollution prevention, noisy plant, hours of operation, dust mitigation and details for keeping residents informed about temporary risks."*

13.4.1.7 Noise and Soundscape Plan for Wales 2023 -2028 (Edition 12 February 2024)

The Noise and Soundscape Plan 2023-2028 is Wales's national strategy on soundscapes, meaning the sound environment as perceived or experienced and/or understood by a person or people, in context.

All forms of airborne sound that may be heard by the people of Wales are considered to be within scope of this document.

The plan outlines strategies for monitoring noise levels, engaging with communities, and implementing measures to reduce harmful noise. The focus on placemaking in Planning Policy Wales (PPW) requires that policy topics such as air quality, noise and soundscape be considered alongside all other relevant policy topics when preparing development plans and designing and determining planning proposals.

13.5 Consultation

Formal consultation with Natural Resources Wales NRW, the client and RPS was undertaken on the 5th November 2024 to discuss the site investigation works and marine licence for construction and dredging and disposal and a scoping and screening request was submitted on the 29th November 2024.

A scoping opinion was received from NRW on 31st January 2025 which scoped construction noise and vibration into the EIA, and deemed necessary to ES should include an assessment of the construction phase of the proposed development in relation to noise and vibration.

Proposed Development will not result in any additional sailings or increased usage of the Ferry Terminal over the existing levels and therefore the operational phase noise and vibration will have a negligible impact upon the surrounding noise sensitive receptors.

Chapter 5: Scoping and Consultation provides details on the types of consultation activities undertaken for the Project.

In relation to noise and vibration, the scoping opinion sought consideration of how materials are to be transported to site. This has been addressed in Chapter 19 Traffic and Transportation.

13.6 Methodology to Inform the Baseline

13.6.1 Desktop study

A desktop study, based on the review of aerial imagery, was undertaken to identify receptors that could be potentially affected by noise and vibration from the construction of the proposed development. A summary of the desktop data used is summarised in Table 13-1.

Table 13-1 Desktop Data for Noise and Vibration Assessment

Title	Source of Desktop Data	Year
Noise sensitive receptors	Google Maps / Google Earth / Bing Maps	2025

Title	Source of Desktop Data	Year
Aerial imagery	Google Maps / Google Earth	2025

13.6.2 Site-specific surveys

In order to inform the ES, site-specific survey were undertaken. A summary of the surveys undertaken to inform the noise and vibration impact assessment is outlined in Table 13-2.

Table 13-2 Summary of Site-Specific Survey Data

Title	Extent of survey	Overview of survey	Date	Reference to further information
Baseline Noise Monitoring Survey	The baseline noise monitoring survey was undertaken to determine the baseline noise levels at the nearest noise sensitive receptors.	The surveying consisted of unattended baseline noise measurements at 3 locations. Simultaneous unattended wind speed and rainfall monitoring at 1 location	21/01/2025 – 11/02/2025	ES Volume III Appendix 13.B

13.7 Assessment Methodology

The methodology and associated impact assessment had regard to the general guidance regarding the undertaking of an EIA, as presented in Chapter 4: Environmental Impact Assessment Process and Methodology and the following noise and vibration specific guidance as follows:

- British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites Part 1: Noise
- British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites Part 2: Vibration
- British Standard 7445:2003 Description and Measurement of Environment Noise – Part 1: Guide to Quantities and Procedures

13.7.1 British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites Part 1: Noise

Part 1 of the standard provides a method of calculating noise from construction plant, including:

- Tables of source noise levels;
- Methods for summing up contributions from intermittently operating plant;
- A procedure for calculating noise propagation;
- A method for calculating noise screening effects; and
- A way of predicting noise from mobile plant, such as haul roads.

The standard also provides guidance on legislative background, community relations, training, nuisance, project supervision and control of noise and vibration.

13.7.1.1 ABC Method

The ‘ABC’ Method within Annex E of BS5228:2009 Part 1 has been used in the construction noise assessment to establish construction noise threshold values and determine significance. This method provides a threshold value based on the existing ambient noise level, rounded to the nearest 5 dB. The resultant threshold value indicates the noise level at which the total noise level, including construction noise, constitutes a significant effect. Table 13-3 outlines the applicable noise threshold values that apply at the nearest noise sensitive receptors.

Table 13-3: Noise Threshold Limits at Nearest Sensitive Receptors

Assessment Category and Threshold Value Period (L_{Aeq})	Threshold Value [dB(A)]		
	Category A[1]	Category B[2]	Category C[3]
Night-time (23:00 - 07:00)	45	50	55
Evening and Weekends[4]	55	60	65
Weekday daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75
NOTE 1: A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.			
NOTE 2: If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise levels for the period increases by more than 3 dB due to construction activity.			
NOTE 3: Applied to residential receptors only.			

13.7.1.2 5 dB(A) Change Method

Another methodology within BS 5228-1:2009 is the ‘5 dB(A) Change’ method, which provides evaluative criteria which are generally applicable to residential housing, but also:

- Hotels and hostels;
- Buildings in religious use;
- Buildings in educational use, and;
- Buildings in health and/or community use.

Noise levels generated by construction activities are deemed to be significant if the total noise (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB from construction noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant impact.

For public open space, impact might be deemed to be significant if the total noise (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise ($L_{Aeq,\ Period}$) by 5 dB or more for a period of one month or more. However, the extent of the area impacted relative to the total available areas also needs to be taken into account.

[1] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

[2] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

[3] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

[4] 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

13.7.2 British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites Part 2: Vibration

Part 2 of the standard gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels, including industry-specific guidance. Guidance is provided concerning methods of measuring vibration, predicting vibration and assessing its effects on the environment.

Humans are known to be very sensitive to vibration, the threshold of perception being typically in the Peak Particle Velocity (PPV) range of 0.14 $mm{\cdot}s^{-1}$ to 0.3 $mm{\cdot}s^{-1}$. Vibrations above these values can disturb, startle, cause annoyance or interfere with work activities. At higher levels they can be described as unpleasant or even painful. In residential accommodation, vibrations can promote anxiety lest some structural mishap might occur. Guidance of effects of vibration levels are illustrated in Table 13-4 below.

Table 13-4: Guidance on Effects of Vibration Levels

Vibration Level	Effect
0.14 $mm{\cdot}s^{-1}$	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 $mm{\cdot}s^{-1}$	Vibration might be just perceptible in residential environments.
1.0 $mm{\cdot}s^{-1}$	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 $mm{\cdot}s^{-1}$	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Limits of transient vibration, above which cosmetic damage could occur, are given numerically in Table 13-5 (Ref: BS5228-2:2009+A1:2014). Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 13-5, and major damage to a building structure can occur at values greater than four times the tabulated values.

Table 13-5: Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak Particle Velocity (PPV) (mm/s) in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings.	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Unreinforced or light framed structures. Residential or light commercial buildings.	15 mm/s at 4 Hz increasing to 20 mm/S at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above.

13.7.3 British Standard 7445:2003 Description and Measurement of Environment Noise – Part 1: Guide to Quantities and Procedures

British Standard BS 7445 provides the framework within which environmental noise should be quantified. BS 7445: Part 1 provides guidance to quantities and procedures in relation to environmental noise monitoring. BS 7445-1 states that sound level meters that are used should conform to Type 1 (or Type 2 as a minimum) and should be calibrated according to the instructions of the manufacturer, with field calibration undertaken before and after each series of noise measurements.

Where it is desired to minimise the influence of reflections then outdoor measurements should, whenever possible, be carried out at least 3.5 m from any reflecting structure other than the ground. When not otherwise specified, the preferred measurement height is 1.2 to 1.5 m above the ground.

Records should be kept of meteorological conditions. Specific meteorological conditions are not prescribed, but as per other standards and general good practice, it is usually recommended that wind speed should not exceed 5 m/s at height of 3-11m above ground and that heavy precipitation should be avoided. Furthermore, it is important to be aware of potential temperature inversions and, therefore, recording of air temperature is also recommended.

Normally, conditions are chosen which are favourable to sound propagation, with measurements taken under light downwind conditions (where possible).

13.7.4 Impact Assessment Criteria

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors.

This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 4: Environmental Impact Assessment Process and Methodology.

13.7.4.1 Magnitude of Impact – Construction Noise

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 4: Environmental Impact Assessment Process and Methodology.

The criteria for defining impact magnitude and significance in this chapter are outlined in below.

The magnitude of construction noise impact has been determined with reference to Annex E of BS 5228-1, within which the ‘threshold of significant effect’ is discussed, indicating that, for the ‘ABC’ assessment method:

“A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise levelis higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for theperiod increases by more than 3 dB due to construction activity.”

For the assessment as per example method 2 (5 dB(A) change method):

“Noise levels generated by site activities are deemed to be potentially significant if the total noise (preconstruction ambient plus site noise) exceeds the pre-construction ambient noise by 5dB or more, subject to lower cut off values of 65dB, 55dB and 45dB L_{Aeq} period, from site noise alone, for the daytime, evening, and night-time periods, respectively, and a duration of one months or more, unless works of a shorter duration are likely to result in a significant effect. “

For the majority of noise-sensitive receptors, pre-construction ambient noise levels are assumed to be relatively low, resulting in the criteria set within the lower cut-off levels given in Table 13-6 below, thus applying the most stringent limits. As such the lower cut-off levels are used throughout the construction assessment to all noise-sensitive receptors.

Table 13-6 shows the magnitude of impact mapped to various values of total daytime noise, which includes both the existing ambient noise and construction noise. The magnitude of impact values are based on the statements within BS5228 Annex E definitions of potentially significant noise levels, as discussed above, and have been extrapolated to include higher values of total noise level. Note that, as per BS5228, these values are for duration of one month or more.

Table 13-6: Magnitude of Impact: Construction Noise Daytime and Night time

Total Daytime Noise Level (dB $L_{Aeq, 12h}$) (Ambient and Construction Noise)	Total Night time Noise Level (dB $L_{Aeq, 8hr}$) (Ambient and Construction Noise)	Magnitude of Impact
< 65 dB (lower cut-off level)	<45	None or Negligible
65 - 70 dB	45-50	Low
70 –75 dB	50-55	Medium
> 75 dB	>55	High

Table 13-7 Definition of Terms Relating to the Magnitude of an Impact

Magnitude of impact	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).

The criteria for defining receptor sensitivity in this chapter are outlined in below.

13.7.4.2 Receptor Sensitivity / Value

Sensitive receptors, in the context of noise and vibration, are typically residential premises but can also include schools, places of worship and noise-sensitive commercial premises. Guidance on defining receptor sensitivity can be found in the Scottish Government’s Technical Advice Note (TAN) on Assessment of Noise. As shown in Table 13-8, which provides the level of sensitivity associated with various examples of noise-sensitive receptors. Section 2.21 of TAN States:

"*There are three levels of sensitivity "high" "medium" and "low". The ranking is primarily based on the relationship between the amenity associated with a NSR and its susceptibility to noise*."

Sensitivity of receptors as defined in TAN has been used as reference criteria for sensitivity of receptors within this chapter.

Table 13-8: Receptor Sensitivity (Ref: TAN Assessment of Noise)

Sensitivity	Description	Examples of Noise Sensitive Receptors
High	Receptors where people or operations are particularly susceptible to noise	Residential, including private gardens where appropriate. Quiet outdoor areas used for recreation Conference facilities Theatres/Auditoria/Studios Schools during the daytime Hospitals/residential care homes Places of worship
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	Offices Bars/Cafes/Restaurants where external noise may be intrusive. Sports grounds when spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf, bowls)
Low	Receptors where distraction or disturbance from noise is minimal	Buildings not occupied during working hours Factories and working environments with existing high noise levels Sports grounds when spectator noise is a normal part of the event Night Clubs

Receptors expected to be affected by noise and vibration impacts from the proposed development include residential receptors as well as other non-residential receptors which are deemed to be highly sensitive. Within the study area, there are also receptors of medium and low sensitivity.

The significance of the effect is determined as a function of the sensitivity of the receptor and the magnitude of impact it is exposed to. The significance of the effect is determined as a function of the sensitivity of the receptor and the magnitude of impact it is exposed to as summarised below in Table 13-9.

Where a range of significance of effect is presented in Table 13-9the final assessment for each effect is based on calculated assessment and professional judgement.

Table 13-9: Matrix Used for the Assessment of the Significance of the Effect

		Sensitivity of Receptor / Receiving Environment to Change / Effect			
Magnitude of Change		**High**	**Medium**	**Low**	**Negligible**
	High	**Major**	**Major**	**Moderate**	Negligible
	Medium	**Major**	**Moderate**	Minor	Negligible
	Low	**Moderate**	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

13.8 Baseline Environment

The site lies within the northern fringes of Goodwick which is a coastal town immediately west of its twin town of Fishguard, within Fishguard Bay. It is bound by steep cliff faces and the Fishguard train Station to the western extents; a breakwater to the north and RNLI Lifeboat Station. Residential properties of Harbour Village lie to the west elevated above Fishguard Bay.

The site is accessed from the A40/Station Hill to the south. The current Stena Line operation includes a twice daily ferry service to Rosslare, covering public ferry passengers and accompanied and unaccompanied freight. The berth is also infrequently used by cruise vessels and historic steamboats.

13.8.1 Current Baseline - Noise

Vehicular access to the port is currently provided via a double roundabout at the Harbour Access / A40 The Parrog / A487 Wern Road / Station Hill junction. The Proposed Development site and the external road network includes:

- A487 Wern Road / A40 The Parrog / Station Hill / Local Road
- Local Road / Fishguard Ferry Port / Fishguard Pier Car Park
- Fishguard Ferry Port Access

Fishguard Port accommodates vehicles and freight that travel on and off the vessel on wheels. These are known as Ro-Ro movements - an abbreviation of Roll On - Roll Off. Traffic generated by Ro-Ro ports is directly linked to the number of sailings per day, the time of the sailings, and the throughput of each vessel i.e. the number of passenger vehicles and freight vehicles.

Currently, Fishguard Port provides services using the Ro-Ro ferry MS Stena Europe, which is 149 metres long and has 1,120 lane metres. The vessel sails twice daily between Fishguard and Rosslare in the Republic of Ireland. The peak ferry activity, and therefore the peak traffic activity associated with the harbour, will occur between 11:15 - 13:10 and between 21:25 - 23:45.

13.8.2 Current Baseline - Vibration

A baseline vibration survey to establish the existing level of ground-borne vibration has not been undertaken since any assessment would be based upon exceedance of criteria rather than change in vibration. There are no known existing significant sources of vibration.

13.8.3 Future Baseline

In the absence of the proposed redevelopment, and as there are no new noise or vibration sources, it is considered unlikely that there would be any significant change to baseline noise and vibration conditions.

13.8.4 Sensitive Receptors

A desk-based review was carried out to identify existing noise sensitive receptors within the study area for each aspect of the noise and vibration impact assessment.

Receptor locations relevant to the Proposed Development have shown in ES Volume III Figure 13.2 Construction Noise Receptors and been tabulated in ES Volume II Appendix 13.B Noise Sensitive Receptors and including residential and non-residential receptors. Non-residential receptors within the study area include other commercial and light industrial premises.

13.8.5 Baseline Noise Monitoring Survey

To inform the assessments, representative baseline data describing the ambient noise environment in the vicinity of the nearest and representative receptors to the Proposed Development was undertaken during January 2025. The locations of the unattended baseline noise monitoring locations are detailed in ES Volume III Figure 13.3 Noise Monitoring Locations and ES Volume II Appendix A Noise Monitoring Survey.

Unattended noise monitoring was undertaken at three locations between 21st January and 11th February 2025. For full details of the baseline noise monitoring survey, please refer to Volume II Appendix 13.C.

The noise monitoring locations (NMLs) are shown in Volume III Figure 13.3 and noise monitoring location coordinates are presented in Table 13-10.

Table 13-10: Summary of Noise Monitoring Locations

Noise Monitoring Location	Description of Noise Monitoring Location	Easting, m	Northing, m	Commencement and Collection Date and Time
1	76 Harbour Village, Goodwick, SA64 0DZ	194908	239048	11:45 on 21/01/25 – 11:15 on 03/02/25
2	Fishguard Bay Hotel, Quay Road, Goodwick, SA64 0BT	194899	238691	11:45 on 21/01/25 – 11:45 on 03/02/25
3	30 Heol Dewi, Fishguard, SA65 9DY	195394	237600	14:15 on 03/02/25- 19:00 on 11/02/25

Details of the baseline surveys, including determination of representative sound levels to be used in the and determination of appropriate thresholds of significance for construction noise in accordance with BS 5228-1:2009+A1:2014, are presented in the ES Volume II Appendix A Noise Monitoring Survey.

The assessment of baseline noise data undertaken was assessed in accordance with the relevant guidance to determine the following:

- Evaluate the baseline noise climate; and,
- The applicable BS 5228 construction noise threshold limit in accordance with British Standard BS5228, Code of Practice of Noise Control on Construction and Open sites.

13.8.5.1 Subjective Notes

Subjective notes regarding the existing noise environment were captured during the set up and collection of the noise monitoring survey equipment. It was noted that, at all noise monitoring locations, the existing noise environment was dominated by road traffic noise from local roads and the surrounding road network.

13.8.5.2 Results Summary

A summary of the noise monitoring results is shown in Table 13-11, with the existing ambient level shown for the relevant construction time periods.

Table 13-11: Noise Monitoring Survey Results Summary

Time Period		$L_{Aeq,T}$		
		NML1	NML2	NML 3
Daytime	07:00 – 23:00	41/44	50	49
Night time	23:00 – 07:00	40	47	40

13.9 Impact Assessment

The noise and vibration impact assessment has considered the following aspects:

- Impact of construction noise on existing noise-sensitive receptors;
- Impact of construction vibration on existing noise-sensitive receptors

Impact of Construction traffic noise impact and assessment on existing noise-sensitive receptors has been scoped out of this chapter.

Operational noise and vibration have been scoped out of the noise and vibration impact assessment, as there are no significant sources of noise or vibration associated with the Proposed Development.

13.9.1 Do Nothing Scenario

The Do-Nothing Scenario will result in no impact upon the existing baseline noise climate as the Ferry Port will continue to operate as it currently does.

13.9.2 Assessment of Construction Effects

The assessment of construction effects has considered the potential noise and vibration effects during construction of the Proposed Development.

A summary of the construction noise and vibration assessment is presented within this section. Details of construction noise and vibration calculations can be found in Volume II Appendix 13.C Construction Noise Assessment.

13.9.2.1 Construction Phasing

The project involves several key activities aimed at enhancing the infrastructure and operational capabilities of the harbour. These include the following:

- Demolition of
  - Disused RNLI slipway structure
  - Buffer Dolphin
  - Suspended deck structure
  - 3 No. small disused kiosks
- Removal of
  - Linkspan bridge, equipment and cabin
  - Jack up barge
- Dredging with disposal at sea
- Reclamation
- Scour protection to the berth and dredged slope to the rear of the berth.
- Piled Reinforced Concrete Bankseat
- Tubular Steel Guide Pile
- Floating pontoon linkspan installation
- Terminal reconfiguration
- Temporary Works

13.9.2.2 Construction Sequence – During Ferry Operations

As per Chapter 2: Project Description and the Contractors Methodology the following will be carried out during ferry operations.

- Demolition of RNLI slipway
- Dredging in the wider harbour and outside the area of the jack up barge
- Reclamation and revetment construction and paving works
- Road furniture and fencing

- Bankseat piling and concrete works
- Pavement construction and tie in to existing
- Guide Pile installation (including installation and removal of temporary piles)

13.9.2.3 Construction Sequence – While Ferry is suspended

As per Chapter 2: Project Description and the Contractors Methodology the following will be carried out whilst the ferry is suspended.

- Remove hydraulic linkspan and Jack Up Barge
- Dredge beneath the Jack Up Barge
- Demolition of buffer dolphin
- Demolition of suspended deck and supports
- Installation of new Linkspan
- Drainage, connection to the existing network
- Completion of pavement works to reclaimed area rock armour to north face of reclamation
- Scour protection throughout the berth and to the dredged slope

13.9.2.4 Construction Hours

The Port currently operates 24 hours per day, 7 days a week. Due to the 3 month shutdown to the ferry service, it is expected that work during the construction stage will be 24hrs/day 7 days per week.

13.9.2.5 Construction Sequence

The construction sequence duration is summarised below:

- Overall Construction – Approximately 9 months; and
- Shutdown Period – Approximately 3 months.

13.9.2.6 Construction Noise Effects

13.9.2.6.1 Construction Noise Level Thresholds

13.9.2.6.1.1 Residential Receptors

The predicted construction noise effects are assessed in accordance with BS 5228-1. For residential dwellings, the ABC method (summarised in Section 13.7 of this ES), has been implemented to determine whether the predicted noise levels from the construction activities will result in any significant noise impact at noise sensitive properties. This method defines categories of construction noise based on existing noise levels, with threshold levels set for various time periods.

As indicated in Table 13-11, the results of the baseline noise monitoring survey show that the existing daytime noise levels at locations representative of the closest noise-sensitive receptors are below 65 dBA and, as such fall within ABC method category A.

As such, a daytime construction noise threshold of 65 dBA applies at the closest noise-sensitive receptors. This threshold applies to construction works undertaken from Monday to Friday 07:00 – 19:00 hrs and Saturday 07:00 – 13:00 hrs.

Night time construction noise threshold of 45 dBA applies at the closest noise-sensitive receptors. This threshold applies to construction works undertaken from 23:00- 07:00 hrs.

13.9.2.6.2 Construction Noise Predictions

The noise impact of demolition and construction works will be dependent on the construction methodologies and scheduling of works. The details of demolition and construction methodologies and scheduling will be determined by the contractor. The noise impact assessment presented in this chapter (and as detailed in Volume II Appendix 13.C: Construction Noise Assessment) is based on realistic worst-case assumptions, considering typical construction plant and equipment for individual phases and tasks.

The construction noise source levels in Annex C and D of BS5228-1 have been used to carry out construction noise predictions. BS5228-1 provides the sound pressure level at 10m or the sound power level of plant and equipment. The worst-case assumptions of plant and equipment associated with each construction activity have been detailed in Volume III Appendix 13.C, along with full details of construction noise predictions.

A summary of the construction noise source levels and activities are summarised in Volume II Appendix 13.C Construction Noise Assessment and below in Table 13-12 and Table 13-13.

Table 13-12: Construction Activities and Plant Ferry Operational and Noise Levels

Activity	Item	BS5228 ref	Number	Sound Pressure Level at 10m dBA	Cumulative Level Sound Pressure Level at 10m dBA
Demolition of RNLI Slipway	Tracked Excavator	C.2.14	1	79	79.0
	90t Long reach excavator	C.4.56	1	83	83.0
	Dump truck	C.2.31	2	87	90.0
	Rock Breaker	D.2.4	1	91	91.0
				TOTAL:	**94.0**
Dredging in the wider harbour and outside the area of the jack up barge	Backhoe Dredger	C.7.2	1	82	82.0
				TOTAL:	**82.0**
Reclamation and revetment construction and paving works	Dump truck	C.2.31	3	87	91.8
	Tracked excavator	C.2.3	2	78	81.0
	Dozer	C.2.12	1	81	81.0
	Compaction Roller	C.2.37	2	70	73.0
	Long Reach Excavator	C.4.56	1	83	83.0
				TOTAL:	**93.0**
Road furniture and fencing	Dumper	C.2.30	1	79	79
	Excavator	C.2.14	1	79	79

Activity	Item	BS5228 ref	Number	Sound Pressure Level at 10m dBA	Cumulative Level Sound Pressure Level at 10m dBA
				TOTAL:	**82.0**
Bankseat piling and concrete works	120t Rotary Bored Piling Rig / Leader Rig	C.3.14	1	83	83.0
	Vibratory piling rig (Temporary Piles)	C.3.8	1	88	88.0
	Crawler Crane	C.3.21	1	79	79.0
	Dumper	C.2.30	2	79	82.0
	Excavator	C.2.14	1	79	79.0
				TOTAL:	**90.6**
Pavement construction and tie in to existing	Dump truck	C.2.31	3	87	91.8
	Tracked excavator	C.2.3	2	78	81.0
	Compaction Roller	C.2.37	2	70	73.0
				TOTAL:	**92.2**
Guide Pile installation (including installation and removal of temporary piles)	Tubular steel piling (Guide Pile)	C.3.3	1	88	88
	200T Crawler Crane	C.3.21	1	79	79
	Vibratory / Impact Hammer CX110	C.3.2	1	87	87
	120t Rotary Bored Piling Rig / Leader Rig	C.3.14	1	83	83
	Vibratory piling rig (Temporary Piles)	C.3.8	1	88	88
				TOTAL:	**93.1**

Table 13-13: Construction Activities and Plant Ferry Not- Operational and Noise Levels

Activity	Item	BS5228 ref	Number	SPL at 10m	Cumulative Level Sound Pressure Level at 10m dBA
Remove hydraulic linkspan and Jack Up Barge	Tracked Excavator	C.2.14	1	79	79.0
	90t Long reach excavator	C.4.56	1	83	83.0
	Dump truck	C.2.31	1	87	87.0
	200T Crawler Crane	C.3.21	1	79	79.0
				TOTAL:	**89.3**
Dredge beneath the Jack Up Barge	Backhoe Dredger	C.7.2	1	82	82.0
	Rock Breaker	D.2.4	1	91	91.0
				TOTAL:	**91.5**
Demolition of buffer dolphin	Dump truck	C.2.31	2	87	90.0
	Tracked excavator	C.2.3	1	78	78.0
	Rock Breaker	D.2.4	1	91	91.0
	Underwater drilling / coring	N/A	N/A	0	0.0
	Wire saw	N/A	N/A	0	0.0
	Long Reach Excavator	C.4.56	1	83	83.0
				TOTAL:	**94.0**
Demolition of suspended deck and supports	Dump truck	C.2.31	2	87	90.0
	Tracked excavator	C.2.3	1	78	78.0
	90t Long reach excavator	C.4.56	1	83	83.0
				TOTAL:	**91.0**
Installation of new Linkspan	Crawler Crane	C.3.21	1	79	79.0
	Crane Barge	CNP 061	1	76	76.0
				TOTAL:	**80.8**
Drainage, connection to the existing network	Tracked excavator	C.2.3	1	78	78.0
				TOTAL:	**78.0**
Completion of pavement works to reclaimed area rock armour to north face of reclamation	Dump truck	C.2.31	3	87	91.8
	Tracked excavator	C.2.3	2	78	81.0
				TOTAL:	**92.1**
	Backhoe Dredger	C.3.3	1	88	88

Activity	Item	BS5228 ref	Number	SPL at 10m	Cumulative Level Sound Pressure Level at 10m dBA
Scour protection throughout the berth and to the dredged slope	90t Long reach excavator	C.4.56	1	83	83
				TOTAL:	89.2

The total sound pressure level at various distances from the construction activity was predicted using the noise propagation methodology within BS5228-1. The resultant levels are presented in Volume II Appendix 13.C. Where more than one item of equipment is involved in a single construction phase/activity, the sound pressure levels have been logarithmically added, resulting in a total sound pressure level for the activity.

Worst case assumptions were made for these calculations as follows:

- Full power operation of each demolition and construction activity throughout the daytime or night time period;
- 1no. item, or more, of equipment of each type operational at once;
- Free field conditions are assumed and ground effects are ignored;
- Equipment is assumed to be operational at closest point to noise sensitive receptor, and;
- No barrier effects have been applied.

The construction programme will give rise to variable noise levels and the impact will vary throughout the construction phase, which will take place over a period of several months. Noise impacts will not be continuous and will vary by phase and by construction activity or combination of activities taking place. The construction noise predictions and impacts are based on worst-case scenarios, assuming construction plant at the closest location within each activity boundary to noise-sensitive receptors.

13.9.2.6.3 Magnitude of Impact

Magnitude of impact will vary depending on construction activity, as summarised in Table 13-14. In addition to this, the impact of construction noise will be highly dependent upon location of works and duration of activities, particularly for works covering a large area.

Table 13-14: Summary of Magnitude of Impact Unmitigated (Daytime and Night time)

Phase	Construction Activity	Magnitude of Impact Daytime (Unmitigated)	Magnitude of Impact Night time (Unmitigated)
Ferry Operational	Demolition of RNLI Slipway	None or negligible	Medium to high
	Dredging in the wider harbour and outside the area of the jack up barge	None or negligible	None or negligible to medium
	Reclamation and revetment construction and paving works	None or negligible	Medium to high
	Bankseat piling and concrete works	None or negligible	Low to high
	Guide Pile installation (including installation and removal of temporary piles)	None or negligible	Medium to high

Phase	Construction Activity	Magnitude of Impact Daytime (Unmitigated)	Magnitude of Impact Night time (Unmitigated)
Ferry Not Operational	Remove hydraulic linkspan and Jack Up Barge	None or negligible	Low to high
	Dredge beneath the Jack Up Barge	None or negligible	Low to high
	Demolition of buffer dolphin	None or negligible	Low to high
	Demolition of suspended deck and supports	None or negligible	Low to high
	Installation of new Linkspan	None or negligible	None to negligible to medium
	Drainage, connection to the existing network	None or negligible	None to negligible to medium
	Completion of pavement works to reclaimed area rock armour to north face of reclamation	None or negligible	Low to high
	Scour protection throughout the berth and to the dredged slope	None or negligible	Low to high

Pre-mitigation, the predicted construction noise impacts are anticipated to result in effects ranging from none/negligible at construction noise receptors during daytime, and none/negligible to major at construction noise receptors during night time.

13.9.2.6.4 Sensitivity of the Receptor

Residential receptors are determined to be of High sensitivity. Non-residential receptors within the study area includes a hotel, which has been included as receptor of High sensitivity.

The study area also includes some light industrial receptors (which may have a low sensitivity if background levels are already high within the premises).

13.9.2.6.5 Significance of the Effect

The predicted significance of effect, daytime and night time, shown in Table 13-15 represents a worst case for high sensitivity receptors. During the construction period, a lower impact will be experienced, where noise levels are lower than those predicted, or where duration of activities does not exceed the time threshold to deem a significant effect. Where a range of potential impacts are indicated, both levels have been included.

Table 13-15: Construction Noise Effects (Daytime and Night time)

Phase	Construction Activity	Magnitude of Impact Daytime (Unmitigated)	Significance (High Sensitivity Receptors) Daytime	Magnitude of Impact Night time (Unmitigated)	Significance (High Sensitivity Receptors) Nigh time
Ferry Operational	Demolition of RNLI Slipway	None or negligible	Negligible / Minor	Medium to high	Moderate / Major
	Dredging in the wider harbour and outside the area of the jack up barge	None or negligible	Negligible / Minor	None or negligible to medium	Negligible / Minor
	Reclamation and revetment construction and paving works	None or negligible	Negligible / Minor	Medium to high	Moderate / Major
	Bankseat piling and concrete works	None or negligible	Negligible / Minor	Low to high	Minor / Moderate - Moderate / Major
	Guide Pile installation (including installation and removal of temporary piles)	None or negligible	Negligible / Minor	Medium to high	Moderate / Major
Ferry Not Operational	Remove hydraulic linkspan and Jack Up Barge	None or negligible	Negligible / Minor	Low to high	Minor / Moderate - Moderate / Major
	Dredge beneath the Jack Up Barge	None or negligible	Negligible / Minor	Low to high	Minor / Moderate - Moderate / Major
	Demolition of buffer dolphin	None or negligible	Negligible / Minor	Low to high	Minor / Moderate - Moderate / Major
	Demolition of suspended deck and supports	None or negligible	Negligible / Minor	Low to high	Minor / Moderate - Moderate / Major
	Installation of new Linkspan	None or negligible	Negligible / Minor	None to negligible to medium	Negligible / Minor

Phase	Construction Activity	Magnitude of Impact Daytime (Unmitigated)	Significance (High Sensitivity Receptors) Daytime	Magnitude of Impact Night time (Unmitigated)	Significance (High Sensitivity Receptors) Nigh time
	Drainage, connection to the existing network	None or negligible	Negligible / Minor	None to negligible to medium	Negligible / Minor
	Completion of pavement works to reclaimed area rock armour to north face of reclamation	None or negligible	Negligible / Minor	Low to high	Minor / Moderate - Moderate / Major
	Scour protection throughout the berth and to the dredged slope	None or negligible	Negligible / Minor	Low to high	Minor / Moderate - Moderate / Major

The significance of noise, daytime, is negligible /minor at all assessed construction noise receptors. The significance of noise, night time, ranges from negligible /minor (Dredging in the wider harbour and outside the area of the jack up barge, Installation of new Linkspan, Drainage, connection to the existing network) at all construction noise receptors to Minor / Moderate - Moderate / Major at all other construction activities assessed. The significance of noise will be dependent on the construction activity.

13.9.2.7 Construction Vibration Effects

BS 5228:2009 Part 2 provides historical data of Peak Particle Velocity at various distances as summarised below in Table 13-16 This data can be used to assess the vibration impacts at the nearest noise sensitive receptors.

Table 13-16 Measured Peak Particle Velocity (PPV) at various plan distances (ref: Table D.11 BS 8233)

Distance from source	8m	16m	32m
PPV for piling	23.7mms-1	7.4 mms-1	2.7 mms-1

The nearest noise sensitive receptors are approximately 270m from proposed piling locations. Therefore, due to distance between receptors and piling operations, vibration from piling operations will not be significant.

13.9.2.7.1 Magnitude of Impact

As discussed in Section 13.7.2, the threshold of perception being typically in the Peak Particle Velocity (PPV) range of 0.14 $mm\cdot s^{-1}$ to 0.3 $mm\cdot s^{-1}$. At a PPV of 1 mm/s, BS5228-2 suggests “It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation is given to residents”.

The vibration study area for construction is 100m from source to receptor. There are no sensitive receptors located within 100m of the proposed piling works.

PPV detailed in Table 13-16 is significantly below the threshold for cosmetic or structural damage of 15-20 mm/s (frequency dependent).

The predicted vibration values will be applicable for a short period of time, with lower vibration levels likely as the separation between pile and receptor increases. Similarly, the effect of vibration on all other receptors further from the proposed development will be lower than those indicated above.

The vibration level will vary with piling location, ground conditions and piling type. The vibration predictions presented include worst-case scenarios which may result in a Negligible or Low Impact.

13.9.2.7.2 Sensitivity of the Receptor

Residential receptors are determined to be of High sensitivity. Non-residential receptors within the study area includes a hotel, which has been included as receptor of High sensitivity.

The study area also includes some light industrial receptors (which may have a low sensitivity if background levels are already high within the premises).

13.9.2.7.3 Significance of the Effect

The vibration level during the majority of construction works will generally be negligible, with some construction activities resulting in temporary increases in vibration levels. The primary source of vibration during the construction programme is likely to be piling works. The resultant vibration levels at receptors will vary with piling location, ground conditions and piling type.

The vibration predictions indicate that the vibration from piling will have a Negligible/Low Adverse Impact with Minor Significance at high or medium sensitivity receptors. For most of the receptors and for the majority of the construction programme, there will be a No Impact due to construction vibration.

13.9.3 Assessment of Operational Effects

13.9.3.1 Operational Noise

Operational noise has not been included as there is no inclusion of new significant noise sources likely to generate perceptible noise levels when the Proposed Development is operational. The Proposed Development will not result in any significant permanent adverse effects on the noise environment within the Study Area.

Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel size are not expected to increase above existing levels. The related number of generated vehicle movements are also not expected to increase above existing levels. Therefore, there will be no traffic noise impact associated with the replacement Linkspan scheme once completed.

13.9.3.2 Operational Vibration

Operational vibration has not been included as there is no inclusion of new significant vibration sources likely to generate perceptible levels of vibration when the Proposed Development is operational.

13.10 Mitigation

Mitigation measures should be employed to reduce any potential temporary construction noise impacts on noise-sensitive receptors. Mitigation measures appropriate to the Proposed Development are presented within this section.

13.10.1 Construction Phase Mitigation Measures

Planning of phasing should consider the noise impact of construction works on residential and non-residential receptors and steps taken to reduce the noise and vibration impact. During each construction phase, it will be critical to consider the closest noise and vibration receptors to construction works and the implement suitable mitigation measures to reduce the noise and vibration impact.

Worst case construction noise predictions can be reduced through use of appropriate mitigations as detailed below in Section 13.10.1.3.

BS 5228-1 states that:

> "…*if the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect*."

These factors have therefore been considered to determine the effect significance.

As a summary of proposed construction works:

- Construction works will be temporary and limited in duration;
- Construction plant and machinery has been assessed as operating for the full working period of the day, i.e. 100% duty cycle. Due to natural pauses in activity and rest breaks equipment will not be fully operational during the working day; and
- Temporary construction noise barriers will be used, where possible, to achieve attenuation of noise levels between ground based construction plant and the nearest noise sensitive properties.

The construction programme will give rise to variable noise levels and the impact will vary throughout the construction phase, which will take place over a period of several months. Noise impacts will not be continuous and will vary by phase and by construction activity or combination of activities taking place. The construction noise predictions and impacts are based on worst-case scenarios, assuming construction plant at the closest location within each activity boundary to noise-sensitive receptors.

13.10.1.1 Night time Noise Impacts

Night time noise construction works will be required throughout the construction of the proposed development. BS 82233 night time noise limit of 45 dB will be applicable at the receptor locations. Night time construction noise impact indicates that there is the potential for significant impact without mitigations.

Screening at source of potentially affected receptors would ensure that the BS 5228 noise limit is adhered to, where possible, reducing impact to temporary minor adverse impact.

13.10.1.2 Construction Environmental Management Plan

A detailed Construction Environmental Management Plan, including specific Noise Management Plan will be undertaken by contractor of the proposed development. The CEMP and subsequent noise management plan will set out the mitigation measures that will be employed to reduce the noise and vibration impacts of the development during the construction phase.

13.10.1.3 Specific Construction Noise Mitigation

Construction mitigation measures will be put in place to ensure construction noise levels are attenuated and reduced where necessary. Best practice measures will be employed to ensure that construction phase noise levels are reduced to the lowest possible levels.

BS5228:2009+A1:2014 – Noise and vibration control on construction and open sites outlines a range of measures that can be used to reduce the impact of construction phase noise on the nearest noise sensitive receptors. These measures will be applied by the contractor where appropriate during the construction phase of the Proposed Development. Construction best practice measures which will be implemented included below:

- Ensuring that mechanical plant and equipment used for the purpose of the works are fitted with effective exhaust silencers and are maintained in good working order.
- Careful selection of quiet plant and machinery to undertake the required work where available.
- All major compressors will be 'sound-reduced' models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use.
- Any ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.
- Machines in intermittent use will be shut down in the intervening periods between work.
- Ancillary plant such as generators, compressors and pumps will be placed behind existing physical barriers, and the direction of noise emissions from plant including exhausts or engines will be placed away from sensitive locations, in order to cause minimum noise disturbance. Where possible, in potentially sensitive areas, temporary construction barriers or enclosures will be utilised around noisy plant and equipment.
- Handling of all materials will take place in a manner which minimises noise emissions.

- Audible warning systems will be switched to the minimum setting required by the Health & Safety Executive.
- In order to minimise the likelihood of complaints, Pembrokeshire Council and potentially affected residents will be kept informed of the works to be carried out and of any proposals for work outside normal hours.

The use of the proposed construction noise mitigation measures will ensure that construction noise levels are controlled to the lowest levels practicable.

13.10.1.3.1 Dredging Mitigation

Although recognised that the choice of dredgers is likely to be determined by the engineering requirements and the suitability of available equipment, dredging activities should be planned where possible to reduce the overall source noise level during the works – e.g. limiting night-time works directly adjacent to noise-sensitive properties etc.

Any dredger used for the works will be expected to be fitted with effective engine exhaust silencers, and there will be a requirement placed on the chosen dredger operator to ensure that all engine silencers are effective and reducing engine exhaust noise levels to the lowest reasonably practicable level.

Screening shall be provided nearest to those properties most likely to experience high noise levels from dredging, particularly during more sensitive night-time periods.

13.10.1.4 Construction Phase Vibration Mitigation Measures

A source of vibration associated with the construction phase is potential piling works. BS5228-2:2009+A1:2014 Part 2 Vibration provides practical measures to reduce vibration from piling sites, which are summarised below and should be considered should piling works take place.

Piling works have been identified as having a low potential vibration impact, however it is recommended that best practice mitigation measures are employed during all piling works. The selection of piling technique is a key element in the vibration output from piling activity. The piling technique with the highest vibration output is impact piling, with alternative techniques such as vibrational pile driving or hydraulic jacking can significantly reduce the vibration impact upon nearby receptors.

Best practice vibration mitigation measures are listed below, as found within BS5228-2. These should be employed, where relevant by the construction and/or piling contractor. It is recommended that a full piling vibration risk assessment is carried out prior to commencement of piling works.

1. Use of alternative methods

   Piling and ground engineering processes are primarily selected on the basis of the ground conditions to be encountered, the loads to be supported and the economics of the system. Taking these constraints into account, the process that is least likely to give rise to unacceptable vibrations in particular circumstances should be selected. Example piling methodologies which would be preferable to driven piles include:

   – Use of continuous flight auger injected piles;
   – Pressed-in pre-formed piles;
   – Auger bored piles;
   – Impact bored piles.
2. Removal of Obstructions
3. Provision of Cut-Off trenches
4. Reduction of energy input per blow
5. Reduction of Resistance to Penetration
   – Pre-boring for driven piles
   – Mudding in for rotary bored piles
   – Adding water to the borehole for impact bored piles

- Excavation under support fluid
- Avoidance of shear leg contact with sensitive structures
- Removal of the plug when using casing vibrators
- Bottom driving
- Use of variable moment vibrators

13.10.2 Operational Phase Mitigation Measures

No operational phase noise impact is expected and therefore, mitigation measures are not deemed to be required for the Proposed Development.

13.10.3 Future Monitoring

Any requirement for noise or vibration monitoring would be advised within planning conditions and are likely to apply to the construction phase of the Proposed Development only. It is recommended that construction noise monitoring is undertaken during construction works, particularly when works are carried out close to the site boundary, at location(s) to monitor and inform management of noise levels. Monitoring should be representative of the closest noise-sensitive receptors, as far as possible.

13.11 Assessment of Residual Effects

13.11.1 Construction Phase

Mitigation by careful scheduling of the works, timing of activities and using best practice will be implemented such that no significant effects arise, and levels are as low as possible. The targeted use of noise barriers, where possible, during construction works is expected to reduce the sound pressure level at the closest receptors.

Residents will be informed of the timing and duration of activities that may produce elevated noise. Elevated levels can be tolerated if prior notification and explanation is given.

For periods of the construction period, a lower impact will be experienced, where noise levels are lower than those predicted, or where duration of activities does not exceed the time threshold to deem a significant effect.

Temporary Minor / Moderate - Moderate / Major impacts due to construction noise during night time have been identified at the closest receptors to proposed construction works.

No permanent residual noise and vibration impacts are predicted during construction of the proposed development. With construction mitigation measures in place as proposed through the CEMP and associated appendices, construction noise monitoring, and temporary construction noise barrier the noise impacts from construction activities is predicted to be reduced to temporary minor / moderate. The impact of these activities is temporary and limited to those receptors in closest proximity to works.

Mitigated predicted construction noise impacts are anticipated to result in effects ranging to None to negligible to medium at construction noise receptors during night time with a

The significance of noise impact, daytime, is negligible /minor at all assessed construction noise receptors with low estimated magnitude of effect.

13.11.2 Operational Phase

No residual impacts or residual significant effects are predicted for the operational stage of the Proposed Development.

13.11.3 Decommissioning Phase

No permanent residual noise and vibration impacts are predicted during decommissioning of the Proposed Development.

13.11.4 Transboundary

The Proposed Development is not located close to any international boundaries and there will be no transboundary effects in relation to noise and vibration.

13.12 Cumulative Effects

A list of other similar major projects has been agreed for assessment for cumulative effects (ES Volume II Appendix 4.1). There are no operational noise or vibration impacts associated with the proposed development. None of these projects are sufficiently close to the noise sensitive receptors identified within this chapter to have any cumulative construction impact upon them. Therefore, no intra site effects have been identified and there will be no cumulative effects.

13.12.1 In-combination effects

There are no in-combination noise or vibration effects predicted during either construction operational phases of proposed development.

13.12.2 Effects interactions

A summary of noise and vibration interactions are detailed below.

13.12.2.1 Traffic

There is an interaction between noise and traffic through the generation of construction traffic.

Chapter 3 Project Description states “Transport by road will be minimal – there is no estimated impact on the road transport network”. Therefore, there is no construction traffic noise impact associated with the proposed development and scoped out of the assessment;

The traffic flows generated by Fishguard Port relate to the number vessel sailings and the times of the sailings. Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel sizes will not increase above existing levels, therefore the number of vehicle movements generated by the Port are also not expected to increase above existing levels, resulting in a negligible traffic impact in the operational phase of the Proposed Development.

13.12.2.2 Population and Human Health

Chapter 7 Population and Human Health assessment conclusion reflects that although the scientific literature indicates a clear association between elevated and sustained noise disturbance and reduced health outcome, the changes would result in a very limited effect in the health baseline of the site-specific populations. The temporary and localised construction noise effects are not expected to affect health inequalities.

13.13 Limitations of the Assessment

Noise and vibration predictions have been based on best assumptions and further predictions and assessment may be required when further detail on construction works becomes available.

13.14 Summary of Effects and Conclusion

The design of the Proposed Development, including layout and selection of equipment have carefully considered the noise impact on noise-sensitive receptors.

The noise impact of construction activities is expected to have a Temporary Medium Adverse Impact with Moderate Significance at a limited number of high-sensitivity receptors. For the majority of high sensitivity receptors within the study area and overall, the impact of construction noise is a Low Adverse Impact with Minor Significance.

Assessment of construction traffic noise indicates a Negligible Impact with Negligible Significance at high sensitivity receptors.

The operational noise assessment presented within this chapter has identified that there will be No Operational Noise Impact at high sensitivity receptors.

Assessment of vibration impact during piling works indicates a Negligible to Low Adverse Impact with Minor Significance at high sensitivity receptors.

There will be No Operational Vibration Impact from the Proposed Development at high sensitivity receptors.

The noise and vibration impact at receptors of lower sensitivity and outside of the study area will be lower than those impacts presented within this chapter.

Description of impact	Phase C	Phase O	Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Noise	✓	×	None	C: Negligible to High Adverse O: No impact	C: High O: High	C: Negligible to Major O: None	Screening and noise barriers, where practicable BS5228-1 Construction Noise Mitigation and Best Practice None	C: Low Adverse with Minor Significance O:No Impact	Construction noise monitoring
Vibration	✓	×	None	C: Negligible to High Adverse O: No impact	C: High O: High	C: Negligible O: None	BS5228-2 Construction Vibration Mitigation and Best Practice	C: Low Adverse with Minor Significance O:No Impact	None

13.15 References

- Noise Policy Statement for Northern Ireland, 2014;
- British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites. Part 1: Noise;
- British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites. Part 2: Vibration;
- British Standard BS 4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound (BS, 2019);
- British Standards BS 7445-1:2003 Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures (BS, 7445-1);

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 14 Underwater Acoustics

794-NI-POR-00886R
May 2025

14 UNDERWATER ACOUSTICS

14.1 Introduction

The main objectives of this assessment are to:

- Undertake a desktop study of the existing noise and environmental conditions relevant acoustics near the Proposed Development;
- Assess the potential impact and effects of the proposed construction and operational phases of the Proposed Development against marine mammal and fish auditory thresholds; and
- Recommend mitigation measures in relation to the proposed construction and operational and phases, if necessary.

The assessment presented is informed by the following key chapters of the ES:

- Chapter 2: Project Description

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

14.2 Purpose of this chapter

The primary purpose of this chapter is to provide an assessment of the likely direct effects of the Proposed Development on marine mammals and fish.

This ES chapter presents:

- The current best scientific guidance for assessing effects on hearing in marine mammals and fish from noise (section 14.6);
- Identifies any limitations encountered and assumption made (14.6.4.1);
- An assessment of the likely ranges to auditory threshold exceedances for marine mammals and fish arising from the Proposed Development (section 14.7). This is based on the information gathered, and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in section 14.10.
- Highlights any necessary mitigation (section 14.8) and/or other measures to prevent, minimise, reduce or offset the potential noise impacts identified in the assessment (section 14.7).

14.3 Study Area

The Proposed Development is located just north of Fishguard, Pembrokeshire, Wales. The boundary of the Proposed Development sits almost wholly within the north and south breakwaters of Fishguard Harbour (Figure 14-1). The water is generally shallow, up to c. 15 m depth at high tide, with a moderate (for the UK) tidal range of c. 5 m.

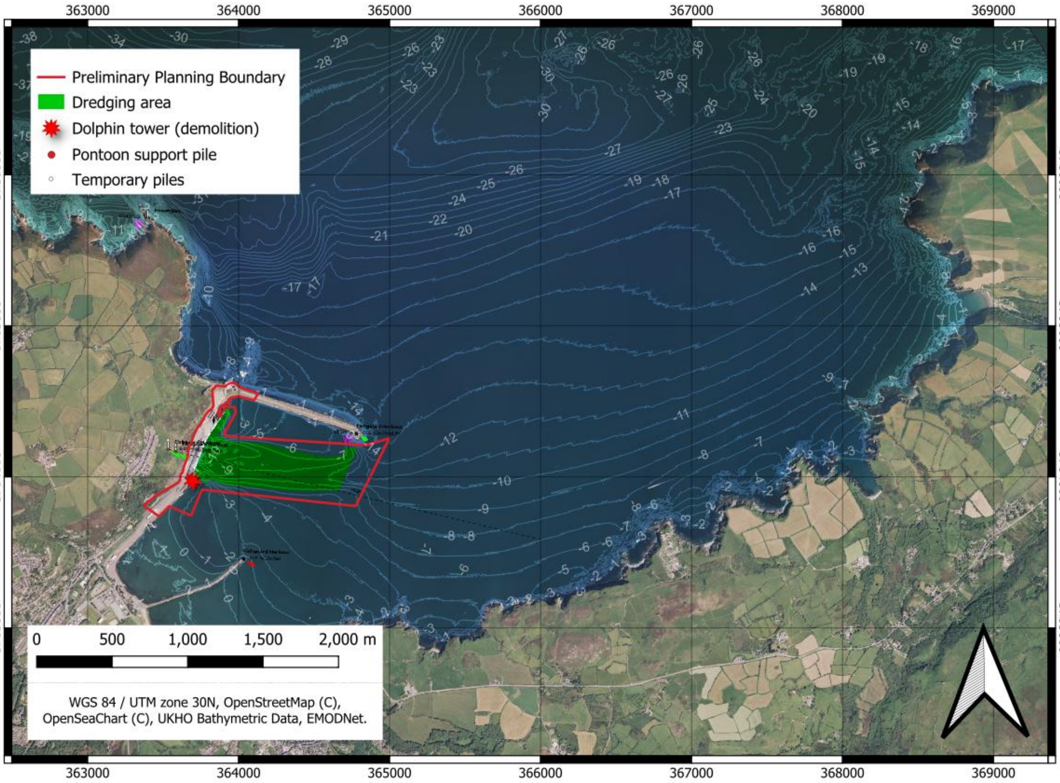

Figure 14-1. Overview map of the Proposed Development boundaries and adjacent Fishguard Bay.

Most of the noisy activities relevant to this assessment will take place within the harbour walls, with the noisiest activities (piling) taking place at the Stena Line linkspan at the western centre of the harbour (Figure 14-2).

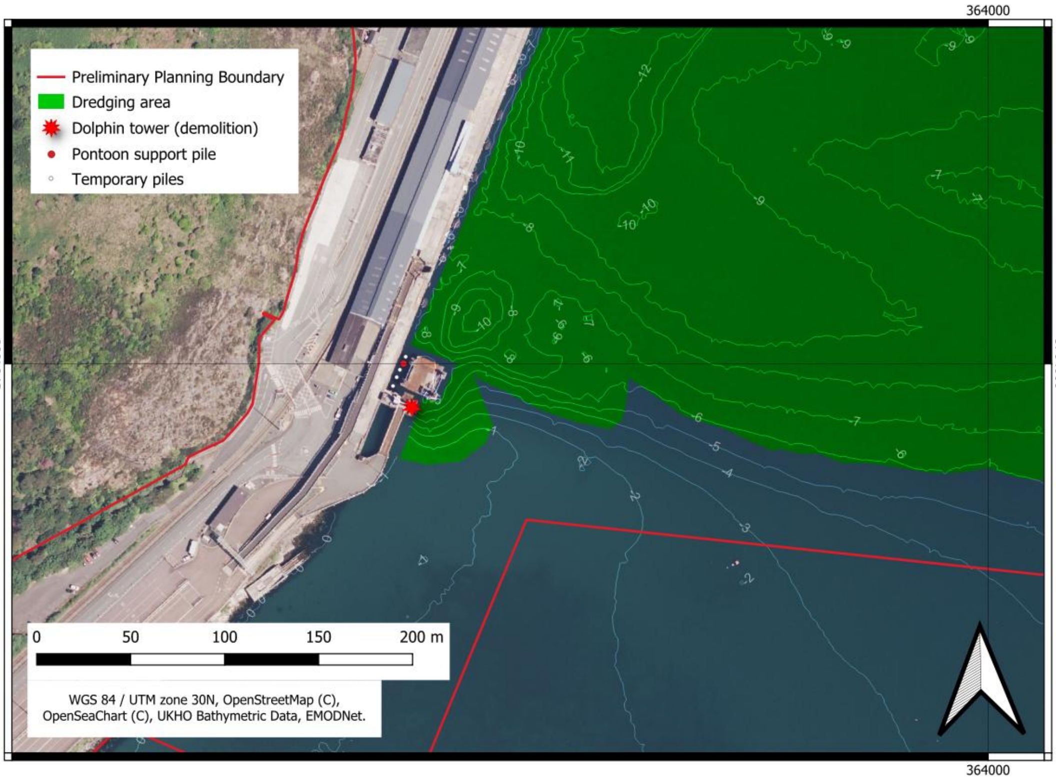

Figure 14-2. View of existing Linkspan with preliminary locations of temporary piles, support pile and dolphin tower (to be demolished).

14.4 Policy Context

14.4.1 EU legislation and policy

The EU Marine Strategy Framework Directive (MSFD) of June 17th 2008[1], stipulates that all EU Member States marine waters must develop marine strategies to achieve or maintain Good Environmental Status (GES). An expert group, the Technical Group on underwater noise (TG Noise) was established to provide guidance on its implementation.

The MSFD underwater noise descriptor number 11 sets out[2]:

- Impulsive noise criterion D11C1:
  The spatial distribution, temporal extent, and levels of anthropogenic impulsive sound sources do not exceed levels that adversely affect populations of marine animals. Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities.
- Continuous low-frequency noise criterion D11C2:
  The spatial distribution, temporal extent and levels of anthropogenic continuous low-frequency sound do not exceed levels that adversely affect populations of marine animals. Member States shall establish threshold values for these levels through cooperation at Union level, taking into account regional or subregional specificities.

The UK is legally required to take measures to achieve or maintain GES and implements this through the UK marine strategy (UKMS). Whilst threshold levels (dB) relative to species (level of onset of biological adverse effects) are not defined yet, the EU have set high level spatial and temporal thresholds. The new limits state that any given marine area cannot be exposed to continuous noise for more than 20 % of the year, and for impulsive noise no more than 20 % of any given day and no more than 10 % over a year.

14.4.2 National legislation and policy

There are two key pieces of legislation relevant to species protection. These are:

- The UK Wildlife and Countryside Act 1981, as amended.
- The EC Habitats Directive as enacted through the England and Wales Conservation of Habitats and Species Regulations

Whilst there are slight differences in wording within these laws; in general, this legislation provides that it is illegal to kill, injure individual animals, or disturb a significant group of the species.

The Joint Nature Conservation Committee (JNCC) has developed a suite of mitigation guidance to reduce potential impacts to marine mammals. JNCC guidance relevant to the Proposed Development:

- “Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise” (2010)

14.5 Baseline Underwater Noise Conditions

The main noise contributor in Fishguard Harbour is presumed to be the existing ferry service, as a review of AIS data and large marine infrastructure found no comparatively noisy activities. A desktop study to estimate vessel density and noise was undertaken to determine likely baseline noise levels based on vessel activity.

Baseline noise in Fishguard Harbour is dominated by the ferry service from/to Rosslare, Ireland (Figure 14-3). This means probable background broadband levels of 80-85 dB SPL with most of this originating from general shipping noise in the Celtic Sea. The visiting Stena Line Ferry service (Rosslare, Ireland to

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[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0056

[2] https://mcc.jrc.ec.europa.eu/main/dev.py?N=29&O=140&titre_chap=D11%20Energy%20and%20Noise

Fishguard, Wales) has 13 weekly trips, meaning that approximately twice a day a ferry will enter and exit the harbour, elevating the sound levels within the harbour (taken as within 1500 m of the ferry terminal) to a minimal SPL of 140-160 dB of mainly lower frequency noise (<1000 Hz) but potentially enough energy at higher frequencies[3] to have an effect on threshold exceedance ranges.

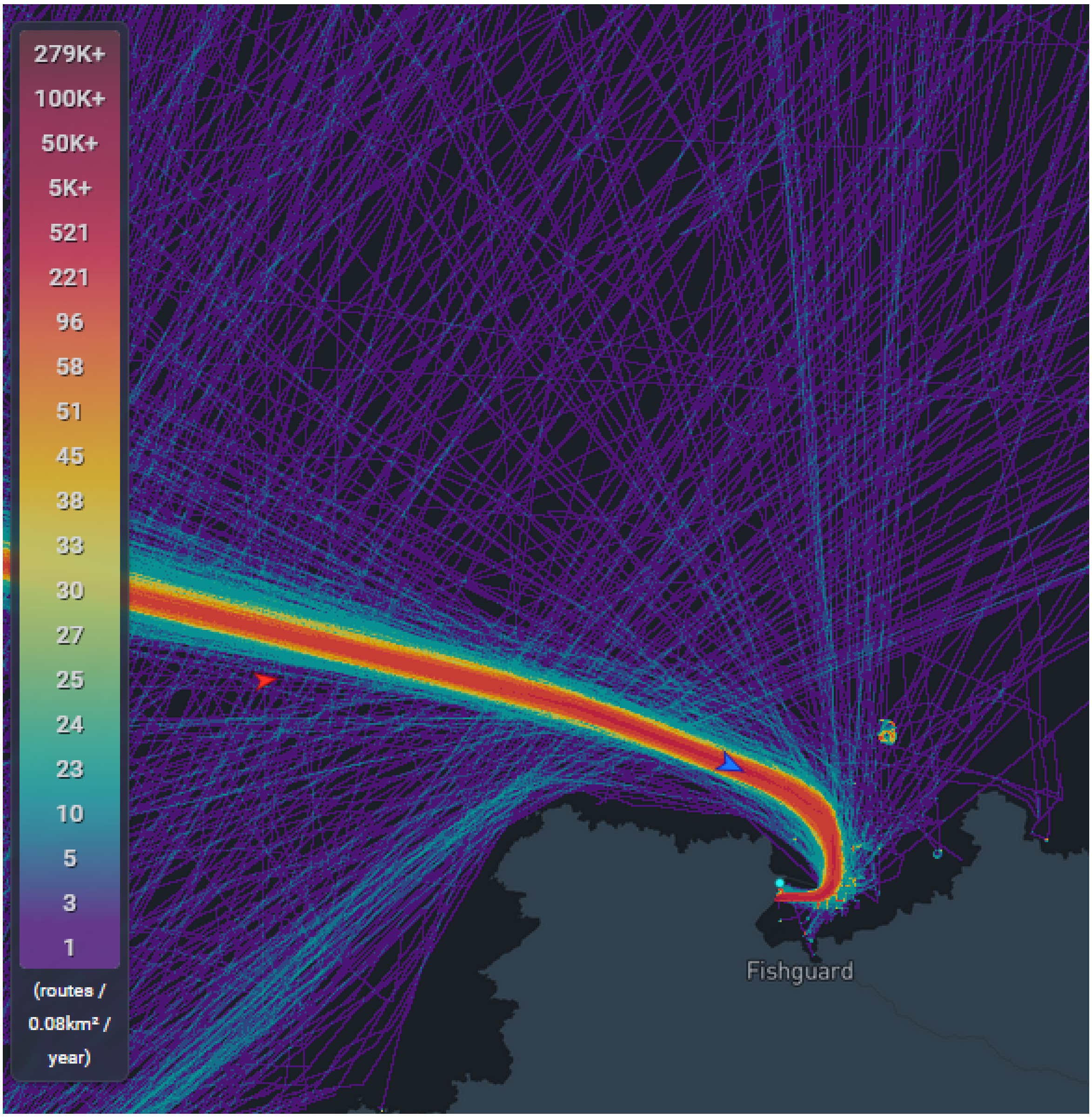

Figure 14-3. Traffic density from AIS data, showing the annual mean traffic per 0.08 km². Data from marinetraffic.com

14.6 Assessment Methodology

To determine the potential spatial range of injury and disturbance, assessment criteria have been developed based on a review of available evidence including national and international guidance and scientific literature. The following sections summarise the relevant assessment criteria and describe the evidence base used to derive them.

[3] Within -20 dB of loudest band or >110 dB in any band from 10-30 kHz

Underwater noise has the potential to affect marine life in different ways depending on its noise level and characteristics. Assessment criteria generally separate sound into two distinct types, as follows:

- **Impulsive sounds** which are typically transient, momentary (less than one second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI, 2005; ANSI, 1986; NIOSH, 1998). This category includes sound sources such as seismic surveys, impact piling and underwater explosions. Additionally included here are sounds under 1 second in duration with a weighted kurtosis over 40 (see note below*).
- **Non-impulsive** (and continuous) sounds which can be broadband, narrowband or tonal, momentary, brief or prolonged, continuous or intermittent and typically do not have a high peak sound pressure with rapid rise/decay time that impulsive sounds do (ANSI, 1995; NIOSH, 1998).This category includes sound sources such as continuous vibro-piling, running machinery, vessels, and some sonar equipment. Additionally included here are sounds over 1 second in duration with a weighted kurtosis under 40 (see note below*).

* Note that the European Guidance: "Monitoring Guidance for Underwater Noise in European Seas, Part II: Monitoring Guidance Specifications" (MSFD Technical Subgroup on Underwater Noise, 2014) includes sonar as impulsive sources (see Section 2.2 in the reference). However, the guidance suggests that *"all loud sounds of duration less than 10 seconds should be included"* as impulsive.

This contradicts research on impact from impulsive sounds suggesting that a limit for "impulsiveness" can be set at a kurtosis[4] of 40 (Martin, et al., 2020). See examples in APPENDIX 14.A, Impulsiveness.

This latter criterion (kurtosis >40) has been used for classification of impulsive versus non-impulsive for sonars and similar sources. The justification for departing from the MSFD criterion is that the Southall et al. 2019, NMFS 2024 and the Popper et al. 2014 frameworks thresholds are based on the narrower definition of impulsive as given in "Impulsive sounds" above.

There is scope for some sounds to be classified as both impulsive and non-impulsive, depending on the criteria applied. Examples are pulses from sonar-like sources that can contain very rapid rise times (<0.5 ms), sweep a large frequency range and have high kurtosis. However, given that the scientific work carried out to identify impulsive thresholds were done with "pure" impulses (from a near instantaneous event), sonar-like sounds are sometimes not included in this, impulsive, category. This argument ignores that sounds used for establishing the non-impulsive thresholds (often narrowband slowly[5] rising pulses), are markedly less impulsive (lower kurtosis, narrower bandwidth) than what is sometimes seen in pulses from sonar-like sources and are thus also not representative for all sonar-like pulses.

Given impulsive sounds' tendency to become less impulsive with increased range, a minimal range can be established where the noise is no longer impulsive (here kurtosis <40 is used as the criterion) (APPENDIX 14.A, Impulsiveness). This range is established using raytracing with sources placed at multiple depths to account for variation in final source setup.

The acoustic assessment criteria for marine mammals and fish in this report has followed the latest international guidance (based on the best available scientific information), that are widely accepted for assessments in the UK, Europe and worldwide (Southall, et al., 2019; Popper, et al., 2014; NMFS, 2024).

14.6.1 Impact assessment criteria

14.6.1.1 Effects on Marine Animals

Underwater noise has the potential to affect marine life in different ways depending on its noise level and characteristics. Richardson *et al.* (1995) defined four zones of noise influence which vary with distance from the source and level, to which an additional zone has been added "zone of temporary hearing loss". These are:

- **The zone of audibility**: This is defined as the area within which the animal can detect the sound. Audibility itself does not implicitly mean that the sound will affect the animal.

[4] Statistical measure of the asymmetry of a probability distribution.

[5] Slowly in this context is >10 ms – slow relative to the integration time of the auditory system of marine mammals.

- **The zone of masking**: This is defined as the area within which sound can interfere with the detection of other sounds such as communication or echolocation clicks. This zone is very hard to estimate due to a paucity of data relating to how animals detect sound in relation to masking levels (for example, humans can hear tones well below the numeric value of the overall sound level). Continuous sounds will generally have a greater masking potential than intermittent sound due to the latter providing some relative quiet between sounds. Masking only occurs if there is near-overlap in sound and signal, such that a loud sound at e.g., 1000 Hz will not be able to mask a signal at 10,000 Hz[6].
- **The zone of responsiveness**: This is defined as the area within which the animal responds either behaviourally or physiologically. The zone of responsiveness is usually smaller than the zone of audibility because, as stated previously, audibility does not necessarily evoke a reaction. For most species there is very little data on response, but for species like harbour porpoise there exists several studies showing a relationship between received level and probability of response (Graham IM, 2019; Sarnoci´nska J, 2020; Booth, 2017; Benhemma-Le Gall A, 2021). This zone is quantified here with the use of behavioural thresholds (Table 14-2, section 14.6.1.2.1 & Table 14-3, section 14.6.1.3).
- **The zone of temporary hearing loss**: The area where the sound level is sufficient to cause the auditory system to lose sensitivity temporarily, causing loss of “acoustic habitat”: the volume of water that can be sensed acoustically by the animal. This hearing loss is typically classified as Temporary Threshold Shift (“TTS”, see section 14.6.1.2 & 14.6.1.3).
- **The zone of injury / permanent hearing loss**: This is the area where the sound level is sufficient to cause permanent hearing loss in an animal. This hearing loss is classified as Auditory Injury (“AUD INJ”, see section 14.6.1.2 & 14.6.1.3). At even closer ranges, and for very high intensity sound sources (e.g., underwater explosions), physical trauma or acute mortal injuries are possible.

For this study, it is the zones of injury (here “AUD INJ”) that are of primary interest, along with estimates of behavioural impact ranges. To determine the potential spatial range of injury and behavioural change, a review has been undertaken of available evidence, including international guidance and scientific literature. The following sections summarise the relevant thresholds for onset of effects and describe the evidence base used to derive them.

14.6.1.2 Thresholds for Marine mammals

The zone of injury in this study is classified as the distance over which a fleeing marine mammal can suffer AUD INJ leading to non-reversible auditory injury. Injury thresholds are based on a dual criteria approach using both un-weighted L_P (maximal instantaneous SPL) and marine mammal hearing weighted SEL. The hearing weighting function is designed to represent the sensitivity for each group within which acoustic exposures can have auditory effects. The categories include:

- **Low Frequency (LF) cetaceans**: Marine mammal species such as baleen whales (e.g. minke whale *Balaenoptera acutorostrata*).
- **High Frequency (HF) cetaceans**: Marine mammal species such as dolphins, toothed whales, beaked whales and bottlenose whales (e.g., bottlenose dolphin *Tursiops truncatus* and white-beaked dolphin *Lagenorhynchus albirostris*).
- **Very High Frequency (VHF) cetaceans**: Marine mammal species such as true porpoises, river dolphins and pygmy/dwarf sperm whales and some oceanic dolphins, generally with auditory centre frequencies above 100 kHz) (e.g., harbour porpoise *Phocoena phocoena*).
- **Phocid Carnivores in Water (PCW)**: True seals, earless seals (e.g., harbour seal *Phoca vitulina* and grey seal *Halichoreus grypus*); hearing in air is considered separately in the group PCA.

[6] The exact limit of how near a noise can get to the signal in frequency before causing masking will depend on the receivers’ auditory frequency resolution ability, but for most practical applications noise and signal frequencies will need to be within 1/3rd octave to start to have a masking effect.

- **Other Marine Carnivores in Water (OW)**: Including otariid pinnipeds (e.g., sea lions and fur seals), sea otters and polar bears; in-air hearing is considered separately in the group Other Marine Carnivores in Air (OCA).
- **Sirenians (SI)**: Manatees and dugongs. This group is only represented in the NMFS guidelines.

These weightings are used in this study and are shown in Figure 14-4. It should be noted that not all of the above hearing groups of marine mammals will be present in the Proposed Development area, but all hearing groups are presented in this report for completeness.

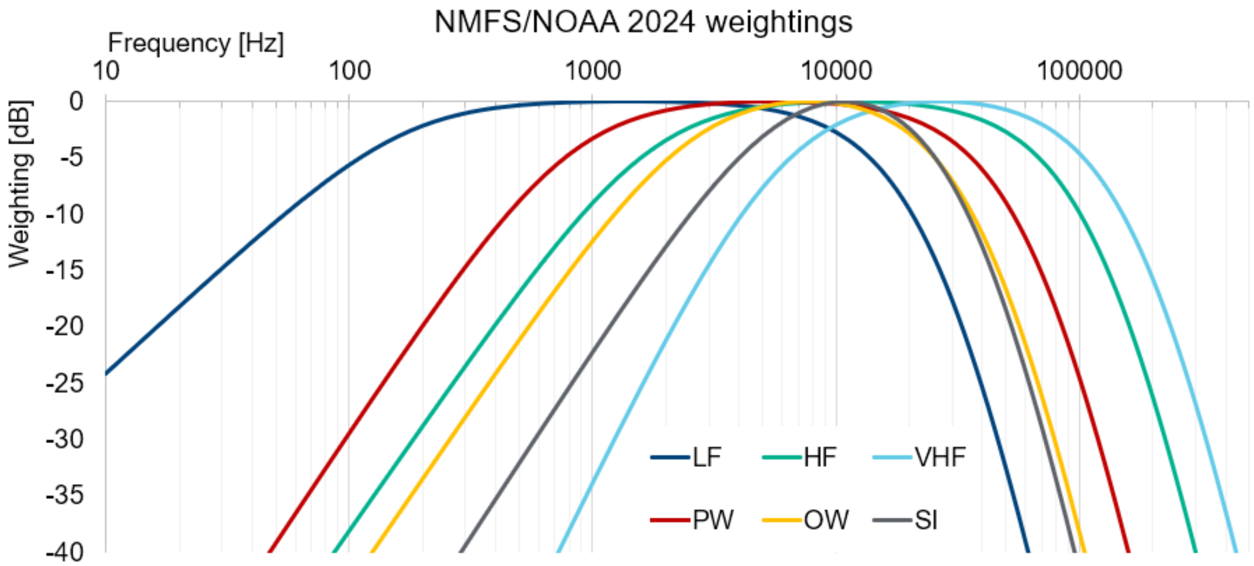

Figure 14-4: Auditory weighting functions for seals, whales and sirenians (NMFS, 2024).

The criteria for impulsive and non-impulsive sound are relevant for this study given the nature of the sound sources used during the Proposed Development. The relevant AUD INJ and TTS criteria proposed by NMFS 2024 are summarised in Table 14-1.

Table 14-1: AUD INJ and TTS onset acoustic thresholds (NMFS, 2024)

Hearing Group	Parameter	Impulsive [dB]		Non-impulsive [dB]	
		AUD INJ	TTS	AUD INJ	TTS
Low frequency (LF) cetaceans	L_P, (unweighted)	222	216	-	-
	SEL, (weighted)	183	168	197	177
High frequency (HF) cetaceans	L_P, (unweighted)	230	224	-	-
	SEL, (weighted)	193	178	201	181
Very high frequency (VHF) cetaceans	L_P, (unweighted)	202	196	-	-
	SEL, (weighted)	159	144	181	161
Phocid carnivores in water (PCW)	L_P, (unweighted)	223	217	-	-
	SEL, (weighted)	183	168	195	175
Other marine carnivores in water (OCW)	L_P, (unweighted)	230	224	-	-
	SEL, (weighted)	185	170	199	179
Sirenians (SI) (NMFS only)	L_P, (unweighted)	225	219	-	-
	SEL, (weighted)	186	171	186	180

14.6.1.2.1 Disturbance to Marine Mammals

The noise thresholds for disturbance of marine mammals are not as mature as the AUD INJ and TTS thresholds and several different approaches exist. A conservative but realistic approach based on a review of Danish and UK guidance documents, as well as scientific reviews has been applied.

The general approach reflects the approach recommended by the Danish guidance (Danish Centre for Environment and Energy, 2021), by a review submitted to the JNCC (Joint Nature Conservation Committee) of the UK (Nedwell, et al., 2007) and by a review for Natural Resources Wales (Sinclair, et al., 2023). These all recommend or acknowledge the use of a weighted received level along with a hearing group specific threshold.

Using 21 suitable studies from these reports, we have arrived at hearing group specific thresholds (Table 14-2) to determine weighted behavioural disturbance levels for non-impulsive noise (here understood to be noise with a kurtosis <40). These thresholds are compared to the range where the hearing group weighted received level exceeds the relevant threshold.

Table 14-2: Disturbance criteria for marine mammals used in this assessment, based on Danish, UK and USA guidance.

Effect	Non-Impulsive Threshold [SPL]	Impulsive Threshold
Low frequency (LF) cetaceans	118	160 dB L_P* (NMFS level B-harassment)
High frequency (HF) cetaceans	92	
Very high frequency (VHF) cetaceans	95	
Phocid carnivores in water (PCW)	108	
Other marine carnivores in water (OCW)	110	

* The NMFS guidance specifies use of SPL but does not mention a measurement duration. This means that the level is not well defined and using the most common legacy use of SPL for impulsive noises (SPL over the duration of 90 % of the pulse energy) is problematic given that the duration over which the SPL is measured changes with receptor location (both depth and range) and can vary substantially. The use of dB L_P is conservative as the SPL over any duration will always be lower than the L_P.

Given the considerable variation in the data (up to 40 dB where both mild disturbance and severe disturbance was included) we have opted to select a conservative value of either the 10th percentile value or the minimal value, whichever is greater[7] (Figure 14-5).

[7] Where there is large data variation the 10th percentile of the equivalent normal distribution can be lower than the minimal value, in these cases we have used the minimal value observed to cause disturbance.

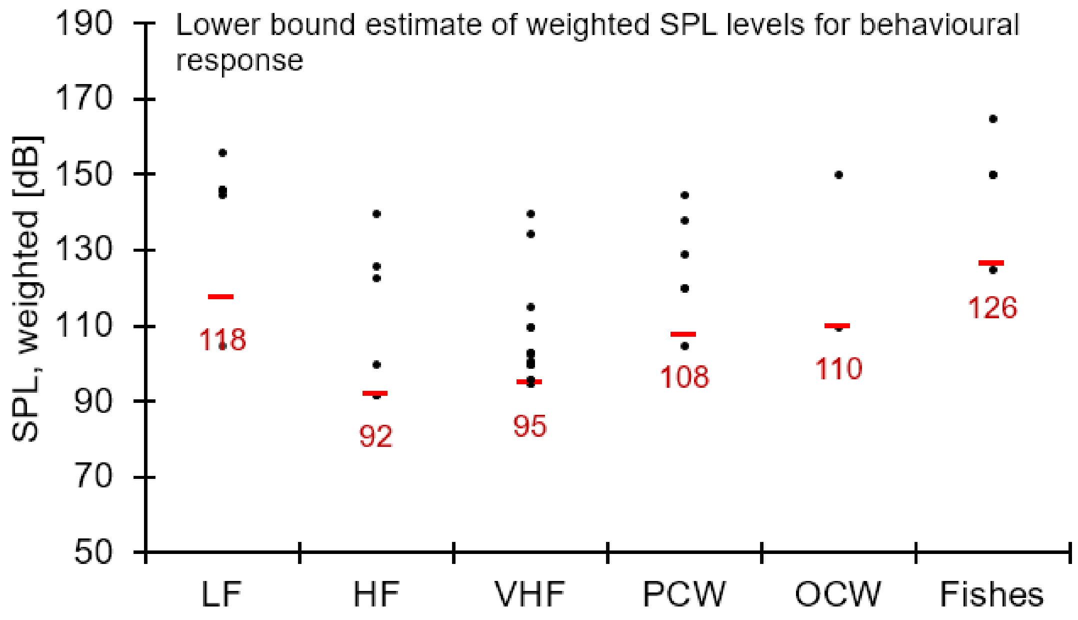

Figure 14-5. Data and behavioural disturbance thresholds. Red lines/values are 10th percentile values or the minimal value, whichever is greater.

Compared to the widespread use of NMFS levels of 120 dB SPL (unweighted) for continuous noise, these limits are comparable, but account for the hearing abilities of each group. This means that high-frequency source such as multibeam echosounders operating over 200 kHz that are not audible to the LF hearing group or fishes is correctly excluded from causing behavioural disturbance to those groups.

14.6.1.3 Injury and Disturbance to Fishes

The injury criteria used in this noise assessment for fish are given in Table 14-3 and Table 14-4 for impulsive noises (L_P) and continuous noise (SEL) respectively. L_P and SEL criteria presented in the tables are unweighted.

It’s important to clarify that this lack of weighting for fishes reflects a lack of scientific consensus about the best method for applying frequency dependence to received levels for fishes, rather than a statement that fishes can hear all frequencies equally. Thus, fishes generally cannot hear above 10 kHz, and if they can, the sensitivity is generally very poor (Figure 14-6, (Nedwell, et al., 2004)).

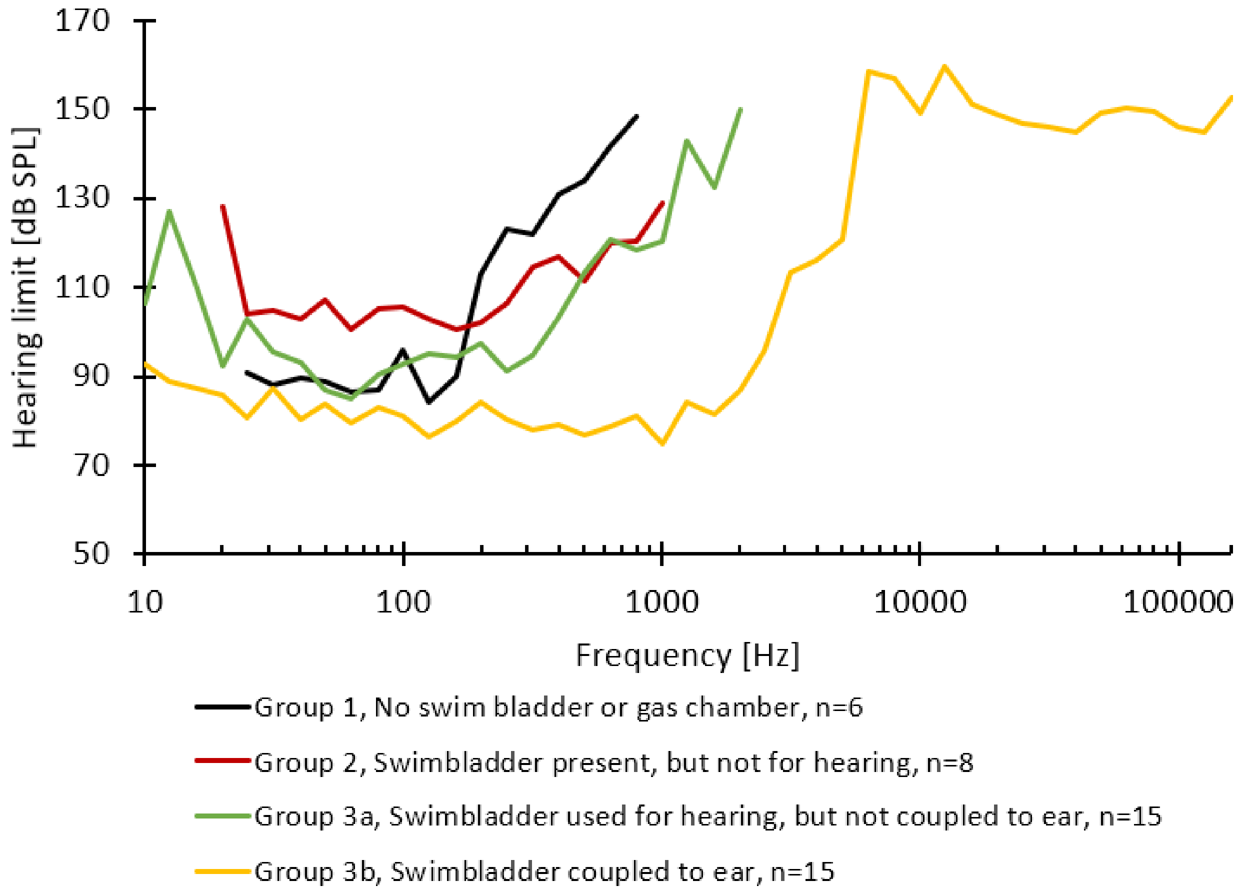

Figure 14-6 Generalised hearing thresholds for fishes grouped by the presence of a swim bladder and its role in hearing.

Physiological effects relating to injury criteria are described below (Popper, et al., 2014):

- **Mortality and potential mortal injury**: either immediate mortality or tissue and/or physiological damage that is sufficiently severe (e.g., a barotrauma) that death occurs sometime later due to decreased fitness. Mortality has a direct effect upon animal populations, especially if it affects individuals close to maturity.

- **Recoverable injury ("AUD INJ" in tables and figures)**: Tissue damage and other physical damage or physiological effects, that are recoverable, but which may place animals at lower levels of fitness, may render them more open to predation, impaired feeding and growth, or lack of breeding success, until recovery takes place.

  The AUD INJ term is used here to describe this, more serious impact, even though it is not strictly permanent for fish. This is to better reflect the fact that this level of impact is perceived as serious and detrimental to the fish.

- **Temporary Threshold Shift (TTS)**: Short term changes (minutes to few hours) in hearing sensitivity may, or may not, reduce fitness and survival. Impairment of hearing may affect the ability of animals to capture prey and avoid predators, and also cause deterioration in communication between individuals, affecting growth, survival, and reproductive success. After termination of a sound that causes TTS, normal hearing ability returns over a period that is variable, depending on many factors, including the intensity and duration of sound exposure.

Popper et al. 2014 does not set out specific TTS limits for L_P and for disturbance limits for impulsive noise for fishes. Therefore publications: "Washington State Department of Transport Biological Assessment Preparation for Transport Projects Advanced Training Manual" (WSDOT, 2020) and "Canadian Department of Fisheries and Ocean Effects of Seismic energy on Fish: A Literature review" (Worcester, 2006) on effects of seismic noise on fish are used to determine limits for these:

- The criteria presented in the Washington State Department of Transport Biological Assessment Preparation for Transport Projects Advanced Training Manual (WSDOT, 2020). The manual suggests an un-weighted sound pressure level of 150 dB SPL (assumed to be duration of 95 % of energy) as the criterion for onset of behavioural effects, based on work by (Hastings, 2002). Sound pressure levels in excess of 150 dB SPL are expected to cause temporary behavioural changes, such as elicitation of a startle response, disruption of feeding, or avoidance of an area. The document notes that levels exceeding this threshold are not expected to cause direct permanent injury but may indirectly affect the individual fish (such as by impairing predator detection). It is important to note that this threshold is for onset of potential effects, and not necessarily an ‘adverse effect’ threshold. The threshold is implemented here as either single impulse SEL or 1 second SEL, whichever is greater.
- The report from the Canadian Department of Fisheries and Ocean “Effects of Seismic energy on Fish: A Literature review on fish” (Worcester, 2006) found large differences in response between experiments. Onset of behavioural response varied from 107-246 dB L_P, the 10^{th} percentile level for behavioural response was 160 dB L_P (rounded to nearest 5 dB to reflect large variation in data).

Thus, the behavioural threshold for fishes for impulsive sound is 160 dB L_P, and for non-impulsive sound 150 dB SPL.

Note that while there are multiple groups of fish presented, we have used the thresholds of the more sensitive group for all fish thus covering all fishes (203/186 AUD INJ/TTS for impulsive sound & 222/204 AUD INJ/TTS for non-impulsive sound). These lower thresholds also cover “Eggs and Larvae.

Table 14-3: Criteria for onset of injury to fish and sea turtles due to impulsive noise. For this assessment the lowest threshold for any group is used for all groups (shown in bold).

Type of animal	Unit	Mortality and potential mortal injury [dB]	Recoverable injury (AUD INJ) [dB]	TTS [dB]	Behavioural [dB]
Fish: no swim bladder (particle motion detection) Example: Sharks.	SEL	219[1]	216[1]	186[1]	150[3]
	L_P	213[1]	213[1]	193[2]	160[2]
Fish: where swim bladder is not involved in hearing (particle motion detection). Example: Salmonoids.	SEL	210[1]	203[1]	186[1]	150[3]
	L_P	207[1]	207[1]	193[2]	160[2]
Fish: where swim bladder is involved in hearing (primarily pressure detection). Example: Gadoids (cod-like).	SEL	207[1]	**203[1]**	**186**	**150[3] [SPL]**
	L_P	207[1]	**207[1]**	**193[2]**	**160[2]**
Sea turtles	SEL	210[1]	(*Near*) High* (*Mid*) Low (*Far*) Low	-	-
	L_P	207[1]		-	-
Eggs and larvae	SEL	210[1]	(*Near*) Moderate (*Mid*) Low (*Far*) Low	-	-
	L_P	207[1]		-	-

[1] (Popper et al. 2014) table 7.4, [2] (Worcester, 2006), [3] (WSDOT, 2020)

* Indicate (range) and risk of effect, e.g., “(Near) High”, meaning high risk of that effect when near the source.

Where Popper et al. 2014 present limits as “>” 207 or “>>” 186, we have ignored the “greater than” and used the threshold level as given.

Relevant thresholds for non-impulsive noise for fishes relating to AUD INJ, TTS, and behaviour are given in Table 14-4.

Table 14-4: Criteria for fish (incl. sharks) due to non-impulsive noise from Popper et al. 2014, (Table 7.7. in guidance)

Type of animal	Unit	Mortality and potential mortal injury	Recoverable injury (AUD INJ) [dB]	TTS [dB]	Behavioural [dB]
All fishes	SEL	(*Near*) Low (*Mid*) Low (*Far*) Low	222†	204†	126 [SPL]*

*Based on review in Section 14.6.1.2.1, also Figure 14-5.

†Based 48 hours of 170 dB SPL and 12 hours of 158 dB SPL

14.6.2 Site Environment

The site is characterised to the west by anthropogenic influence (concrete quays, dredged channels/bays) and further to the east by the rugged coastline of Fishguard bay. The bay is generally shallow (<20 m depth) with a steady increase in depth with an increase in distance from the shore (Figure 14-1).

14.6.2.1 Sediment Properties

Grab sample data was sourced from the “Sediment Analysis Information”, RPS Consulting Engineers report No 17-67594-1 from 17/01/2018. The report presents data for six grab samples from the immediate vicinity of the linkspan and data shows that c. 78 % of the sediment was “fine sand” (grain diameter of 0.063-0.2 mm, ISO 14688-1:2017) and c. 17 % “medium sand” (grain diameter of 0.2-0.63 mm). The remaining 5 % were mainly silty or clayey particles smaller than 0.063 mm in diameter.

The sediment for modelling uses the “fine sand” grain diameter and a sediment properties model (Ainslie, 2010) to estimate acoustics properties.

Table 14-5: Sediment properties.

Sediment name (ISO 14688-1:2017)	Grain size [mm]	Density [kg/m³]	Compressional soundspeed [m/s]
Fine sand	0.18	1992	1739

Finer sediment (silt/clay) will tend to have higher transmission losses, therefore using the coarser sediment (sand) represents a conservative approach.

14.6.2.2 Water Properties

Water properties were determined from historical data for the area. Where a range of values are expected or observed, the value resulting in the lowest transmission loss was chosen for a more conservative assessment (more noise at range). For example, the water temperature varies throughout the year, and as higher water temperatures lead to less transmission loss in the water, but more transmission loss due to sediment interactions, both summer and winter temperatures are modelled, with the most conservative results reported. Therefore, the assessment also covers seasonal variation.

- Temperature: 7-17°C –Temperatures were sourced from seatemperature.org[8] .
- Salinity: 34 psu – The minimal salinity was sourced from (Hadziabdic, et al.).
- Soundspeed profile: It has been assumed to be generally uniform as a conservative measure (a typical summer sound speed profile would increase transmission loss by refracting sound towards the sediment. The shallow water in the area means any soundspeed gradient is negligible when compared to surface and bottom reflections.

[8] https://www.seatemperature.org/europe/united-kingdom/fishguard.html

- The tidal range at Fishguard is 5 m based on the maximal tide from tide-forecast.com[9]

14.6.3 Noise Sources

Underwater noise sources are usually quantified in dB scale with values referenced to 1 µPa pressure amplitude as if measured at a hypothetical distance of 1 m from the source (called the Source Level). In practice, it is not usually possible to measure at 1 m from a source, but the metric allows for comparison and reporting of different source levels on a like-for-like basis. In reality, for a large sound source, this imagined point at 1 m from the acoustic centre does not exist. Furthermore, the energy is distributed across the source and does not all emanate from an imagined acoustic centre point. Therefore, the stated sound pressure level at 1 m does not occur for large sources. In the acoustic near-field (i.e. close to the source), the sound pressure level near the source will be lower than the value predicted by the back-calculated source level (SL).

The noise sources and activities investigated during this assessment are summarised in Table 14-6.

14.6.3.1 Source Models

Source models are generally either:

- Empirical – relying on a best fit to recorded data with some statistical uncertainty,
- Numerical – using physical properties of the source and the environment to predict sound output, or
- Hybrid – using physical properties of the source and the environment to adjust an empirical model.

For all models we assess the statistical uncertainty and use the 90th percentile levels as a representative but conservative model of the source levels.

More detail on each source model can be found in the sections below.

14.6.3.2 Summary of Source Levels

A summary of source level can be found in Table 14-6, with details in the following sections.

Table 14-6: Summary of Sound Sources and Activities Included in the Subsea Noise Assessment

Equipment	Source level	Comments/details	Impulsive/non-impulsive
Dredging	174 dB SPL	Based on a 90 m generic Trailing Suction Hopper Dredger (TSHD) vessel. Also covers backhoe dredging.	Non-impulsive
Demolition, Rock Breaking, Pecking during dredging	194 dB SPL	Based on SPT testing, down-the-hole hammering and hydraulic rock breakers. This also covers the use of wire saws and drilling in relation to the demolition.	Non-impulsive
Vibro piling, main pontoon pile	194 dB SPL	Assuming diameter of 2 m.	Non-impulsive
Coring, main pontoon pile	163 dB SPL	Assuming diameter of 2 m.	Non-impulsive
Impact piling, support pile	209 dB SEL (245 dB L_P)	Assuming a blow rate of 0.6 Hz, diameter of 1.22 m, 110 kJ hammer. Max daily duration of 2x30 min.	Impulsive to 900 m range then non-impulsive*
Vibro piling, support pile	194 dB SPL	Assuming diameter of 1.22 m.	Non-impulsive

9 https://www.tide-forecast.com/locations/Fishguard-Wales/tides/latest)

Equipment	Source level	Comments/details	Impulsive/non-impulsive
Impact piling, Bank seat piles (piles installed in made ground)	194 dB SPL in water *Based on 209 dB SEL (245 dB L_P)*	Assuming diameter of 1.22 m. not assessed separately, see "Demolition, Rock breaking etc."	Non-impulsive (due to land-water interface effects)
Coring, Bank seat pile	159 dB SPL	Assuming diameter of 1.22 m.	Non-Impulsive
Rock dumping	185 dB SPL	Based on "Demolition, Rock breaking", but adjusted for recorded broadband levels.	Impulsive to 100 m range then non-impulsive*

*See section 14.6 and Appendix 14.A for details on transition from impulsive to non-impulsive.

14.6.3.3 Dredging

A dredging vessel of 90 m in length with a hopper capacity of 4000 m³ and installed power of 6000 kW has been modelled. The assessment also covers vessels of shorter length or less installed power/capacity. The band levels are based on an ensemble model for vessels (Wittekind, 2014; Liefvendahl, et al., 2015; Simard, et al., 2016; Jong, 2021) adjusted for active dredging based on 14 recordings of Trailer Suction Hopper Dredger (TSHD) vessels. The broadband level for the dredging is expected to be below 174 dB SPL with a -20 dB bandwidth from 10-50,000 Hz.

Other dredging methods that are less noisy underwater, such as backhoe dredging are also covered under this source.

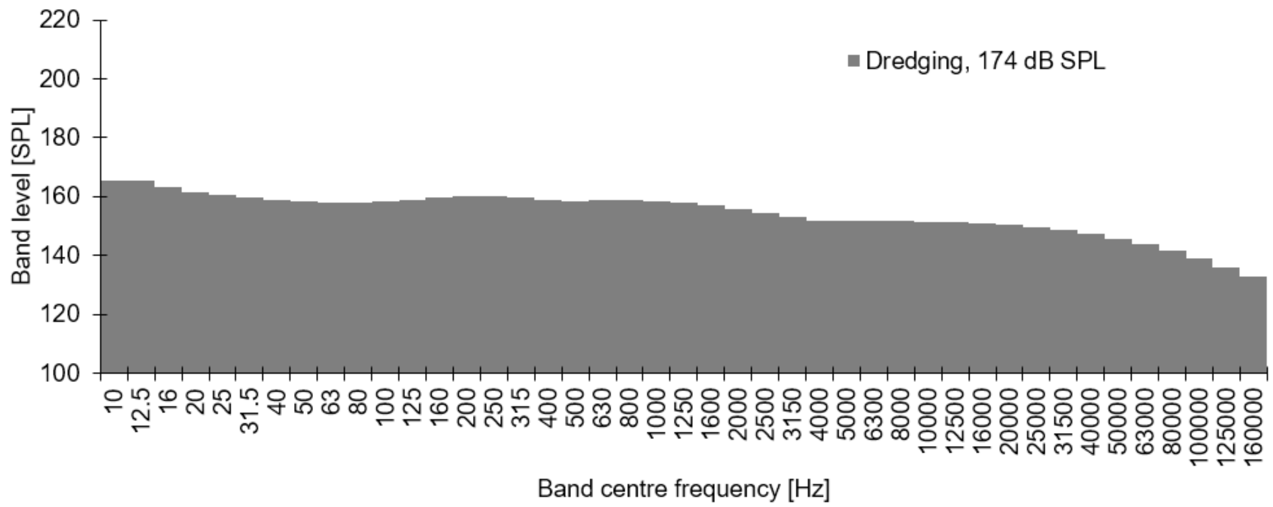

Figure 14-7. Band levels for a representative TSHD vessel.

14.6.3.4 Demolition, Drilling, Rock Breaking, Pecking

The source band levels for demolition are based on levels from recordings of standard penetration testing (Erbe, et al., 2017; L-F, et al., 2023), hydraulic rock breaking ("Xcentric Ripper XR-60" or "IHC S70") and down-the-hole hammering ("Epiroc HB 10000") (Barham, 2018; Connell, et al., 2023). It's assumed that these together will cover the same frequencies as present during the demolition of the old linkspan support structure. The broadband level is 194 dB SPL with a -20 dB bandwidth from 12.5-8000 Hz.

This also covers the use of "pecking" during dredging, which involves a fast-oscillating impact hammer (>250 blows/minute) to break rock or sediment too hard to be dredged otherwise.

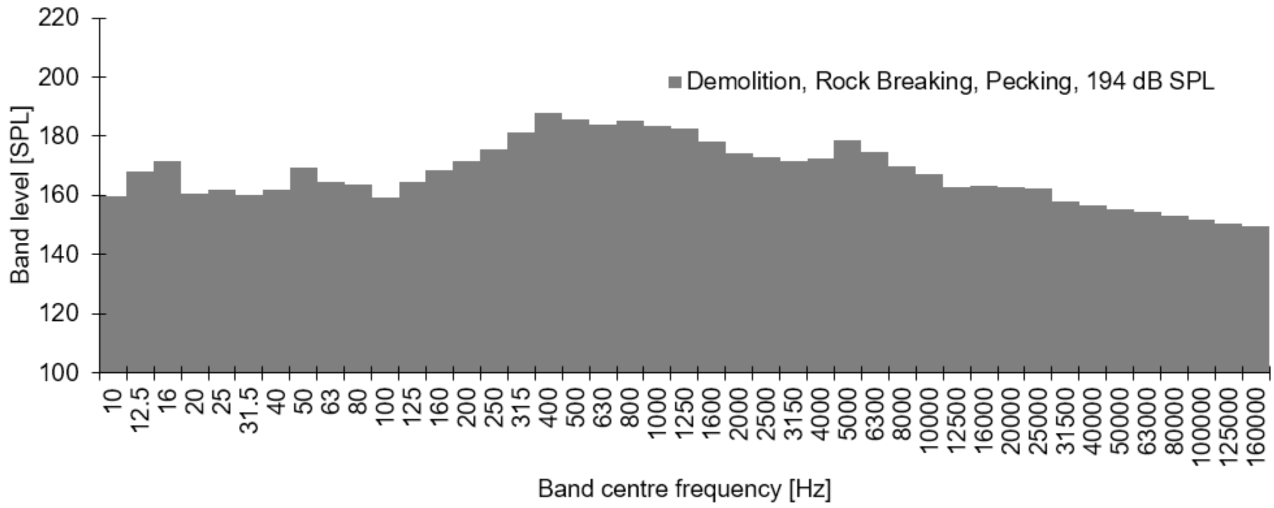

Figure 14-8. Band levels for demolition activity.

14.6.3.5 Impact Piling – Temporary Support piles

Impact piling band levels are modelled using our in-house hybrid model "Taranis" (APPENDIX 14.B) which models both the band levels, time series and blow-for-blow levels during a pile installation. The model has been validated against piles of 0.5-9 m diameter for a wide range of hammers and sediment conditions.

The source level for impact piling of the support piles is expected to have a broadband level up to 211 dB $SEL_{single\ blow}$ (at a blow rate of 0.6 Hz this equates to 209 dB SPL). The noise is broadband and has most energy around 500 Hz and a -20 dB bandwidth from 10-12,500 Hz (Figure 14-9).

A soft start of 20 minutes with a reduced level is also modelled. This is based on using the hammer at minimal blow energy for 20 minutes, given an effective broadband reduction of 12 dB, when compared to normal impact piling.

14.6.3.5.1 Support Piles

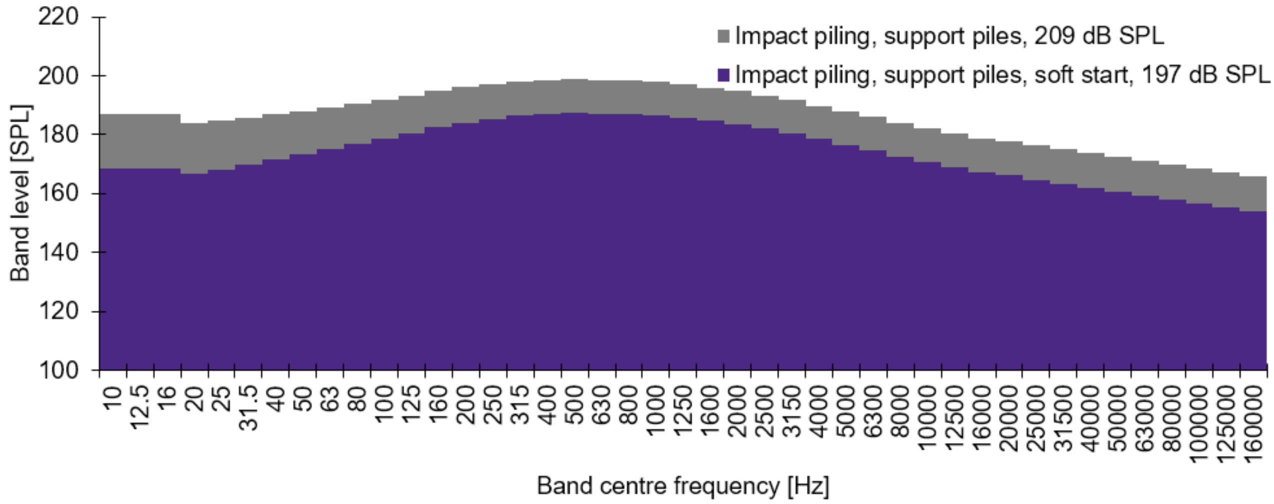

Figure 14-9. Band levels for impact piling of support piles.

14.6.3.5.2 Bank Seat Piles

The impact piling of the bank seat piles has been assumed to have the same source levels as the impact piling of the support piles. However, given that they are installed wholly in made ground (in the bank seat), there is a high transmission loss into the water and across the soil/water interface, meaning that the realised in-water level will be near 194 dB SPL.

From previous work[10] this effect has been observed to be well described by:

$$SPL_{Water} = SPL_{Soil} - 29.7 \cdot \log_{10}(35m) - \frac{0.25dB}{m} \cdot 35m - 13.6 \quad (3)$$

Assuming 1 m in-soil propagation:

$$209\ dB\ SPL - 29.7 \cdot \log_{10}(1m) - \frac{0.25dB}{m} \cdot 1m - 13.6 \approx 194\ dB\ SPL$$

This broadband level is sufficiently similar to the source levels from section 14.6.3.4, Demolition, Drilling, Rock Breaking, Pecking, that it can be represented by the same modelling.

14.6.3.6 Vibratory piling

Vibro piling band levels are based on recordings of installations using vibro piling from inhouse work and published literature (Dahl, et al., 2015; Illingworth & Rodkin Inc., 2016; Matuschek, et al., 2009). No dependence on pile size, sediment or vibratory hammer was found[11], so both the main pontoon pile and the support piles have the same band levels (Figure 14-10 & Figure 14-11).

14.6.3.6.1 Main Pontoon Pile

The broadband level is expected to be below 194 dB SPL with a -20 dB bandwidth from 10-12,500 Hz.

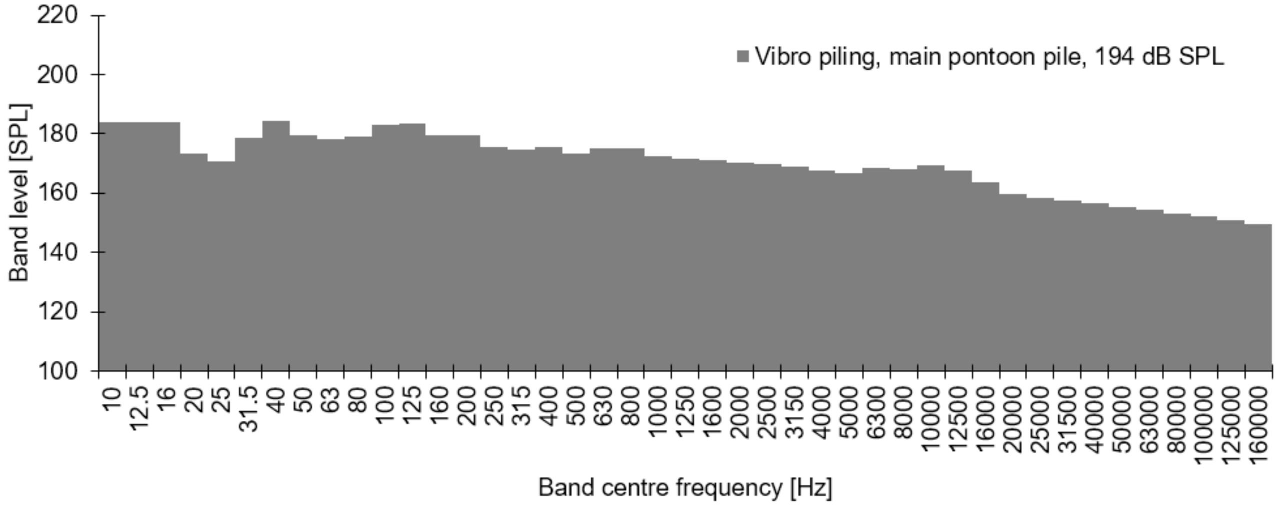

Figure 14-10. Band levels for installation vibro piling of main pontoon pile.

14.6.3.6.2 Support Piles

The broadband level is expected to be below 194 dB SPL with a -20 dB bandwidth from 10-12,500 Hz

[10] Modelling of transmission losses through soil using normal mode and parabolic equation methods.

[11] Not all installation are identical, but no empirical relationship with could be made with variables like driver energy, soil conditions and pile dimensions.

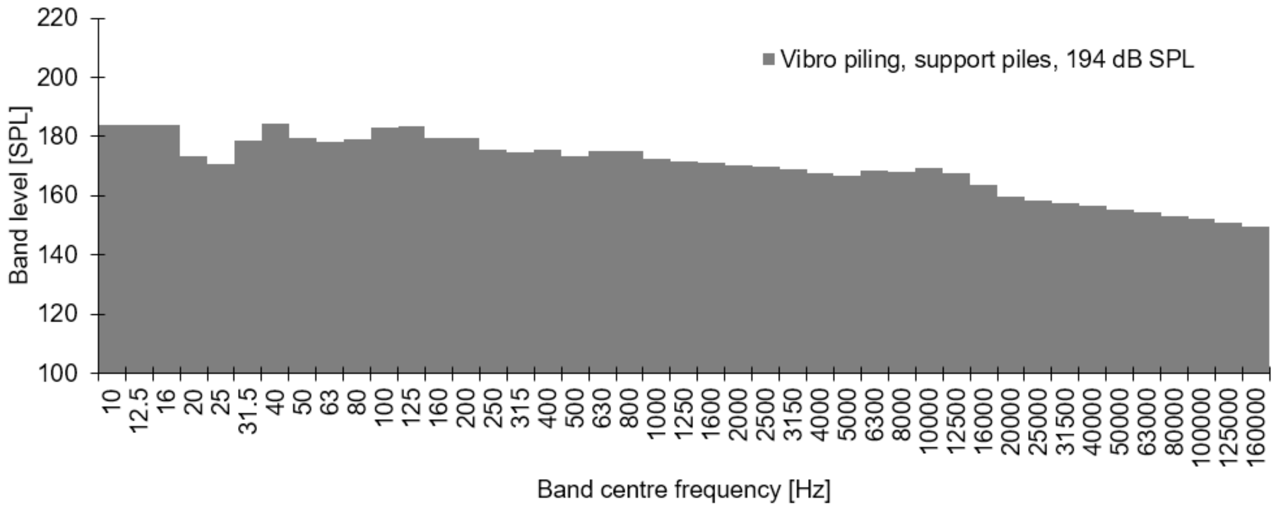

Figure 14-11. Band levels for installation vibro piling of support piles.

14.6.3.7 Coring/Rotary Drilling

Band levels for rotary drilling/coring are based on an empirical model of 16 recordings (Erbe, et al., 2017; Fisheries and Marine Service, 1975; MR, et al., 2010; L-F, et al., 2023; Ward, et al., 2012). The model is dependent on the coring diameter.

14.6.3.7.1 Main Pontoon Pile

The noise from the coring for the main pontoon pile is expected to have a maximum broadband level of 163 dB SPL with a -20 dB bandwidth from 10-2000 Hz.

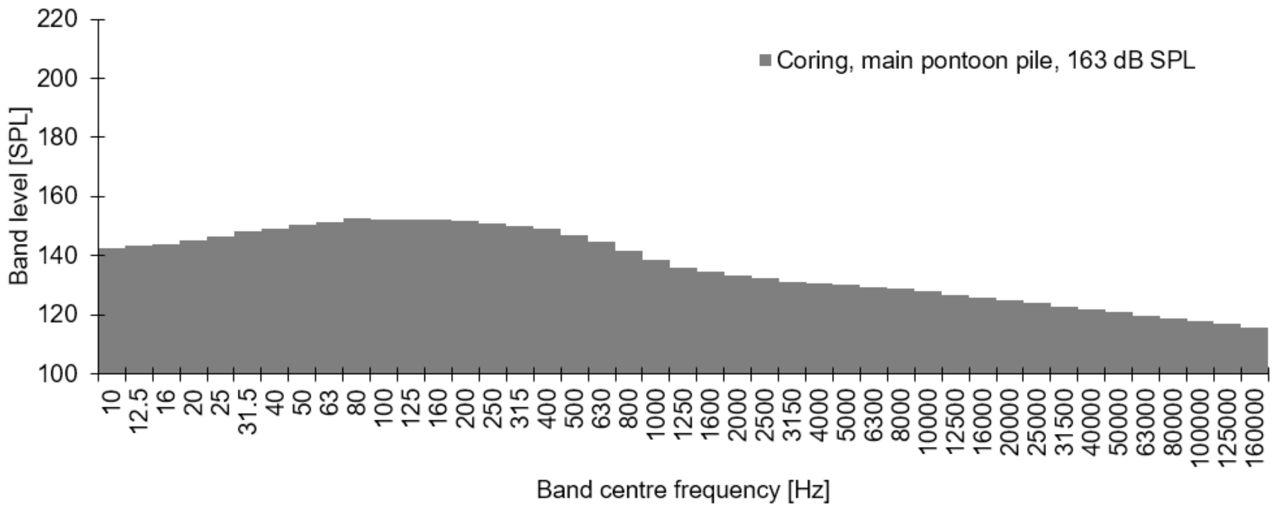

Figure 14-12. Band levels for coring of main pontoon pile.

14.6.3.7.2 Bank Seat Piles

The noise from the coring for the bank seat piles is expected to have a broadband level of maximally 159 dB SPL with a -20 dB bandwidth from 10-8000 Hz.

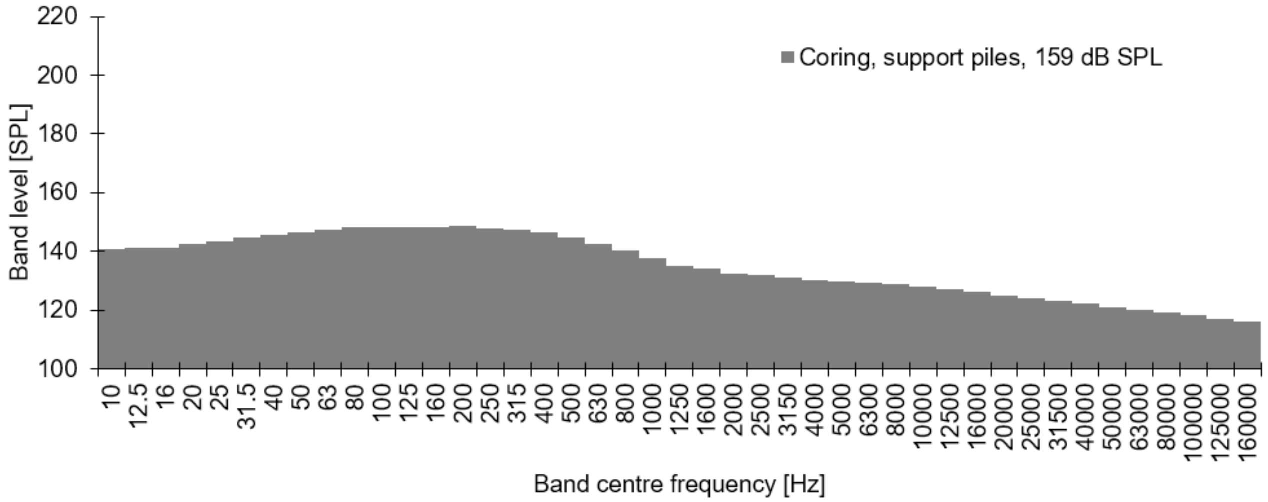

Figure 14-13. Band levels for coring of bank seat piles.

14.6.3.8 Rock Dumping

Rock dumping band levels are based on the SPT (standard penetration testing) and rock breaking band levels as given in section 14.6.3.4, but adjusted to fit with recorded broadband levels found in literature (JASCO, 2013; JIP, 2020). The broadband level is expected to be below 185 dB SPL, with the main energy (-20 dB bandwidth) within 12.5-8000 Hz. The rock dumping is modelled as impulsive to 100 m, after which raytracing indicates that the noise has transitioned to non-impulsive (see section 14.6 and Appendix 14.A for reasoning).

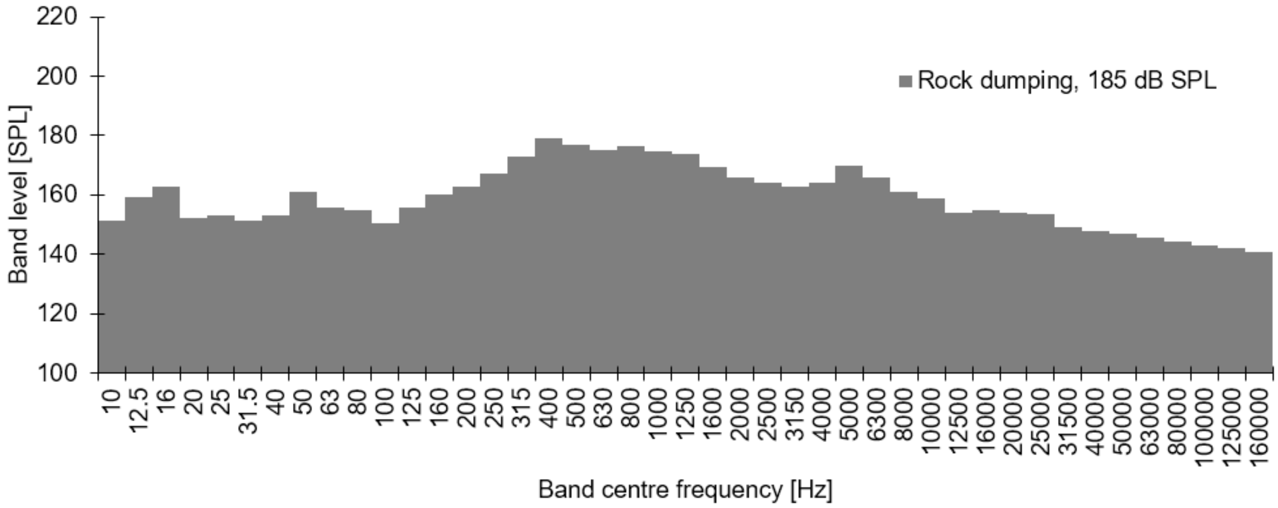

Figure 14-14. Band levels for Rock dumping.

14.6.4 Sound Propagation Modelling Methodology

There are several methods available for modelling the propagation of sound between a source and receiver ranging from very simple models which simply assume spreading according to a $10\times\log_{10}$(range) or $20\times\log_{10}$(range) relationship, to full acoustic models (e.g., ray tracing, normal mode, parabolic equation, wavenumber integration and energy flux models). In addition, semi-empirical models are available which lie somewhere in between these two extremes in terms of complexity (e.g., (Rogers, 1981; Weston, 1971)).

For simpler scenarios, such as this one, where the sediment is relatively uniform and mostly flat or where great detail in the sound field is not needed, the computational speed of these simpler models is preferred over the higher accuracy of numerical models and are routinely used for these types of assessments. For this assessment, we have used the Weston model (Weston, 1971), which is suitable to depths of c. 200 m and generally softer sediments.

This model will tend to underestimate the transmission losses (leading to estimates greater than actual impact), primarily due to the omission of surface roughness, wind effects and shear waves in the sediment.

Validation examples of the model can be found in APPENDIX 14.C

14.6.4.1 Modelling Assumptions

The main assumptions made for the modelling are:

1. Animals fleeing the area will not return within a 24-hour period.
2. Animals flee for up to 2 hours, after which they will be up to 10.8 km and 3.6 km away for marine mammals and fish, respectively.
3. Results assume a transition from impulsive (kurtosis >40) to non-impulsive (kurtosis <40) at some distance from the source (source, sediment and depth dependant).
   This means that for impact piling, at ranges greater than 900 m the received noise will have become non-impulsive, and for rock dumping the transition occurs at ranges below 100 m.
   After the transition to non-impulsive noise the noise is assessed against the non-impulsive thresholds (see Appendix 14.A).

   This assumption is also applicable for the assessment of behavioural disturbance.
4. Sources are modelled as point sources. While piles are *not* point sources, the source model ("Taranis") generates source levels appropriate for use with this assumption.
5. Modelling is done for high tide (LAT + 5 m), being the tidal state with the least transmission loss.

14.6.4.2 Exposure Calculations (dB SEL)

To compare modelled levels with the two impact assessment frameworks (NMFS 2024 & Popper et al. 2014) it is necessary to calculate received levels as exposure levels (SEL), weighted for marine mammals and unweighted for fishes. For ease of implementation, sources have been presented as an SPL source level, meaning it was necessary to convert from SPL to SEL for a single, or multiple events.

To convert from SPL to SEL, the following relation can be used:

$$SEL = \mathrm{SPL} + 10 \cdot Log_{10}(t_2 - t_1) \tag{1}$$

Or, where it is inappropriate to convert SEL from one event to SEL cumulative by relating to the number of events as:

$$SEL_{,n\ events} = SEL_{single\ event} + 10 \cdot Log_{10}(n) \tag{2}$$

And SPL from SEL:

$$SPL = SEL_{single\ event} + 10 \cdot Log_{10}\left(\frac{n}{t_2 - t_1}\right) \tag{3}$$

As an animal swims away from the sound source, the noise it experiences will become progressively more attenuated; the cumulative, fleeing SEL is derived by logarithmically adding the SEL to which the mammal is exposed as it travels away from the source. This calculation is used to estimate the approximate minimum start distance for an animal in order for it to be exposed to sufficient sound energy to result in the exceedance of a threshold, or to check if a set exclusion zone is sufficient for an activity (e.g. will an exclusion zone of 500 m be sufficient to prevent exceeding an AUD INJ threshold). It should be noted that the sound exposure calculations are based on the simplistic assumption that the animal will continue to swim away at a constant speed. The real-world situation is more complex, and the animal is likely to move in a more varied manner. Reported swim speeds are summarised in Table 14-7 along with the source papers for the assumptions.

For this assessment, a swim speed of 1.5 m/s for marine mammals, and 0 m/s for fishes (including sharks) is assumed.

For very long fleeing durations, the ambient sound itself can exceed the thresholds, e.g., an ambient sound level of 122.4 dB, weighted for the VHF group, will exceed the non-impulsive TTS threshold of 161 dB SEL after 2 hours' exposure[12]. For this assessment, we consider fleeing durations of 2 hours (7200 seconds, allowing 10800 m of fleeing), meaning that weighted levels of 122.4 dB SPL will exceed the VHF group's non-impulsive TTS threshold in the fleeing model.

Table 14-7: Swim speed examples from literature

Species	Hearing Group	Swim Speed (m/s)	Source Reference
Harbour porpoise	VHF	1.5	Otani *et al.,* 2000
Harbour seal	PCW	1.8	Thompson, 2015
Grey seal	PCW	1.8	Thompson, 2015
Minke whale	LF	2.3	Boisseau *et al.,* 2021
Bottlenose dolphin	HF	1.52	Bailey and Thompson, 2010
White-beaked dolphin	HF	1.52	Bailey and Thompson, 2010
Basking shark	Fish (unweighted)	1.0	Sims, 2000
All other fish groups	Fish (unweighted)	0.5	Popper *et al.,* 2014
Sea turtles	Fish (unweighted)	0.56-0.84 & 0.78-2.8	(F, et al., 1997; SA, 2002)

14.7 Impact Assessment

14.7.1 Assessment of Construction Effects

Results are presented here as the geographical "risk range" to an auditory threshold (AUD INJ/ TTS/ Behavioural), as given in Table 14-1, Table 14-2, Table 14-3 and Table 14-4.

A given risk range specifies the expected range, within which, a fleeing receiver would exceed the relevant threshold. Risk ranges are given for the 90th percentile value and the maximal value.

Several result types are presented for each activity in Table 14-8 to inform this assessment and to provide flexibility in mitigation.

Table 14-8. Result types summary.

Condition	
Behavioural disturbance range	The range at which the behavioural limit for the marine mammals or the fishes (including sharks) is exceeded.
TTS,1 seconds' exposure	This is the range of acute risk of impact from the activity (a one second exposure) and is presented to indicate instantaneous risk and for comparison with other studies. This assumes a stationary animal (during the 1-second
AUD INJ,1 seconds' exposure	

[12] 122.4 dB SPL + 10*log$_{10}$(3600 seconds) = 161 dB SEL, TTS non-impulsive threshold for the VHF group is 161 dB SEL.

	exposure) with all equipment operating at full power and does not include a soft start.
TTS, sound exposure, fleeing receiver, no soft start	The minimal range a fleeing animal needs to start fleeing from to avoid being exposed to noise exceeding its TTS/ AUD INJ threshold. Animals are moving in a straight line away from the source at a constant speed of 1.5m/s (0 m/s for fish, including sharks).
AUD INJ, sound exposure, fleeing receiver, no soft start	
TTS, sound exposure, fleeing receiver, 20-minute soft start	Minimal starting range for a fleeing animal with a 20 min soft start, where the piling is 12 dB lower than normal operation (lowest power).
AUD INJ, sound exposure, fleeing receiver, 20-minute soft start	
TTS, peak pressure	This is the range of immediate risk of impact from the activity and indicate instantaneous risk. This criterion is based on a single exposure to peak pressure compared with the L_P threshold for impulsive noise. Only relevant for impulsive noise sources.
AUD INJ, peak pressure	

14.7.1.1 Assumptions and Notes on Results

The results should be read while keeping the following in mind:

- The harbour is enclosed by the breakwater and the headland to the east (Ynys Dinas/Dinas Island Figure 14-1), meaning there is a natural limit to ranges of effect from noise. Thus, the ranges for behavioural disturbance are limited by the geometry of the site, not by the sound reducing to levels below the threshold.
- Given the enclosed nature of the site, two types of results are given:
    - 90th percentile ranges – 90% of models show results below this range, and 10% show result larger than this range.
    - Maximal ranges – the maximal range of exceedance modelled.
      For this site, these ranges will be in the eastward direction.
- Results are rounded up to the nearest two significant digits. This can lead to apparent overlaps in risk ranges.
- The modelling resolution of 10 metres means that were results are lower than this, “<10” is stated to mean “below 10 metres”.
- Where risk ranges are large (often the case for TTS risk ranges), an increase in soft start duration will not be effective to lower the TTS risk range. This is due to the logarithmic nature of transmission losses:
  For a marine mammal that starts fleeing at 500 m range:
    - Increasing the soft start from 0 to 10 minutes allows a marine mammal to swim an additional 900 m (1.5 m/s * 600 seconds), from 500 m range to 1400 m range.
      This result in a c. 6.5 dB reduction in received level for the animal.
    - Increasing the soft start from 10 to 20 minutes allows the animal to swim an additional 900 m, from 1400 m range to 2300 m range.
      This results in a c. 3.5 dB reduction in received level for the animal.
    - Increasing the soft start from 20 to 30 minutes (2300 to 3200 m), results in a c. 2 dB reduction in received level for the animal.
- As the impulsive noise transitions to non-impulsive noise with increased ranges, the appropriate behavioural threshold for the assessment changes from 160 dB to 92-126 dB (a likely >10-fold increase in range). This means that there are large ranges of disturbance, but should be considered in relation to, for example, the radiated noise from common vessels, which will exceed this threshold to ranges of 500-10000 m (assuming 160-180 dB SPL source level).
- Animals are modelled as fleeing in straight lines (except fish, no fleeing). Where sites are very confined, the maximal risk ranges will be restricted by line-of-sight ranges (and cut short where they meet land).

- Modelling assumed a maximal fleeing time of 7200 seconds (2 hours). This allows for 10.8 km of fleeing for marine mammals.
- Modelling is limited to a range of 5 km from the site boundary.

14.7.1.2 Results Tables

14.7.1.2.1 Dredging

The dredging has little to no risk of exceeding TTS or AUD INJ thresholds (Table 14-9) but estimates for exceedance of the behavioural thresholds extend to ranges of 5600 m – coinciding with the extend of the modelled area (Proposed Development boundary +5 km).

There is considerable variation in the extent of the noise from the dredging depending on the location of the dredging vessel, with the breakwater and headland to the east (Ynys Dinas/Dinas Island), blocking noise transmission (Figure 14-15 and Figure 14-16).

Table 14-9. Threshold exceedance ranges for dredging.

Condition		LF	HF	VHF	PW	OW	Fishes
Behavioural disturbance range	90th percentile range [m]	2800	4000	4000	4300	2600	1100
	Maximal range [m]	4200	5600	5600	5600	4300	1100
TTS,1 seconds' exposure	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
AUD INJ,1 seconds' exposure	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
TTS, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
AUD INJ, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10

* Fish are modelled as stationary

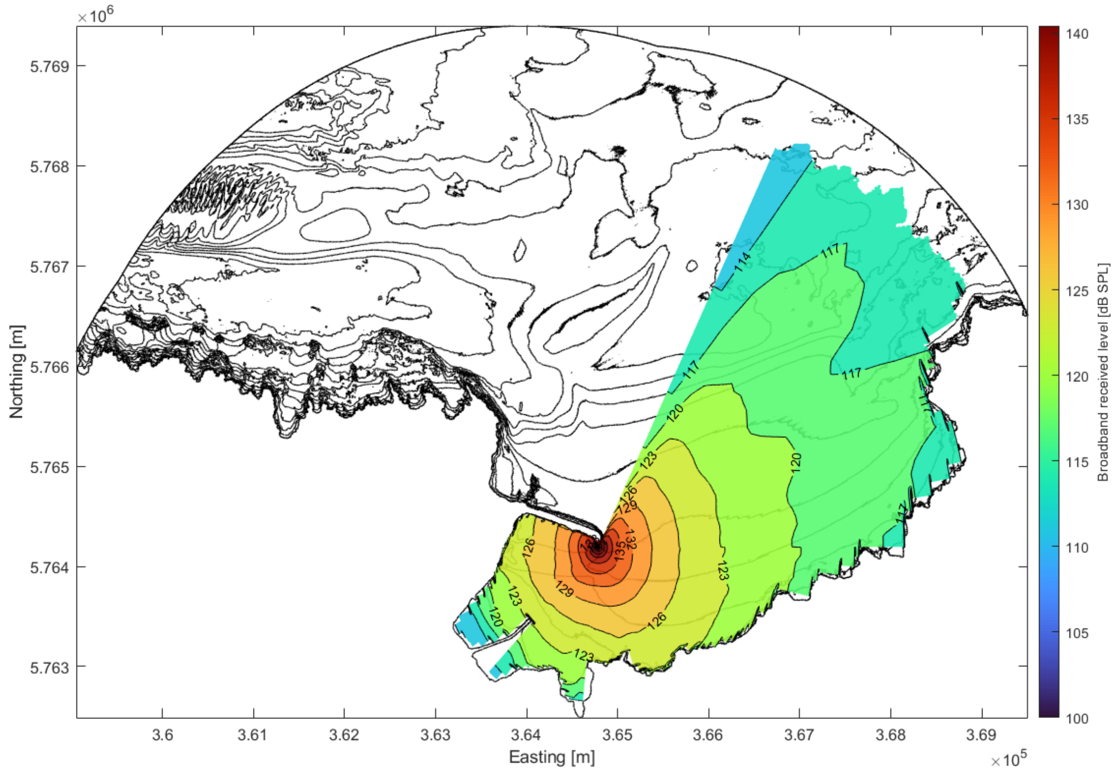

Figure 14-15. Map of unweighted levels [SPL] from dredging near the end of the breakwater. UTM 30N.

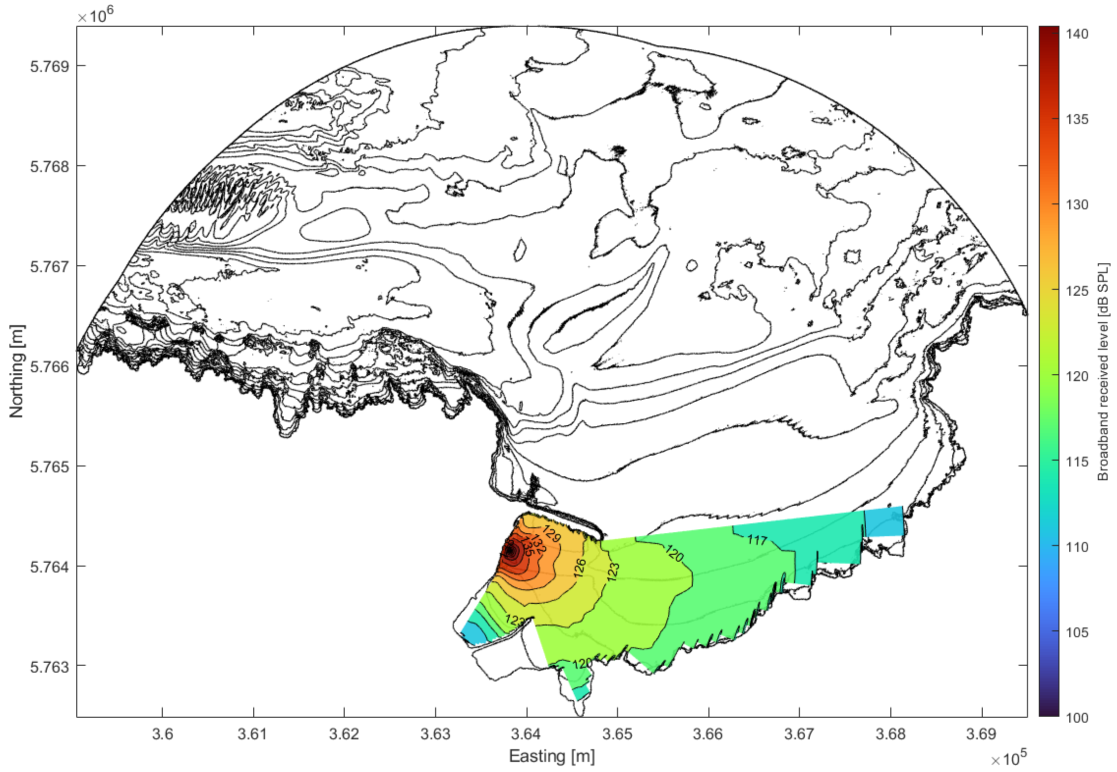

Figure 14-16. Map of unweighted levels [SPL] from dredging near the quay and linkspan. UTM 30N.

14.7.1.2.2 Demolition, Drilling, Rock Breaking, Pecking

The demolition has little to no risk of exceeding AUD INJ thresholds (Table 14-10).

The activity is likely to exceed TTS thresholds for the PW group from 310 to 680 m (90th percentile range to maximal range) and TTS for the LF and VHF groups from 410 m to 1400 m (90th percentile range to maximal range).

Exceedance of the behavioural thresholds is expected for all species within line of sight (4800 m), limited by the headland to the east (Ynys Dinas/Dinas Island) and the breakwater to the north.

These results are also representative for pecking during dredging and for the in-soil impact piling during installation of the bank seat piles.

Table 14-10. Threshold exceedance ranges for demolition.

Condition		LF	HF	VHF	PW	OW	Fishes
Behavioural disturbance range	90th percentile range [m]	2200	2200	2200	2200	2200	2200
	Maximal range [m]	4800	4800	4800	4800	4800	4800
TTS,1 seconds' exposure	90th percentile range [m]	10	<10	<10	<10	<10	<10
	Maximal range [m]	10	<10	<10	<10	<10	<10
AUD INJ,1 seconds' exposure	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
TTS, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	580	<10	410	310	20	40
	Maximal range [m]	1400	<10	830	680	20	40
AUD INJ, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10

* Fish are modelled as stationary

14.7.1.2.3 Impact piling

14.7.1.2.3.1 Support Piles

This activity is limited in time to 30-minute intervals, occurring maximally twice daily, thus the modelling assumes 60 minutes activity daily.
The planned total number of occurrences will be four – 30 minutes impact piling per support pile over two days.

The impact piling at the pontoon support piles is likely to exceed AUD INJ thresholds for all species groups (Table 14-11), and to ranges of several hundred meters for most groups.

The species groups most strongly affected are the LF, VHF, PW and Fishes groups that have likely exceedance ranges for the AUD INJ threshold from 630 m to 880 m (90th percentile range to maximal range).

The OW hearing groups have likely exceedance up to 280 m and the HF hearing group up to 40 m.

The peak pressure is likely to exceed the AUD INJ threshold of all groups to <10 m.

Ranges for exceedance of the exposure TTS thresholds are limited by line of sight for all species groups with a range of 4900 m.

The peak pressure is likely to exceed the TTS threshold of Fishes from 60 m to 70 m and the VHF group from 30 m to 50 m (90th percentile range to maximal range).

Ranges for behavioural disturbance are limited by line of sight and cover the part of Fishguard bay as enclosed by the norther breakwater and the headland to the east (Ynys Dinas/Dinas Island) (Figure 14-17).

Effects of a 20-minute soft start

Introducing a 20-minute soft start with a 12 dB reduction for 20 minutes prior to piling decreases exceedance ranges for the AUD INJ threshold for the VHF group from 600 to 630 m (up to 880 m with no soft start). The remaining groups have exceedance range for AUD INJ reduced to less than 340 m, with exception of the stationary Fishes hearing group who see a small increase[13] from 640 to 680 m (630 m to 670 m with no soft start).

The exceedance ranges of the TTS threshold are similar with the presence of a soft start. This is an effect of the soft start itself and the effect of increasing the duration of impact piling to 80 minutes (from 60 minutes, 20 minutes of which are from the soft start).

Table 14-11. Threshold exceedance ranges for impact piling at the main pontoon pile.

Condition		LF	HF	VHF	PW	OW	Fishes
Behavioural disturbance range	90th percentile range [m]	2200	2200	2200	2200	2200	2200
	Maximal range [m]	4900	4900	4900	4900	4900	4900
TTS,1 seconds' exposure	90th percentile range [m]	530	20	1100	260	80	30
	Maximal range [m]	530	20	1100	260	80	30
AUD INJ,1 seconds' exposure	90th percentile range [m]	40	<10	120	10	<10	<10
	Maximal range [m]	40	<10	120	10	<10	<10
TTS, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	2000	900	1900	2000	960	900
	Maximal range [m]	4500	2500	4300	4400	2700	900
AUD INJ, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	810	30	870	690	270	630
	Maximal range [m]	840	40	880	720	280	670
TTS, sound exposure, fleeing receiver*, 20-minute soft start	90th percentile range [m]	2000	170	1900	2000	520	900
	Maximal range [m]	4500	2500	4300	4400	2700	900
AUD INJ, sound exposure, fleeing receiver*, 20-minute soft start	90th percentile range [m]	280	<10	600	80	<10	640
	Maximal range [m]	340	<10	630	110	<10	680
TTS, peak pressure	90th percentile range [m]	10	10	30	10	10	60
	Maximal range [m]	10	10	50	10	10	70
AUD INJ, peak pressure	90th percentile range [m]	10	10	10	10	10	10
	Maximal range [m]	10	10	10	10	10	10

* Fish are modelled as stationary

[13] The soft start will increase cumulative received noise for a stationary receiver.

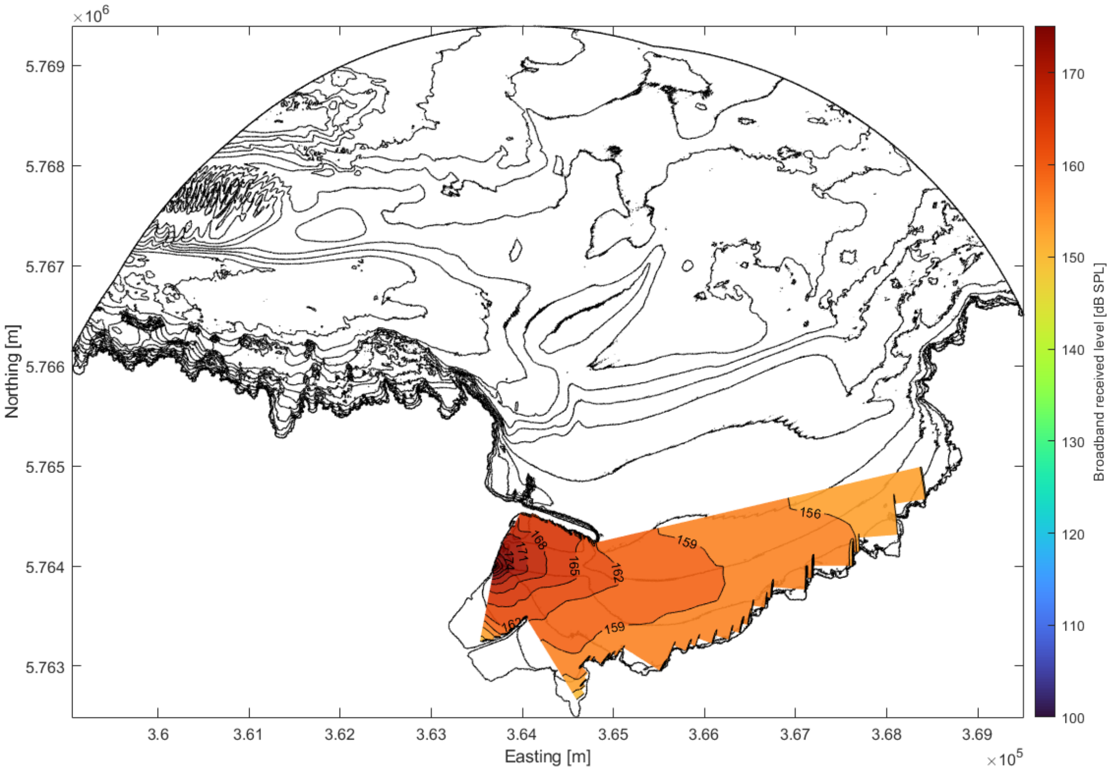

Figure 14-17. Map of unweighted levels [SPL] from impact piling the support piles. UTM 30N.

14.7.1.2.3.2 Bank Seat Piles

The bank seat piles are wholly separated by the water by at least 1 m of made ground, providing an effective noise barrier.

The results for Demolition, Drilling, Rock Breaking, Pecking, section 14.6.3.4 are representative for the impact piling of the bank seat piles.

14.7.1.2.4 Vibratory piling

14.7.1.2.4.1 Main Pontoon Pile & Support Piles

The vibro piling for the main pontoon pile is also representative of (or louder than) the vibro piling of the support piles. Only results for vibro piling of the main pontoon pile are presented.

This also covers the use of vibro piling for extraction of the temporary piles.

The vibro piling has little to no risk of exceeding AUD INJ threshold for any species group (Table 14-12).

For the VHF species group, it’s likely that the TTS threshold will be exceeded to ranges from 190 m to 270 m (90th percentile range to maximal range).

The PW and Fishes groups has a risk of exceedance of the TTS threshold to ranges up to 30 m.

The LF hearing group has TTS exceedance risk ranges from 90 to 130 m.

Ranges for behavioural disturbance are limited by line of sight and cover the part of Fishguard bay as enclosed by the norther breakwater and the headland to the east (Ynys Dinas/Dinas Island).

Table 14-12. Threshold exceedance ranges for vibratory piling at the main pontoon pile and support piles.

Condition		LF	HF	VHF	PW	OW	Fishes
Behavioural disturbance range	90th percentile range [m]	2200	2200	2200	2200	2200	2200

	Maximal range [m]	4900	4900	4900	4900	4900	4800
TTS,1 seconds' exposure	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
AUD INJ,1 seconds' exposure	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
TTS, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	90	<10	190	20	<10	30
	Maximal range [m]	130	<10	270	30	<10	30
AUD INJ, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10

* Fish are modelled as stationary

14.7.1.2.5 Coring/Rotary Drilling

14.7.1.2.5.1 Main Pontoon Pile & Bank Seat Piles

The coring has little to no risk of exceeding TTS or AUD INJ thresholds (Table 14-13) but is causing possible exceedance of the behavioural thresholds to ranges of 1600 m for the HF species group. The remaining groups have exceedance ranges for the behavioural thresholds of 110 m to 500 m.

The higher ranges of the HF group are a result of the weighting excluding less lower frequencies (compared to the VHF group) and lower behavioural disturbance threshold overall (92 dB SPL weighted).

The results are for coring at the main pontoon pile. The noise from the bank seat piles will be much lower (lower source level and additional loss through land/water interface) and have not been modelled separately.

Table 14-13. Threshold exceedance ranges for coring at the main pontoon pile.

Condition		LF	HF	VHF	PW	OW	Fishes
Behavioural disturbance range	90th percentile range [m]	490	1100	450	460	110	230
	Maximal range [m]	500	1600	490	480	120	250
TTS,1 seconds' exposure	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
AUD INJ,1 seconds' exposure	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
TTS, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
AUD INJ, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10

* Fish are modelled as stationary

14.7.1.2.6 Rock Dumping

The rock dumping is unlikely to exceed AUD INJ thresholds at any range for all species groups expect the VHF hearing group which has AUD INJ exceedance to a range of 50 m for sound exposure and to 40 m for the Fishes hearing group..

The activity is likely to exceed the TTS thresholds for the LF, VHF, PW and Fishes groups from 80 m to 120 m (90th percentile range to maximal range).

Groups HF and OW TTS threshold exceeded to ranges of up to 20 m.

Ranges for behavioural disturbance are limited by line of sight and cover the part of Fishguard bay as enclosed by the norther breakwater and the headland to the east (Ynys Dinas/Dinas Island).

Table 14-14. Threshold exceedance ranges for rock dumping.

Condition		LF	HF	VHF	PW	OW	Fishes
Behavioural disturbance range	90th percentile range [m]	2200	2200	2200	2200	2200	2100
	Maximal range [m]	5200	5200	5200	5200	5200	5200
TTS,1 seconds' exposure	90th percentile range [m]	10	<10	50	<10	<10	<10
	Maximal range [m]	10	<10	50	<10	<10	<10
AUD INJ,1 seconds' exposure	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
TTS, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	110	<10	100	80	20	100
	Maximal range [m]	120	<10	100	80	20	100
AUD INJ, sound exposure, fleeing receiver*, no soft start	90th percentile range [m]	<10	<10	50	<10	<10	40
	Maximal range [m]	<10	<10	50	<10	<10	40
TTS, peak pressure	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10
AUD INJ, peak pressure	90th percentile range [m]	<10	<10	<10	<10	<10	<10
	Maximal range [m]	<10	<10	<10	<10	<10	<10

* Fish are modelled as stationary

14.7.2 Assessment of Operational Effects

After construction has completed, it's assumed that activities will revert to what they were before the Proposed Development commenced, with no meaningful changes to the noise from the activities (i.e. dominated by the ferry service).

14.8 Mitigation

14.8.1 Construction Phase Mitigation Measures

14.8.1.1 Impact Piling

During impact piling protocols from the JNCC document "Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise" (JNCC, 2010) should be applied, specifically a 30-minute pre-piling survey for absence of marine mammals with a mitigation zone by a qualified Marine Mammal Observer (MMO).

In addition to this a 20-minute soft start, with a 12 dB reduction in source level will lower the AUD INJ exceedance range to less than 630 m for the VHF group and less than 340 m for the remaining groups for a 60-minute impact piling duration.

Note that adding a soft start has no effect on the effects on fish which have risk of exceeding the AUD INJ threshold to 680 m. A non-fleeing animal will instead experience more noise overall if a soft-start is introduced.

While the MMO pre-piling survey would normally be limited to a range of 500 m, the calmer waters resulting from the breakwaters could assist in spotting marine mammals to ranges over 630 m. The end of the northern breakwater, c. 1100 m away from the linkspan, can be used as a visual que to aid in determining this range.

Additional soft start time will not lessen the effects as the noise from the soft start itself will drive the exceedance ranges.

14.8.1.2 Remaining Construction Activities

Vibro piling, coring, demolition and dredging all have AUD INJ exceedance ranges <10 m for all hearing groups, meaning than no mitigation is required to mitigate against this effect. Rock dumping has AUD INJ exceedance ranges to 50 m for the VHF group and 40 m for the Fishes group with the remaining groups <10 m, meaning that if an animal is very near this activity there is some risk of the animal experiencing auditory injury. Given the conservativeness of the assessment, it’s unlikely that this will be realised, and no mitigation is recommended for non-impact piling activities.

14.8.2 Operational Phase Mitigation Measures

No significant change in noise patterns is expected following the Proposed Development, therefore no mitigation is needed.

14.9 Assessment of Residual Effects

Noise is a transient pollutant, once the noisy activity stops, the immediate effect ceases. Residual effects may include learned avoidance of the area for marine mammals. Comments on other residual effects to be found in Chapter 8 – Biodiversity Marine

14.10 Cumulative Effects

No other Proposed Developments with significant underwater noise emissions are known to have been planned for the relevant area.

14.11 Limitations of the Assessment

There are limitations to the modelling accuracy. These have been addressed by assuming conservative values (leading to a larger assessed impact and effect) for inputs that are critical to accuracy (e.g. water depth, sediment characteristics, animal swimming speeds and source levels).

See sections 14.6.3.1, 14.6.4 and 14.7.1.1 for examples and details.

14.12 Summary of Effects and Conclusion

14.12.1 Impact piling

The impact piling to install the support piles for the installation of the main pontoon pile is the only activity assessed with the risk of exceeding acoustic thresholds for marine mammals to ranges over 50 m.

Given that the recommended JNCC mitigation for impact piling is implemented (30-minute pre piling watch for absence of marine mammals, 20-minute soft start) the risk range for exceedance of the auditory injury range for the VHF group (porpoises) can be reduced to <630 m and <340 m for the remaining animal groups assessed. The exception to this is fish, which given the lack of fleeing will have risk of auditory injury to ranges of 680 m.

Further increase of soft start duration will not decrease this risk range, as the soft start itself is noisy (relative to noise thresholds).

14.12.2 Remaining Activities

The remaining activities assessed included dredging, demolition, drilling, rock breaking, pecking, vibro piling, coring and rock dumping. Rock dumping is the activity with the greatest potential impact and has a risk range for exceedance of auditory injury of <50 m. All remaining activities have risk ranges for exceedance of auditory injury of <10 m.

No mitigation is recommended for these activities

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FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 15 Air Quality

794-NI-POR-00886R
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15 AIR QUALITY

15.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as “the Proposed Development”) on air quality and the vulnerability of the Proposed Development to climatic factors. This chapter considers the potential impacts to air quality from the Project during the construction and operational phases of the Proposed Development.

Directive 2011/92/EU included air quality as a criteria for assessment in EIA in terms of the impact of the project on air quality through the release of pollutants with potential to affect human health and ecosystems at a local level (this includes a construction phase dust and emissions assessment). Potential effects to air quality may arise during the construction phase, such as from the generation of dusts and from construction traffic. The construction activities have been examined to identify those that have the potential for air emissions. Each of these potential sources has been identified and emissions have been evaluated using standard procedures.

The main objectives of this assessment are to:

- Determine baseline air quality within the study area;
- Identify human receptors where a potential significant change in NO_2, PM_{10} or $PM_{2.5}$ concentrations, due to the Proposed Development, may occur;
- Identify sensitive designated habitats where a potential significant change in NOx concentrations, due to the Proposed Development, may occur;
- Identify human and sensitive designated habitats where there is risk of dust, emissions and traffic movement effects occurring during the construction phase; and,
- Determine suitable mitigation measures to reduce significant air quality effects to an acceptable level.

The impact of the Proposed Development on air quality has been assessed for both the construction and operational phases by considering the pollutant background concentrations, emissions from road traffic, potential for construction dust, emissions from vehicles (cars and HGVs) and emissions from ships and machinery. Predicted concentrations have been compared to the relevant statutory limit values and the WHO guidelines for the protection of human health.

The assessment presented is informed by the following key chapters of the ES

- Chapter 2: Project Description

Other aspects relevant to air quality are addressed in the specific chapters of the ES, namely:

- Chapter 19: Traffic and Transport

This chapter should be read in conjunction with:

- Volume II Appendix 15.A – Detailed Dust Assessment
- Volume II Appendix 15.B – Air Quality Impacts On Designated Nature Conservation Sites

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

15.2 Purpose of this chapter

The primary purpose of the ES chapter is to provide an assessment of the likely direct and indirect significant effects of the Project on air quality. In particular, this ES chapter:

- Presents the existing environmental baseline established from desk studies, relevant datasets and consultation (section 15.8);
- Identifies any limitations encountered in compiling the environmental information (section 15.13);

- Presents an assessment of the potential likely significant effects on air quality arising from the Proposed Development (section 15.7.5) based on the information gathered and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in section 15.12.
- Highlights any necessary monitoring (section 15.10.3) and/or measures (see section 15.10.1 and section 15.10.2) to prevent, minimise, reduce or offset the likely significant environmental effects identified in the assessment (section 15.9).

15.3 Study Area

The site is a parcel of land spanning an area of approximately 36 hectares of the harbour, to include the existing linkspan, hinterland and within the bay foreshore. The Proposed Development lies within the northern fringes of Goodwick which is a coastal town immediately west of its twin town of Fishguard, within Fishguard Bay. It is bound by steep cliff faces and the Fishguard Train Station to the western extents; a breakwater to the north and RNLI Lifeboat Station. Residential properties of Harbour Village lie to the west elevated above Fishguard Bay. The site is accessed from the A40/Station Hill to the south.

For dust, the Institute of Air Quality Management (IAQM) 2024 guidance states that a dust assessment is typically required where there is:

- A ‘human receptor’ within:
  - 250 metres of the boundary of the site; or
  - 50 metres of the route(s) used by construction vehicles on the public highway, up to 250 metres from the site entrance(s).
- An ‘ecological receptor’ within:
  - 50 metres of the boundary of the site; or
  - 50 metres of the route(s) used by construction vehicles on the public highway, up to 250 metres from the site entrance(s).

In consideration of the distances outlined above, an Air Quality Study Area of 250m from all possible on-site components of the Proposed Development has been selected for the purposes of this assessment, with a visual representation of the resulting Air Quality Study Area illustrated in Figure 15.1.

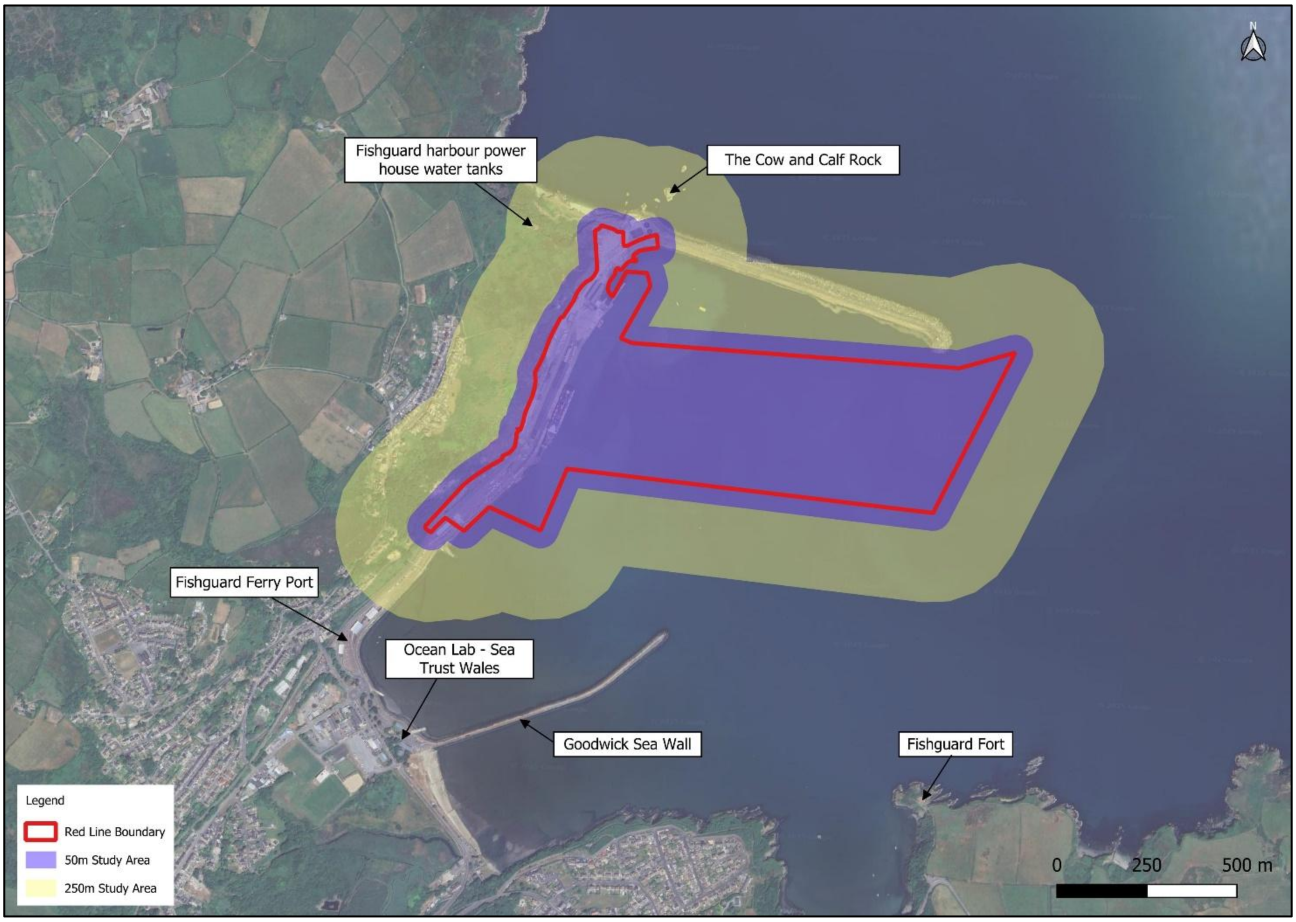

Figure 15.1: Air Quality Study Area

15.4 Policy Context

Air pollution can have an effect on people's health. Exposure to air pollution can have long-term effects on health, it also has negative impacts on the environment. The UK government's and devolved administrations' primary objective is to ensure that all members of the public should have access to outdoor air without significant risk to their health, where this is economically and technically feasible.

15.4.1 EU legislation and policy

The following EU Directives set limits for air pollutants in ambient air:

- Cleaner air for Europe (CAFÉ directive – 2008/50/EC); and,
- Air quality 4th daughter directive.

15.4.2 National legislation and policy

15.4.2.1 UK Air Quality Strategy

Local authorities are responsible for reviewing the state of air quality in their district council area. To assist them with this process, an Air Quality Strategy (AQS) has been devised for the UK. This sets out standards and objectives for the air quality pollutants causing the problems and enables councils to review air quality in their area against these. Wales departments also have a responsibility to ensure limit values, target values and alert thresholds for specified pollutants are not exceeded. The AQS is presented in two volumes:

- Volume 1 of the UK air quality strategy,
- Volume 2 of the UK air quality strategy.

In most cases, the AQS objectives are identical to the EC Directive limit values, the only differences being the more stringent dates by which the former must be achieved.

15.4.2.2 Air Quality (Wales) Regulations 2000, as amended by the Air Quality (Wales) (Amendment) Regulations 2002

The national air quality objectives for Wales represent pragmatic thresholds above which the Welsh Government considers the health risks associated with air pollution to be unacceptable. However, air just barely compliant with the objectives should not be considered ‘clean’ and still carries long-term health risks. The lower the concentration of pollutants such as nitrogen dioxide and particulate matter, the lower will be the risks of adverse health effects in the exposed population. Therefore, while compliance with the national air quality objectives is essential, it is desirable to keep levels of pollution as low as reasonably practicable.

The national air quality objectives contained in the Air Quality (Wales) Regulations 2000, as amended by the Air Quality (Wales) (Amendment) Regulations 2002 are detailed below in Table 15-1.

Table 15-1: National Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration	Measured as
Benzene	16.25 µg/m^3	running annual mean
	5 µg/m^3	annual mean
1,3-Butadiene	2.25 µg/m^3	running annual mean
Carbon Monoxide	10 mg/m^3	maximum daily running 8-hour mean
Lead	0.25 µg/m^3	annual mean
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times per year	1-hour mean
	40 µg/m^3	annual mean
Particles (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times per year	24-hour mean
	40 µg/m^3 (WHO guideline 20 µg/m^3)	annual mean
Sulphur Dioxide	266 µg/m^3, not to be exceeded more than 35 times per year	15-minute mean
	350 µg/m^3, not to be exceeded more than 24 times per year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times per year (WHO guideline 20 µg/m^3)	24-hour mean

15.4.2.3 Well-being of Future Generations (Wales) Act 2015

Air quality management is a public health and environmental priority, and integrated action to improve the air people breathe and to which we expose the natural environment must be taken internationally, nationally, regionally and locally. The Welsh public sector is driving air quality improvements in a number of ways, including through local air quality management, land use and transport planning, environmental permitting, active travel, investment in cleaner technologies and education and awareness-raising.

Public bodies in Wales need to carry out air quality and noise management in accordance with the five ways of working set out in the Well-being of Future Generations (Wales) Act 2015 ("the WFG Act"). This means:

- looking to the long term when making decisions so they do not compromise the ability of future generations to meet their own needs;
- taking an integrated approach, such as by joining up action to reduce air and noise pollution with action to improve road safety, make transport more sustainable, reduce greenhouse gas emissions and enhance the built environment with appropriately sited trees and hedgerows;
- taking every opportunity to talk to the public, including businesses, about the challenges associated with air and noise pollution, listen to their concerns and seek their views on potential solutions and their involvement in delivering them;
- collaborative working between environment, public health, transport and planning professionals and others to find shared sustainable solutions to air quality and noise problems; and,
- keeping exposure to air and noise pollution as low as reasonably practicable across the whole of the population, looking out in particular for areas where the national air quality objectives might be at risk of being breached, a nuisance created, or a critical load for wildlife exceeded at some point in the future and acting pre-emptively to prevent those situations from occurring.

15.4.2.4 Environment (Air Quality and Soundscapes) (Wales) Act 2024

The Environment (Air Quality and Soundscapes) (Wales) Act 2024 (the 2024 Act) became law on 14 February 2024. The 2024 Act seeks to improve the quality of our air environment and reduce the impacts of airborne pollution on human health, nature, the environment and our economy.

The 2024 Act creates a framework for the Welsh Ministers to set targets in relation to air quality and amends existing air quality legislation in relation to local air quality management, road user charging, anti-idling and smoke control such as the Environment Act 1995. The Act also creates new duties for the Welsh Ministers to take steps to promote awareness of the risks to human health and the natural environment caused by air pollution, and ways of reducing or limiting air pollution.

The 2024 Act also places the Welsh Ministers and local authorities under a duty to promote active travel as a way of reducing or limiting air pollution and makes provision for this duty to be imposed by regulations, on other public authorities. The Act also requires the Welsh Ministers to produce a national strategy on soundscapes.

15.4.2.5 Local Air Quality Management (LAQM) Technical Guidance 2022

Local Air Quality Management Technical Guidance LAQM.TG22 supersedes all previous versions. It is designed to support local authorities in carrying out their duties under the Part IV of the Environment Act 1995 as amended by the Environment Act 2021, and subsequent regulations.

Authorities will continue to appraise air quality, with the main emphasis on those pollutants shown to be challenging in respect of compliance i.e. Nitrogen Dioxide (NO_2), Particulate Matter (PM_{10}) and Sulphur Dioxide (SO_2), whilst introducing a new role for local authorities to work towards reducing levels of $PM_{2.5}$ in England and a statutory objective for this pollutant in Scotland. At the core of LAQM delivery are three pollutant objectives; these are:

- Nitrogen Dioxide (NO_2),
- Particulate Matter (PM_{10}), and;
- Sulphur Dioxide (SO_2).

All current AQMA's across the UK are declared for one or more of these pollutants, with NO_2 accounting for the majority. It is a statutory requirement for local authorities to regularly review and assess air quality in their area and take action to improve air quality when objectives set out in regulation cannot be met.

Reflecting feedback under the LAQM review process, the UK and Welsh Governments have decided to retain Benzene, 1,3-Butadiene, Carbon Monoxide and Lead in regulations for England and Wales. However, in recognition of the fact that all of the objectives for these pollutants have been met for several years and are well below objective values, local authorities in England and Wales do not have to report on these pollutants (or SO_2, in the case of Wales) unless local circumstances indicate otherwise. These pollutants remain a statutory reporting requirement in Scotland and Northern Ireland.

As of February 2022, there were more than 600 AQMAs currently declared across the UK (over 500 of which are in England). There are currently 214 Local Authorities that have one or more AQMAs declared within their jurisdiction. Of these, the vast majority (over 95%) are related to road traffic emissions, where attainment of the annual mean objective for nitrogen dioxide (NO_2) is considered unlikely, sometimes in association with exceedances of the 24-hour mean PM_{10} objective, or in Scotland the annual mean PM_{10} objective.

Examples of where air quality objective may apply is given in Table 15-2.

Table 15-2: Example of Where Air Quality Objectives Apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual-mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building's façades), or any other location where public exposure is expected to be short-term.
Daily mean	All locations where the annual-mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to locations at the building's façade), or any other location where public exposure is expected to be short-term
Hourly-mean	All locations where the annual and 24-hour mean would apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks and bus stations etc which were not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations to which the public might reasonably be expected to spend 1-hour or longer	Kerbside sites where the public would not be expected to have regular access

15.4.2.6 The Clean Air Plan for Wales

The aim of the Clean Air Plan for Wales is to improve air quality and reduce the impacts of air pollution on human health, biodiversity, the natural environment and our economy. This Plan supports delivery of commitments under Prosperity for All: our national strategy. In particular, 'reducing emissions and delivering vital improvements in air quality' to support 'healthier communities and better environments. Wales are undertaking work to understand the impact of COVID-19 on air quality. As this is an emerging picture, they will take account of any impacts of COVID-19 when reviewing this Plan and implementing actions within it. Their first Clean Air Plan for Wales brings together work across many Government departments and public sector organisations. It includes ambitions to meet and where possible exceed requirements set down in UK and international guidance and legislation.

This Plan sets out a 10-year pathway to achieving cleaner air. We have structured the Plan around four core themes, with actions to enable collaborative approaches to reducing air pollution.

- People: Protecting the health and well-being of current and future generations
- Environment: Taking action to support our natural environment, ecosystems and biodiversity
- Prosperity: Working with industry to reduce emissions, supporting a cleaner and more prosperous Wales

- Place: Creating sustainable places through better planning, infrastructure and transport.

The themes were designed through the lens of the Well-being of Future Generations Act to enable collaborative and integrated approaches to improving air quality, across a range of policy areas and sectors. The timescales for delivering actions are framed within three Senedd periods, short term: 2020 to 2021, medium term: 2021-26 and longer term: 2026-2031.

15.5 Consultation

No specific comments regarding air quality have been received during consultation activities undertaken to date, together with how these issues have been considered in the preparation of this ES chapter. Chapter 5: Scoping and Consultation provides details on the types of consultation activities undertaken for the Project.

15.6 Methodology to inform the baseline

15.6.1 Desktop study

Information on air quality within the Air quality Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 15-3. These sources provide the most up to date data for this assessment.

Table 15-3 Summary of key desktop reports.

Title	Source	Year
Pembrokeshire County Council 2023 Air Quality Progress Report	Pembrokeshire County Council	2023
Air Quality in Wales 2023/2024 Report	Senedd	2024
DEFRA 2021 based background maps	Defra - Department for Environment Food and Rural Affairs	2025

15.6.2 Site-specific surveys

No site-specific baseline surveys were undertaken as part of the assessment for air quality. The baseline data presented in this section is derived from district council reports, DEFRA mapping concentration estimates, and available metrological data, and may be taken as representative of the background conditions.

15.7 Assessment Methodology

The methodology and associated impact assessment had regard to the general guidance regarding the undertaking of an EIA, as presented in Chapter 4: Environmental Impact Assessment Process and Methodology and the following air quality specific guidance as follows:

- Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction www.iaqm.co.uk January 2024 (Version 2.2);
- Institute of Air Quality Management (IAQM) A guide to the assessment of air quality impacts on designated nature conservation sites May 2020 (Version 1.1);

- Institute of Air Quality Management (IAQM) Land-Use Planning & Development Control: Planning For Air Quality January 2017; and
- Design Manual for Roads and Bridges (DMRB) Sustainability and Environment, LA105 Air Quality June 2024..

15.7.1 Applicable Guidance for Assessment

15.7.1.1 Land Use Planning & Development Control: Planning for Air Quality (IAQM)

This IAQM document sets out indicative criteria for requiring an air quality assessment. These points are set out in Table 15-4 below.

Table 15-4: IAQM Indicative Criteria for Requiring an Air Quality Assessment

The development will:	Indicative Criteria to Proceed to an Air Quality Assessment:	Does this Proposed Development satisfy the criteria?
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight)	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere	**No**
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.	**No**
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA.	**No**
4. Introduce a new junction or remove an existing junction near to relevant receptors	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.	**No**
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere	**No**
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).	**No**
7. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors. NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping	Typically, any combustion plant where the single or combined emission rate is less than 5 mg/sec* is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.	**No**

**As a guide, the 5 mg/s criterion equates to a 450 kW ultra low NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm*^{3}*.*

The Proposed Development does not satisfy the criteria requiring a proposal to be supported with an air quality assessment. Therefore in accordance with this IAQM guidance an operational air quality assessment may be screened out.

15.7.1.2 Design Manual for Roads and Bridges (DMRB) Sustainability and Environment, LA105 Air Quality

The approach to considering an assessment (local assessment) or screening it out follows the guidance set out by the DMRB Sustainability & Environment, LA105 Air Quality (Standards for Highways, 2024). Requirements for a local air quality assessment emanate from the following criteria being met:

- annual average daily traffic (AADT) ≥ 1,000; or
- heavy duty vehicle (HDV) AADT ≥ 200; or
- a change in speed band; or
- a change in carriageway alignment by ≥ 5 m.

For this Proposed Development none of the 4 criteria are met. There is not predicted to be any significant change in traffic volumes when the Proposed Development is operational compared to the existing baseline scenario.

In addition to this, in terms of designated ecological sites, the Proposed Development is partly located within the West Wales Marine / Gorllewin Cymru Forol Special Areas of Conservation (SACs). There are no biological SSSIs located within 3km from the development. A geological designated site, Fishguard Cliffs SSSI, lies to east of Fishguard Harbour beyond the mouth of the Afon Gwaun. St. David's SAC lies 4.75km northwest of the proposed development with the qualifying features being vegetated sea cliffs, European dry heaths, floating water-plantain. Strumble Head – Llechdafad Cliffs SSSI is the closest component SSSI of the SAC and is designated for its floral assemblage, breeding cliff-nesting bird assemblage, and invertebrates. There are no Non-Statutory Designated Sites within 2km.

Designated site that should be considered for assessment are those which the designated features are sensitive to air pollutants, either directly or indirectly, and which could be adversely affected by the effect of local air quality on vegetation with the following nature conservation sites: SACs (SCIs or SACs), SPAs, pSPAs, ASSIs and Ramsar sites.

LA 105 –Wales National Application Annex for Air Quality (WNAA) states that there are no specific requirements for Welsh Government supplementary or alternative to those given in LA 105.

15.7.2 Impact assessment criteria

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 4: Environmental Impact Assessment Process and Methodology.

Table 15-5 describes sensitivity of receptor and may be used in an environmental impact assessment to ensure a standardised approach. In this instance the assessment of air quality employs standards set out in the IAQM guidance document[1] is used and compliments this standard approach presented in Table 15-6.

Table 15-5: Definitions of Sensitivity or Value

Sensitivity	Example Descriptor
Very High	Very high importance and rarity, international scale and very limited potential for substitution.

[1] Institute of Air Quality Management Guidance on land-use planning and development control: Planning for air quality 2017

Sensitivity	Example Descriptor
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Table 15-6: Definitions of Magnitude

Sensitivity	Example Descriptor
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Both sensitivity/value and magnitude are taken into account in determining the significance of effect.

15.7.3 Construction Phase – Methodology

15.7.3.1 Dust and Particulates

Dust is the generic term used to describe particulate matter in the size range 1-75 µm in diameter. Particles greater than 75 µm in diameter are termed grit rather than dust. Dusts can contain a wide range of particles of different sizes. The normal fate of suspended (i.e. airborne) dust is deposition. The rate of deposition depends largely on the size of the particle and its density; together these influence the aerodynamic and gravitational effects that determine the distance it travels and how long it stays suspended in the air before it settles out onto a surface. In addition, some particles may agglomerate to become fewer, larger particles; whilst others react chemically.

The effects of dust are linked to particle size and two main categories are usually considered:

- PM_{10} particles, those up to 10 µm in diameter, remain suspended in the air for long periods and are small enough to be breathed in and so can potentially impact on health; and,
- Dust, generally considered to be particles larger than 10 µm which fall out of the air quite quickly and can soil surfaces (e.g. a car, window sill, laundry). Additionally, dust can potentially have adverse effects on vegetation and fauna at sensitive habitat sites.
- The IAQM Guidance on the assessment of dust from demolition and construction sets out 250 m as the distance from the site boundary and 50 m from the site traffic route(s) up to 250 m of the entrance, within which there could potentially be nuisance dust and PM_{10} effects on human receptors. For sensitive ecological receptors, the corresponding distances are 50 m in both cases. These distances are set to be deliberately conservative.

15.7.3.2 Human Receptors Definition

A ‘human receptor’ refers to any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to particulates over a time period relevant to the air quality objectives, as defined in the Government’s technical guidance for Local Air Quality Management Technical Guidance (TG22). In terms of annoyance effects, this will most commonly relate to dwellings, but may also refer to other premises such as buildings housing cultural heritage collections (e.g. museums and galleries), vehicle showrooms, food manufacturers, electronics manufacturers, amenity areas and horticultural operations (e.g. salad or soft-fruit production).

15.7.3.3 Sensitivities of People and Property Receptors to Dust

For the sensitivity of people and their property to soiling, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, considering the following general principles.

High sensitivity receptor

- Users can reasonably expect enjoyment of a high level of amenity.
- The appearance, aesthetics or value of their property would be diminished by soiling; and
- The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.

Indicative Examples: Dwellings, Museums and other culturally important collections. Medium and long-term car parks and car showrooms.

Proposed Development Examples: There are residential properties west of the Proposed Development located on Quar Road, New Hill and Harbour Village.

Medium sensitivity receptor

- Users would expect a to enjoy a reasonable level of amenity but would not reasonably expect to enjoy the same level of amenity as in their home.
- The appearance, aesthetics or value of their property could be diminished by soiling.
- The people or property wouldn’t reasonably be expected a to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.

Indicative Examples: Parks, Places of work

Proposed Development Examples: Offices and places of work located within the proposed development however recognise that these may not be operational during construction. Ocean Lab - Sea Trust Wales is located south of the proposed development.

Low Sensitivity

- The enjoyment of amenity would not reasonably be expected.
- There is property that would not reasonably be expected to be diminished in appearance, aesthetics, or value by soiling.
- There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.

Indicative Examples: Playing fields, farmland (unless commercially sensitive horticultural). Footpaths and roads. Short-term car parks and roads.

Proposed Development Examples: There are numerous footpaths surrounding the Proposed Development. Fishguard Pier Car Park is south of the proposed development. East of the proposed development is primarily agricultural land.

15.7.3.1 Sensitivities of People and Property Receptors to PM_{10}

For the sensitivity of people to the health effects PM_{10}, the IAQM recommends that the air quality practitioner assumes that there are three sensitivities based on whether the receptor is likely to be exposed to elevated concentrations over a 24-hour period, consistent with the Defra's advice for local air quality management (Defra. 2022, LAQM Technical Guidance LAQMTG.22).

High sensitivity receptor

- Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).

Indicative Examples: Residential properties, Schools, hospitals, and residential care homes.

Proposed Development Examples: There are residential properties west of the Proposed Development located on Quar Road, New Hill and Harbour Village.

Medium Sensitivity

- Locations where people are occupationally exposed over a full working day.

Indicative Examples: Office and shop workers (but generally exclude workers occupationally exposed to PM_{10} as protection is covered by Health and Safety at Work legislation).

Proposed Development Examples: Offices and places of work located within the proposed development however recognise that these may not be operational during construction. Ocean Lab - Sea Trust Wales is located south of the proposed development.

Low Sensitivity

- Locations where human exposure is transient.

Indicative Examples: Public footpaths, playing fields, parks. Shopping streets.

Proposed Development Examples: There are numerous footpaths surrounding the Proposed Development. Fishguard Pier Car Park is south of the proposed development.

15.7.3.2 Sensitivities of Receptors to Ecological Effects

A Habitat Regulation Assessment of the site maybe required as part of the planning process if the site lies close to an internationally designated site.

Professional judgement is required to identify where on the spectrum between high and low sensitivity a receptor lies, considering the likely effect and the value of the ecological asset. A habitat may be highly valuable but not sensitive, alternatively it may be less valuable but more sensitive to dust deposition. For the sensitivity of ecosystems to dust deposition the IAQM recommends that an ecologist is consulted to determine the potential effects on plant communities.

High sensitivity receptor

- Locations with an international designation and the designated features may be affected by dust soiling.
- Locations where there is a community of a particular dust sensitive species such as vascular species included in the Red Data List for Great Britain.

Indicative Examples: Special Area of Conservation (SAC) designated for acid heathlands adjacent to a mineral's development releasing alkaline dusts.

Medium sensitivity receptor

- Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown.
- Nationally designated site and the designated features may be affected by dust deposition;

Indicative Examples: Areas of Special Scientific Interest (ASSIs) or a local wildlife site with very specific sensitivities.

Low sensitivity receptor

- Locations with a local designation where the features may be affected by dust deposition.

Indicative Examples: Local Nature Reserve with dust sensitive features.

In terms of designated ecological sites, the Proposed Development is located partly within the West Wales Marine / Gorllewin Cymru Forol Special Areas of Conservation (SACs) . Further detail on ecological impact are consider in Chapter 8 and 9.

15.7.3.3 Source Pathway Receptor

Concentration-based limit values and objectives have been set for the PM_{10} suspended particle fraction, but no statutory or official numerical air quality criterion for dust annoyance has been set at a UK, European or World Health Organisation (WHO) level. Construction dust assessments have tended to be risk based, focusing on the appropriate measures to be used to keep dust impacts at an acceptable level.

Consistent with the recommendations in the IAQM dust guidance, a risk-based assessment has been undertaken for the development, using the well-established source-pathway-receptor approach:

The dust impact (the change in dust levels attributable to the development activity) at a particular receptor will depend on the magnitude of the dust source and the effectiveness of the pathway (i.e. the route through the air) from source to receptor.

The effects of the dust are the results of these changes in dust levels on the exposed receptors, for example annoyance or adverse health effects. The effect experienced for a given exposure depends on the sensitivity of the particular receptor to dust. An assessment of the overall dust effect for the area as a whole has been made using professional judgement taking into account both the change in dust levels (as indicated by the Dust Impact Risk for individual receptors) and the absolute dust levels, together with the sensitivities of local receptors and other relevant factors for the area.

The dust risk categories that have been determined for each of the four activities (demolition, earthworks, construction and track-out) have been used to define the appropriate site-specific mitigation measures based on those described in the IAQM dust guidance. The guidance states that provided the mitigation measures are successfully implemented; the resultant effects of the dust exposure will normally be “not significant”. This assessment does not consider the air quality impacts of dust from any contaminated land. If contaminated land is identified on the site of the Proposed Development, the impacts will be assessed in other technical discipline reports. This is not detailed further in this chapter.

15.7.4 Significance Criteria for Development Impacts on the Local Area

The rationale for describing the impact of the Proposed Development is derived from the Environmental Protection UK (EPUK) and IAQM guidance (EPUK & IAQM) “Land-Use Planning & Development Control: Planning for Air Quality (Jan 2017)” (paragraphs 6.25-6.39), which has replaced “Development Control: Planning for Air Quality (2010 Update)”.

There is a two-stage process to be followed in the assessment of air quality impacts;

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

The suggested framework for describing the impacts is set out in Table 6.3 of the EPUK & IAQM guidance document and is shown in Table 15-7 in this chapter. The term Air Quality Assessment Level (AQAL) has been adopted as it covers all pollutants, i.e. those with and without formal standards. AQAL is used to include air quality objectives or limit values where these exist. The Environment Agency uses a threshold criterion of 10% of the short term AQAL as a screening criterion for the maximum short-term impact. The EPUK & IAQM guidance adopts this as a basis for defining an impact that is sufficiently small in magnitude to be regarded as having an insignificant effect.

Table 15-7: Impact Descriptors for Individual Receptors

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Moderate
103-109% f AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Explanation

1. *AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.*
2. *The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5% will be described as Negligible.*
3. *The Table is only designed to be used with annual mean concentrations.*
4. *Descriptors for individual receptors only; the overall significance is determined using professional judgement. For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.*
5. *When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.*
6. *The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.*
7. *It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.*

The rationale for the assessment of significance is derived from the EPUK & IAQM Guidance (paragraphs 7.1-7.12 referring to Table 6.3) and relates to Table 15-7. Impacts on air quality, whether adverse or beneficial, will have an effect on human health that can be judged as 'significant' or 'not significant'. An 'impact' is the change in the concentration of an air pollutant, as experienced by a receptor. This may have an 'effect' on the health of a human receptor, depending on the severity of the impact and other factors that may need to be taken into account. The impact descriptors set out in Table 15-7 are not, of themselves, a clear and unambiguous guide to reaching a conclusion on significance. These impact descriptors are intended for application at a series of individual receptors. Whilst it may be that there are 'slight', 'moderate' or 'substantial' impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances.

Any judgement on the overall significance of effect of a development will need to take into account factors such as:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts, and
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts.

Other factors may be relevant in individual cases. In this case, the development is not within an AQMA. The impacts descriptor table acknowledges this and points to a conclusion of significant effect in cases where concentrations of a regulated pollutant are in excess of the objective value. Where the baseline concentrations are close to the objective value at a receptor, but not exceeding it, a case may be made for the development's predicted contribution being significant. It will always be difficult, however, to attribute the exceedance of an objective to any individual source.

15.7.5 Significance of Effects

The assessment of significance is based on the matrix illustrated in Table 15-8.

Table 15-8: Assessment of Significance Matrix (Simple)

Sensitivity	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
Low	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Medium	Negligible or minor	Minor	Moderate	Moderate or major
High	Minor	Minor or moderate	Moderate or major	Major

- ***Substantial***: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- ***Major***: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- ***Moderate***: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- ***Minor***: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
- ***Negligible***: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

15.8 Baseline Environment

Potential effects to air quality may arise during the construction phase, such as from the generation of construction dusts and construction traffic. The construction activities have been examined to identify those that have the potential for air emissions. Each of these potential sources has been identified and emissions have been evaluated using standard procedures. The measures to reduce, avoid and prevent these likely significant effects are proposed, where they are necessary. Thereafter, the likely significant residual effects of the project on air quality are predicted. To establish baseline conditions, the following key sources of information were referred to as part of the assessment on air quality:

- Air Quality in Wales 2023/2024 Report;
- Pembrokeshire County Council 2023 Annual Progress Report; and,
- Department for Environment, Food & Rural Affairs (DEFRA) Mapped Concentration Estimates.

15.8.1 Primary Atmospheric Pollutants

Atmospheric pollution within the surrounding area of the Proposed Development is largely dominated by emissions associated with operational activities at the Stena Line Fishguard, agricultural emissions from the nearby farms, road traffic exhaust fumes and residential emissions. The current Stena Line operation includes a twice daily ferry service to Rosslare, covering public ferry passengers and accompanied and unaccompanied freight. The berth is also infrequently used by cruise vessels and historic steamboats.

Therefore, the primary contaminants of concern identified were Nitrogen Oxides (NO_X) and Particulate Matter (PM_{10} and $PM_{2.5}$). NO_X is primarily produced during combustion at high temperatures with contributions from traffic, residential heating, and industry. PM_{10} are particles in air with diameters of 10µm (microns) or less.

These particles can consist of direct emission from combustion engines and burning solid fuels, while natural sources can be windblown salt, plant spores, and pollens. $PM_{2.5}$ or fine particulate matter is composed of varying components depending on its source but can include nitrates, sulphates, volatile organic compounds (VOCs), metals and soil or dust particles.

15.8.2 International Convention for the Prevention of Pollution from Ships (MARPOL)

From 1st January 2020, a new global emissions limit on all maritime vessels came into force, capping the amount of sulphur (SOx) emissions that ships can emit. Sulphur emissions are associated with a number of environmental risks, including increased acidification of oceans, acid rain as well as respiratory and other impacts on human health. Efforts to reduce the amount of sulphur emitted from ships is expected to reduce these potential impacts.

In 2008, members of the global body responsible for shipping safety, security, and the prevention of shipping pollution – the UN agency known as the International Maritime Organisation (IMO) – agreed to reduce SOx emissions from ship exhausts. The requirements regarding air pollution from ships are stipulated under Annex VI of the MARPOL Convention. It was agreed that the sulphur cap was to come into force in either 2020 or 2025, depending on when it was feasible to do so.

In 2016, the IMO confirmed that the global limit would be reduced to 0.50% by mass (m/m) of sulphur in marine fuels, which came into effect on January 1st 2020. However, since 2015 the EU (including the UK) and others have gone even further to set more stringent Emissions Control Areas on shipping emissions in territorial waters, with a 0.10% m/m sulphur limit.

Due to this being a globally enforced change as one that affects a very large industry that is key for a large volume of global trade movements, it is possible that the effects could be felt outside of just the shipping industry. For fuel suppliers such as United Kingdom Petroleum Industry Association (UKPIA's) members, there are choices to be made by their customers about what fuels they may want to use. Low sulphur fuels come in different forms, but ships who can remove sulphur themselves could use high sulphur (<3.5% m/m) fuels and still comply, and a change in production of one fuel could affect the rest of the product mix too.

15.8.3 Air Quality in Wales 2023/2024 Report

The Welsh Government and the Welsh Air Quality Forum (WAQF) maintain a close collaborative relationship with air quality experts and the Department for Environment, Food and Rural Affairs (Defra) to actively oversee and mitigate air pollution within Wales. Figure 15.2 illustrates the annual average long-term trends for nitrogen dioxide (NO_2), fine particles (PM_{10}) and ozone (O_3) concentrations across Wales. These trends are derived from measurements taken at monitoring sites affiliated with local authorities and the Automatic Urban and Rural Network (AURN), where annual data capture was 75% or greater. With the exception of O_3, concentrations of pollutants have exhibited an overall decline since the pollutant records began. It is worth noting that O_3 qualifies as a regional pollutant, with transboundary characteristics, and as such its regulation falls beyond immediate purview of the Welsh Government and local authorities.

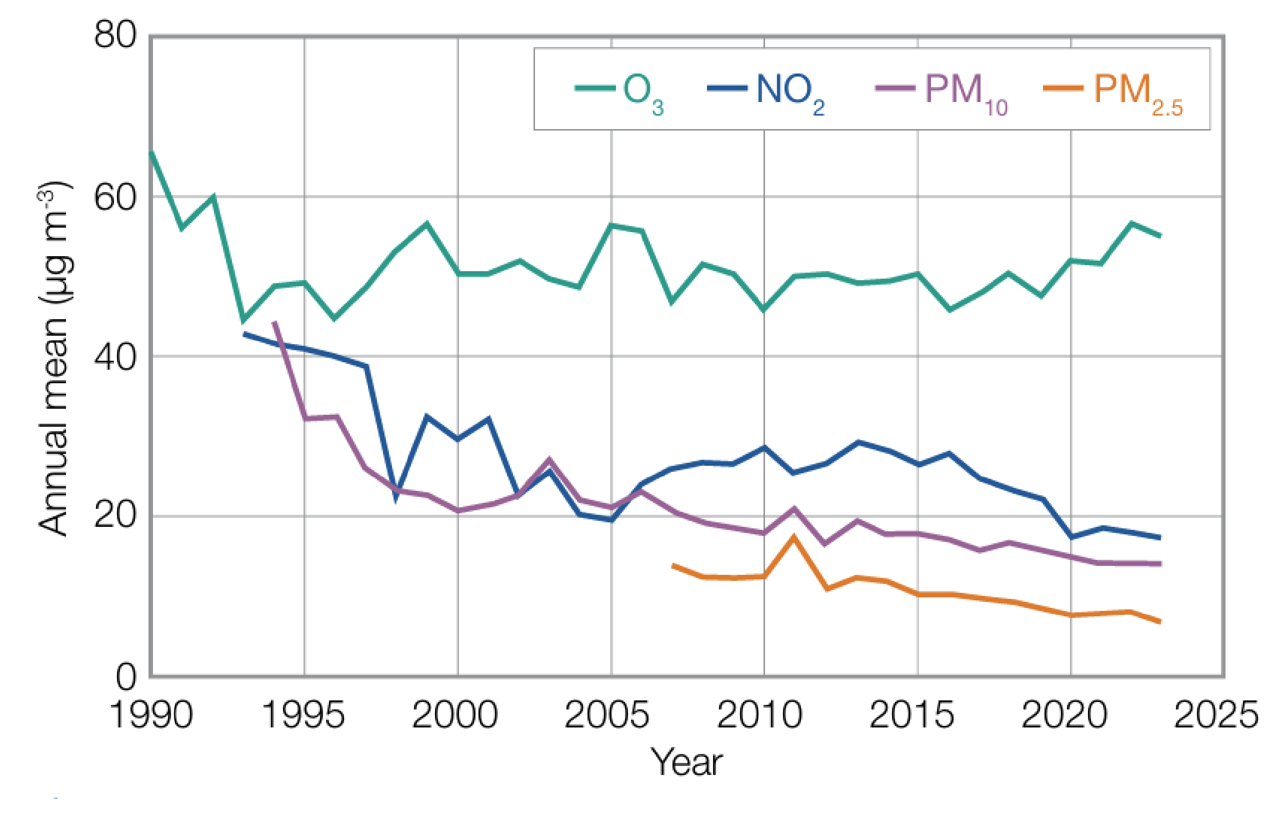

Figure 15.2: Key Ambient Air Pollutant Trends in Wales 1990-2023

In 2023, ambient concentrations of PM_{10} were 'moderate' on 59 days, 'high' on 11 days and 'very high' on 9 days (as defined by the Daily Air Quality Index bandings). For $PM_{2.5}$ there was 1 day with 'moderate' concentrations, and no days were recorded as 'high' or 'very high'. There were no recorded days with 'moderate', 'high' or 'very high' NO_2 concentrations. SO_2 also had no 'moderate', 'high' or 'very high' levels recorded. For O_3 , there were 47 days with 'moderate' levels, 1 day recorded as 'high' and no days recorded as 'very high'. Overall, pollution levels in Wales were low for 257 days, moderate for 90 days, high for 9 days and very high for 9 days. Therefore, 70% of the time, pollution levels were low across the whole of Wales. . Details of the Daily Air Quality Index banding system used can be found Table 15-9.

Exceedance statistics, generated from the Welsh Air Quality database, indicate that in 2023 no monitoring sites in Wales exceeded any Air Quality Strategy (AQS) Objective for NO_2 , $PM_{2.5}$, CO, SO_2 , benzene or lead. For PM_{10} , one site (Port Talbot Prince Street 2) recorded daily mean PM_{10} concentrations above 50 µg/m³ on 45 days, thereby exceeding the daily mean objective of 35 days. These exceedances were spread evenly throughout the year.

Table 15-9: Air Pollution Bands and Indices µ/m³

Pollutants	Band	Low			Moderate			High			Very High
	Index	1	2	3	4	5	6	7	8	9	10
Ozone - running 8 hourly mean	µg/m³	0-33	34-66	67-100	101-120	121-140	141-160	161-187	188-213	214-240	241 or more
Nitrogen Dioxide - hourly mean	µg/m³	0-67	68-134	135-200	201-267	268-334	335-400	401-467	468-534	535-600	601 or more

Pollutants	Band	Low			Moderate			High			Very High
	Index	1	2	3	4	5	6	7	8	9	10
Sulphur Dioxide - 15-minute mean	µg/m³	0-88	89-177	178-266	267-354	355-443	444-532	533-710	711-887	888-1064	1065 or more
$PM_{2.5}$ Particles - 24 hour running mean	µg/m³	0-11	12-23	24-35	36-41	42-47	48-53	54-58	59-64	65-70	71 or more
PM_{10} Particles - 24 hour running mean	µg/m³	0-16	17-33	34-50	51-58	59-66	67-75	76-83	84-91	92-100	101 or more

A health descriptor is associated with each band based upon current understanding and research studies (Department of Health). Current descriptors are presented below in **Table 15-10**.

Table 15-10: Air Pollution Bandings and Health Descriptor Impacts on Sensitive Receptors

Air Pollution Banding	Value	Accompanying health messages for at-risk groups and the general population	
		At-risk individuals*	General Population
Low	1-3	Enjoy your usual outdoor activities.	Enjoy your usual outdoor activities.
Moderate	4-6	Adults and children with lung problems, and adults with heart problems, who experience symptoms, should consider reducing strenuous physical activity, particularly outdoors.	Enjoy your usual outdoor activities.
High	7-9	Adults and children with lung problems, and adults with heart problems, should reduce strenuous physical exertion, particularly outdoors, and particularly if they experience symptoms. People with asthma may find they need to use their reliever inhaler more often. Older people should also reduce physical exertion.	Anyone experiencing discomfort such as sore eyes, cough or sore throat should consider reducing activity, particularly outdoors.
Very High	10	Adults and children with lung problems, adults with heart problems, and older people, should avoid strenuous physical activity. People with asthma may find they need to use their reliever inhaler more often.	Reduce physical exertion, particularly outdoors, especially if you experience symptoms such as cough or sore throat.

**Adults and children with heart or lung problems are at greater risk of symptoms. Follow your doctor´s usual advice about exercising and managing your condition. It is possible that very sensitive individuals may experience health effects even on Low air pollution days.*

15.8.4 Air Quality in Pembrokeshire County Council [2]

Narberth Monitoring Station is the only automatic monitoring location within Pembrokeshire County Council and resides approximately 32km south east of the Proposed Development (as illustrated in Figure 15.3). The monitoring station is within a self-contained, air conditioned housing located at the edge of a field adjacent to a hedgerow. A quiet rural road runs to the south of the site at a distance of approximately 90 metres.

The manifold inlet is approximately 3 metres high at a distance of approximately 5 metres from the nearest obstruction. The surrounding area is open and comprises fields with a small amount of light industry at distances of up to 0.5 - 1.8 km distance.

Figure 15.3: Automatic Monitoring Location

This monitoring location is Air Pollution Banding “Low” and the ambient concentrations of pollutants recorded between the 6th December 2024 – 4th February 2025 are illustrated below in Figure 15.4, with the latest values are based on provisional data from 10:00am 4th February 2025 detailed in

Table 15-11.

[2] https://www.airquality.gov.wales/

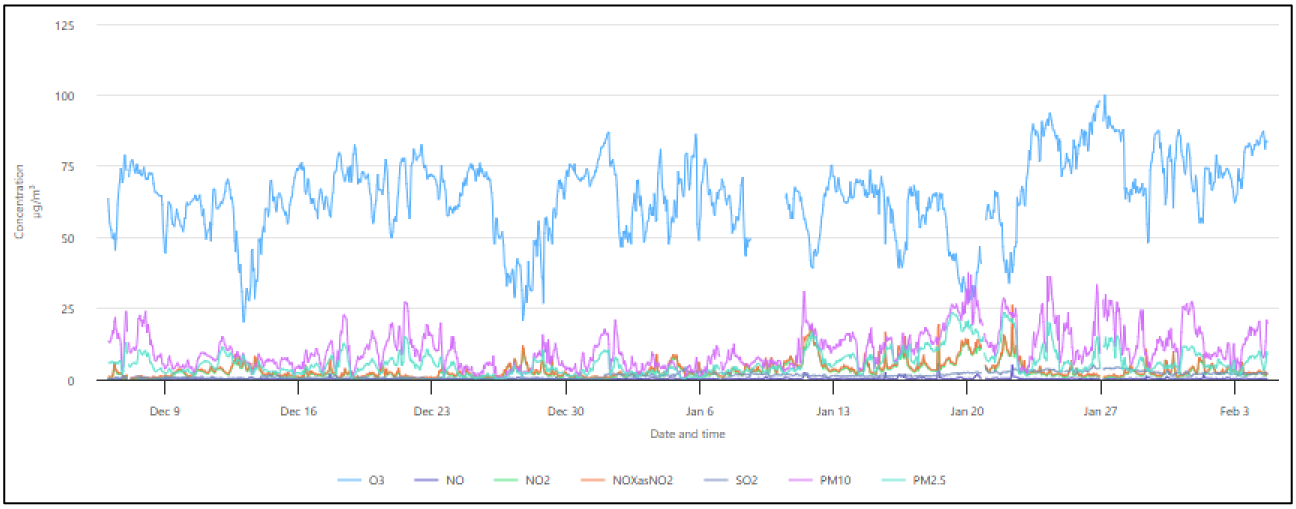

Figure 15.4: Narberth Monitoring Location Ambient Concentrations of Pollutants Recorded over the Previous 60 Days[3]

Table 15-11: Narberth Monitoring Location Latest Data Updated 04/02/2025 10:00 GMT

Parameter	Index	Band	Concentration	Period
O_3	3	**LOW**	84 µg/m³	8 Hour mean
$PM_{2.5}$	1	**LOW**	7 µg/m³ (Ref.eq)	24 Hour mean
PM_{10}	1	**LOW**	16 µg/m³ (FIDAS)	24 Hour mean
NO_2	1	**LOW**	2 µg/m³	hourly mean
SO_2	1	**LOW**	2 µg/m³	15 Minute mean
NO	No Data		0 µg/m³	hourly mean
NO_XasNO_2	No Data		3 µg/m³	hourly mean

15.8.5 Pembrokeshire County Council 2023 Air Quality Progress Report

15.8.5.1 Description of Local Authority Area

Pembrokeshire is a predominantly rural County, with a strong maritime influence and has a history of development based on agriculture, tourism, defence, energy and port activities centred on the Milford Haven Waterway. The area is characterised by a series of distinct, yet interdependent settlements. The unique environment and strong sense of community is attractive to both residents and visitors and provides a distinctive sense of place. The Pembrokeshire ports and the Haven Waterway are international assets, critical to the future energy security of the UK.

[3] https://www.airquality.gov.wales/air-pollution/site/PEMB

15.8.5.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in the Air Quality Strategy for England, Scotland, Wales and 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not air quality objectives are likely to be achieved. Where exceedances are considered likely, the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of objectives.

15.8.5.3 Air Quality Objectives

The air quality objectives applicable to LAQM in Wales are contained within the Air Quality (Wales) Regulations 2000, as amended by the Air Quality (Wales) (Amendment) Regulations 2002, and are shown in Table 15-12 below. This table shows the objectives in units of microgrammes per cubic metre µg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) together with the number of exceedances in each year that are permitted.

Table 15-12: Air Quality Objectives included in Regulations for the purpose of LAQM in Wales

Pollutant	Air Quality Objective	
	Concentration	Measured as
Benzene	16.25 µg/m^3	Running annual mean
	5 µg/m^3	Annual mean
1,3-butadiene	2.25 µg/m^3	Running annual mean
Carbon monoxide	10 mg/m^3	Maximum daily running 8-hour mean
Lead	0.25 µg/m^3	Annual mean
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate matter (PM_{10}) (gravimetric)	50 µg/m^3 , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3 (WHO guideline 20 µg/m^3)	Annual mean
Sulphur dioxide	350 µg/m^3 , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3 , not to be exceeded more than 3 times a year (WHO guideline 20 µg/m^3)	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

15.8.5.4 Air Quality Management Areas (AQMAs)

Pembrokeshire County Council currently have two declared AQMAs (Haverfordwest and Pembroke). All AQMAs have been declared due to exceedances of the NO_2 annual mean AQS objective. All AQMA boundaries are either close to, or have busy roads within them, recognising the influence vehicle emissions have upon local air quality. Both Pembroke and Haverfordwest AQMAs have been compliant for three years.

Neither of the declared AQMAs are in close proximity to the proposed development.

15.8.5.5 Automatic Monitoring Sites

Pembrokeshire County Council undertook automatic (continuous) monitoring at one site during 2022. Narberth Monitoring Station is the only automatic monitoring location within Pembrokeshire County Council and resides approximately 32km south east of the Proposed Development (as illustrated in Figure 15.3). The details of which are summarised in Table 15-13.

Table 15-13: Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	Associated with (Named) AQMA?	X OS Grid Y OS Grid	Pollutants Monitored	Monitoring Technique	Inlet Height (m)
PEMB	Narberth	Rural	N/A	214374 212774	NO_2, O_3, PM_{10}, $PM_{2.5}$, SO_2	API Analysers, Fidas, Echotech Serinus	2.5

15.8.5.6 Non-Automatic Monitoring Sites

Pembrokeshire County Council undertook non-automatic (passive) monitoring of NO_2 at 45 sites during 202, however none are in close proximity to the proposed development. The location of the nearest non-automatic monitoring sites to the Site are shown in Figure 15.5 and summarised in Table 15-14 below.

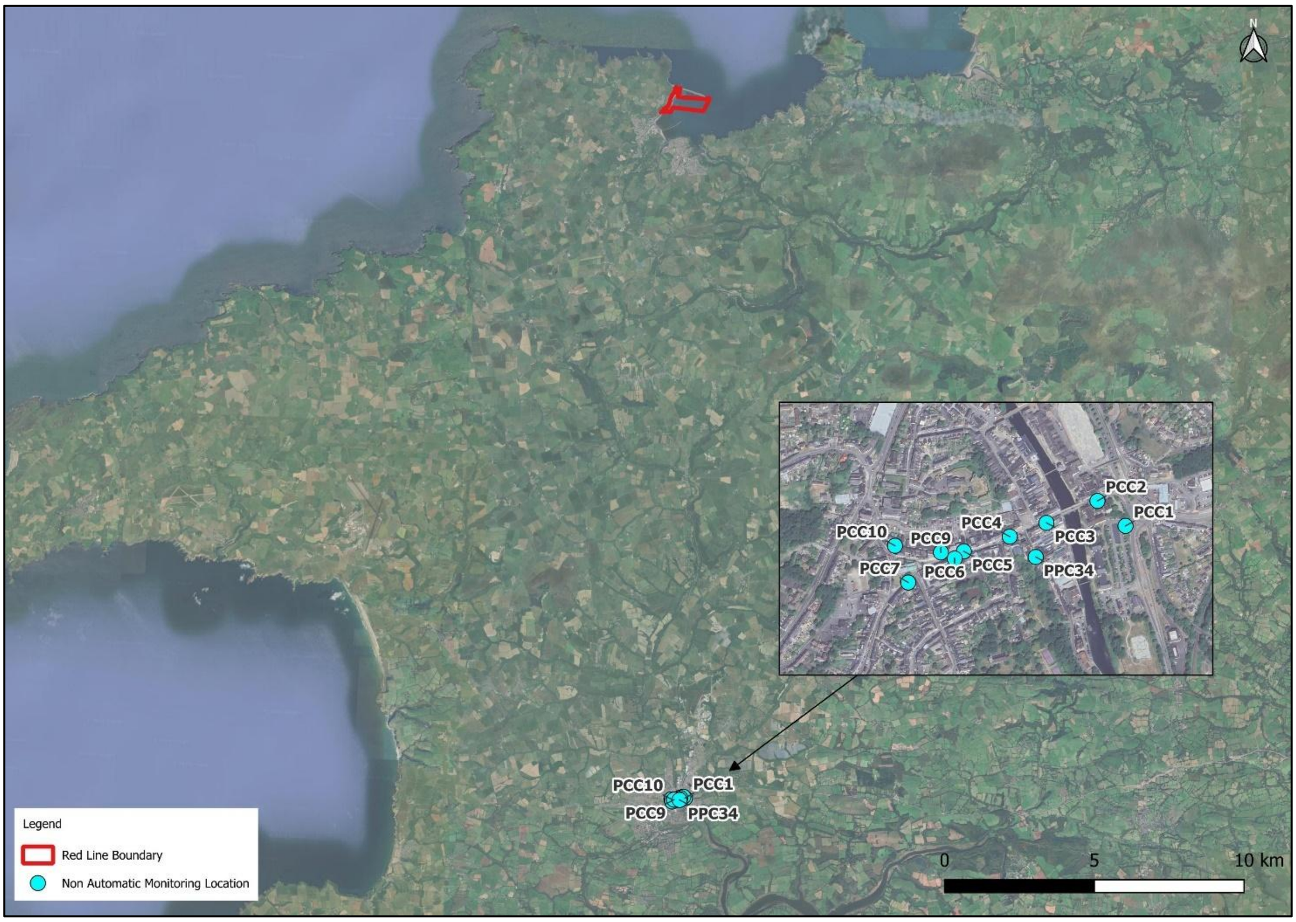

Figure 15.5: Non – Automatic Monitoring Sites Nearest to the Proposed Development

Table 15-14: Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	Associated with Named AQMA?	X OS Grid	Y OS Grid	Site Height (m)	Collocated with a Continuous Analyser?	Distance from monitor to nearest relevant exposure (m)	Distance from Kerb to Nearest Relevant Exposure (m)	Distance from Kerb to Monitor (m)
PCC1	Salutation Square	Roadside	N	195629	215655	2.0	N	N/A	N/A	1.0
PCC2	Picton Place	Roadside	Y - Haverfordwest AQMA	195574	215704	2.0	N	1.0	2.0	1.0
PCC3	Victoria Place	Roadside	Y - Haverfordwest AQMA	195474	215661	2.0	N	1.0	1.0	1.0
PCC4	High St	Roadside	Y - Haverfordwest AQMA	195402	215634	2.0	N	1.0	2.0	1.0
PCC5	High St	Roadside	Y - Haverfordwest AQMA	195312	215605	2.0	N	1.0	2.0	1.0
PCC6	High St	Roadside	Y - Haverfordwest AQMA	195294	215591	2.0	N	1.0	2.0	1.0
PCC7	High St	Roadside	Y - Haverfordwest AQMA	195203	215544	2.0	N	1.0	2.0	1.0
PCC9	Dark St	Roadside	N	195267	215603	2.0	N	1.0	2.0	1.0
PCC10	Dark St	Roadside	N	195177	215616	2.0	N	1.0	2.0	1.0
PPC34	Quay St	Roadside	N	195453	215594	2.0	N	1.0	2.0	1.0

15.8.5.7 Comparison of Monitoring Results with Air Quality Objectives

15.8.5.7.1 Automatic Monitoring Data

15.8.5.7.1.1 Nitrogen Dioxide

Table 15-15 and Table 15-16 summarises recent monitoring data from the council's nitrogen dioxide automatic analysers for 2022 and preceding years from 2018. In all cases, exceedances of the Air Quality Strategy Objectives are highlighted in bold. The automatic monitoring station located in Narberth continues to report compliance with the annual mean NO_2 AQS objective, with stable concentrations fluctuating between 3 to 4 µg/m^3. This is expected due to the rural nature of the monitoring site.

Table 15-15: Results of Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [1]	Valid Data Capture 2022% [2]	Annual Mean Concentration (µg/m^3)				
					2018	2019	2020[c]	2021	2022
PEMB	Rural	N	97.2	97.2	4	4	3.1	3.1	2.9

*In **bold**, exceedance of the NO_2 annual mean AQS objective of 40µg/m^3*

*NO2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold** and <u>underlined</u>.*

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table 15-16: Results of Automatic Monitoring for NO_2: Comparison with the 1-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [1]	Valid Data Capture 2022% [2]	Number of Hourly Means > 200µg/m^3				
					2018	2019	2020[c]	2021	2022
PEMB	Rural	N	97.2	97.2	0	0	0	0	0

*In **bold**, exceedance of the NO_2 hourly mean AQS objective (200 µg/m^3 – not to be exceeded more than 18 times per year)*

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

15.8.5.7.1.1 Particulate Matter (PM_{10})

Table 15-17 and Table 15-18 summarises recent monitoring data from the council's PM_{10} automatic analysers for 2022 and preceding years from 2018. In all cases, exceedances of the Air Quality Strategy Objectives are highlighted in bold. During 2022 the Narberth automatic monitoring site recorded PM_{10} concentrations well below the 40 µg/m^3 PM_{10} AQS objective. There is a minor reduction of 1.2 µg/m^3 from 2021, overall, the annual mean concentration remains relatively stable and consistent over the last five years. There was only 2 exceedances of the 24-hour mean concentrations in excess of 50 µg/m^3 in 2022, therefore compliance to the 24-hour AQS objective.

Table 15-17: Results of Automatic Monitoring for PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [1]	Valid Data Capture 2022% [2]	Annual Mean Concentration (µg/m³)				
					2018	2019	2020[c]	2021	2022
PEMB	Rural	N	99.6	99.6	12	11	10.5	10.1	11.3

*In **bold**, exceedance of the PM_{10} annual mean AQS objective of 40µg/m³*

All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table 15-18: Results of Automatic Monitoring for PM_{10} Comparison with the 24-Hour Means Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [1]	Valid Data Capture 2022% [2]	Number of Hourly Means > 50µg/m³				
					2018	2019	2020[c]	2021	2022
PEMB	Rural	N	99.6	99.6	0	0	1	0	2

*In **bold**, exceedance of the PM_{10} 24-hour mean objective (50µg/m³ not to be exceeded more than 35 times/year)*

If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

15.8.5.7.1.1 Particulate Matter (PM_{10})

Table 15-19 summarises recent monitoring data from the council's $PM_{2.5}$ automatic analysers for 2022 and preceding years from 2018. During 2022 the Narberth automatic monitoring site recorded $PM_{2.5}$ concentrations well below the $PM_{2.5}$ AQS target of 20 µg/m³. There is a minor increase of 0.4 µg/m³ from 2021, but overall, the annual mean concentrations remains relatively stable and consistent over the last five years. There is no LAQM air quality objective for $PM_{2.5}$, however concentrations continue to remain low and consistent.

Table 15-19: Results of Automatic Monitoring for $PM_{2.5}$: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [1]	Valid Data Capture 2022% [2]	Annual Mean Concentration (µg/m³)				
					2018	2019	2020[c]	2021	2022
PEMB	Rural	N	99.6	99.6	6	7	5.9	6	6.4

.All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

15.8.5.7.1.2 Other Pollutants Monitored

The number of 8-hour mean O_3 concentrations greater than 100 µg/m^3 reported at the Narberth automatic monitoring location in 2022 was 27. There is no LAQM air quality objective for O_3, however this does exceed the UK National air quality objective of 100 µg/m^3 not to be exceeded more than 10 times a year.

For SO_2, the number of 15-minute mean concentrations greater than 266 µg/m^3 , 1-hour mean concentrations greater than 350 µg/m^3 , and 24-hour mean concentrations greater than 125 µg/m^3 reported at the Narberth automatic monitoring location in 2022 were all zero. There are three LAQM air quality objectives for SO_2, and Pembrokeshire is compliant for all 3 air quality objectives.

15.8.5.7.2 Diffusion Tube Data

In order to obtain a better understanding of how levels of nitrogen dioxide are varying across the area over time and to investigate those locations where previous rounds of the review and assessment process have highlighted areas of concern, Pembrokeshire County Council undertook non-automatic (passive) monitoring of NO_2 at 45 sites during 2022. Historical data from the nearest tubes to the Proposed Development where it is available is summarised in Table 15-20. Table 15-21 provides a full summary of monthly concentrations for 2022.

Table 15-20: Results of NO_2 Diffusion Tubes (2018 to 2022)

Site ID	Site Location	Site Type	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]				
				2018	2019	2020	2021	2022
PCC1	Salutation Square	Roadside	N	20.7	20.2	13.7	17.3	16.2
PCC2	Picton Place	Roadside	Y - Haverfordwest AQMA	26.4	25.6	16.2	19.3	20.6
PCC3	Victoria Place	Roadside	Y - Haverfordwest AQMA	27.1	26.1	15.8	18.9	16.4
PCC4	High St	Roadside	Y - Haverfordwest AQMA	30.6	32.1	24.8	26.9	22.9
PCC5	High St	Roadside	Y - Haverfordwest AQMA	36.9	38.8	28.9	29.1	26.8
PCC6	High St	Roadside	Y - Haverfordwest AQMA	33.6	33.2	24.2	27.9	25.9
PCC7	High St	Roadside	Y - Haverfordwest AQMA	35.6	35.4	25.2	29.6	27.5
PCC9	Dark St	Roadside	N	23.1	21.8	16.3	18.5	18.9
PCC10	Dark St	Roadside	N	15.1	15.7	13.4	12.1	13.4
PPC34	Quay St	Roadside	N	21.2	21.1	13.1	16.1	16.4

In bold, exceedance of the NO_2 annual mean AQS objective of 40µg/m^3

Underlined, annual mean > 60µg/m^3, indicating a potential exceedance of the NO_2 hourly mean AQS objective

Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG22 if valid data capture for the full calendar year is less than 75%.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

Table 15-21: Full Monthly Diffusion Tube Results for 2022 (µg/m³)

Site ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Dara	Bias Adjusted (0.83) and Annualised
PCC1	28.7	13.3	24.4	19.1	14.4	7.5	16.4	23.3	21.9	19.2	20.5	26.3	19.6	16.2
PCC2	28.6	19.1	30.0	24.5	18.5	11.6	22.3	27.5	23.9	28.8	30.2	33.4	24.9	20.6
PCC3	27.9	21.8	22.2	-	16.7	9.7	17.1	-	-	-	-	33.8	21.3	16.4
PCC4	-	-	29.5	-	-	13.1	25.5	34.1	-	25.7	30.8	35.1	27.7	22.9
PCC5	42.0	30.1	34.7	35.8	29.9	11.2	30.9	42.2	30.8	25.9	35.4	38.3	32.3	26.8
PCC6	37.1	29.9	36.4	32.2	24.0	10.4	-	34.2	26.3	35.4	36.6	41.3	31.2	25.9
PCC7	37.4	27.3	40.4	34.8	26.7	11.9	32.8	41.3	32.3	35.9	35.3	41.6	33.1	27.5
PCC9	29.7	-	26.8	24.3	17.0	9.1	17.5	27.3	19.5	21.8	24.2	33.2	22.8	18.9
PCC10	22.6	8.1	22.1	16.9	12.0	6.3	13.1	16.7	12.9	17.5	20.2	25.2	16.1	13.4
PPC34	30.0	20.4	19.9	18.1	14.6	7.6	16.0	20.4	-	-	22.3	28.6	19.8	16.4

Exceedances of the NO_2 annual mean objective of 40µg/m³ are shown in bold.

NO_2 annual means exceeding 60µg/m³ , indicating a potential exceedance of the NO_2 1-hour mean objective are shown in bold and underlined.

15.8.6 DEFRA Mapped Concentration Estimates

DEFRA issued revised 2021 based background maps for Oxides of Nitrogen - NO_X, Nitrogen Dioxide - NO_2, Particulate Matter - PM_{10} and Particulate Matter - $PM_{2.5}$ which incorporate updates to the input data used for modelling. The main purpose of the background maps is to provide estimates of background concentrations for specific pollutants. These can then be used in air quality assessments to better understand the contribution of local sources to total pollutant concentrations. They provide information on how pollutant concentrations change over time and across a wide area; they also provide an estimated breakdown of the relative sources of pollution.

The total concentration of a pollutant comprises those from explicit local emission sources such as, roads, chimneystacks, etc., and those that are transported into an area by the wind from further away. If all the local sources were removed, all that would remain is that which comes in from further away; it is this component that is called ‘background’.

In many situations the background contribution may represent a significant or dominant proportion of the total pollutant concentration, so it is important that authorities give this careful consideration. A good understanding of background concentrations is important when completing air quality assessments as it allows for a good understanding of local pollutant sources.

The current background concentration maps for Wales (2021 reference year) are available. A file is also available for each year between 2021 and 2040 covering all Wales that provides the maps for on the British Grid. The use of background concentrations within the air quality concentration prediction process ensures that pollutant sources other than traffic are represented appropriately. Background sources of pollutants within the vicinity of the study site include industrial, domestic and rail emissions.

The DEFRA results for the six closest locations to the Proposed Development site, shown in Figure 15.6 below are detailed in Table 15-22 -Table 15-27.

Figure 15.6: DEFRA Results for the Six Closest Locations to the Site

Table 15-22: DEFRA Location 1 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$) 2022 - 2028

DEFRA Location 1							
	X Co-ordinates: 194,500				Y Co-ordinates: 239,500		
	2022	2023	2024	2025	2026	2027	2028
NO_x	2.83	2.73	2.63	2.53	2.45	2.36	2.28
NO_2	2.31	2.23	2.15	2.07	2.01	1.94	1.87
PM_{10}	9.07	9.00	8.92	8.85	8.77	8.70	8.62
$PM_{2.5}$	4.87	4.81	4.74	4.68	4.62	4.55	4.49

Table 15-23: DEFRA Location 2 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$) 2022 – 2028

DEFRA Location 2							
	X Co-ordinates: 195,500				Y Co-ordinates: 239,500		
	2022	2023	2024	2025	2026	2027	2028
NO_x	2.99	2.87	2.76	2.64	2.56	2.47	2.38
NO_2	2.44	2.35	2.26	2.16	2.09	2.02	1.95
PM_{10}	8.36	8.28	8.21	8.14	8.06	7.99	7.91
$PM_{2.5}$	4.78	4.72	4.65	4.59	4.53	4.46	4.40

Table 15-24: DEFRA Location 3 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$) 2022 – 2028

DEFRA Location 3							
	X Co-ordinates: 196,500				Y Co-ordinates: 239,500		
	2022	2023	2024	2025	2026	2027	2028
NO_x	2.82	2.72	2.61	2.51	2.43	2.34	2.26
NO_2	2.30	2.22	2.14	2.06	1.99	1.92	1.85
PM_{10}	8.19	8.12	8.04	7.97	7.90	7.82	7.75
$PM_{2.5}$	4.74	4.68	4.61	4.55	4.49	4.42	4.36

Table 15-25: DEFRA Location 4 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$) 2022 – 2028

DEFRA Location 4							
	X Co-ordinates: 194,500				Y Co-ordinates: 238,500		
	2022	2023	2024	2025	2026	2027	2028
NO_x	3.12	3.01	2.89	2.78	2.68	2.57	2.47
NO_2	2.54	2.46	2.36	2.27	2.19	2.11	2.03
PM_{10}	8.69	8.61	8.53	8.45	8.37	8.29	8.22
$PM_{2.5}$	5.04	4.96	4.89	4.82	4.75	4.69	4.62

Table 15-26: DEFRA Location 5 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$) 2022 – 2028

DEFRA Location 5							
	X Co-ordinates: 195,500				Y Co-ordinates: 238,500		
	2022	2023	2024	2025	2026	2027	2028
NO_x	3.30	3.15	3.00	2.86	2.76	2.66	2.56
NO_2	2.69	2.57	2.45	2.33	2.26	2.18	2.10
PM_{10}	8.43	8.35	8.28	8.20	8.12	8.05	7.97
$PM_{2.5}$	4.88	4.81	4.74	4.68	4.61	4.55	4.48

Table 15-27: DEFRA Location 6 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$) 2022 - 2028

DEFRA Location 6							
	X Co-ordinates: 196,500				Y Co-ordinates: 238,500		
	2022	2023	2024	2025	2026	2027	2028
NO_x	2.93	2.82	2.71	2.60	2.51	2.42	2.33
NO_2	2.39	2.31	2.22	2.13	2.06	1.98	1.91
PM_{10}	8.33	8.25	8.18	8.11	8.03	7.96	7.88
$PM_{2.5}$	4.80	4.73	4.67	4.61	4.54	4.48	4.42

Based on the DEFRA Background Mapping data for Wales from 2022 to 2028, DEFRA Location 1 exhibits the highest predicted overall concentrations of PM_{10} while DEFRA Location 3 recorded the lowest levels. Predicted elevated levels of PM_{10} in locations near ports and ferry terminals can be attributed to several interrelated factors. High volumes of vehicular traffic, including trucks and passenger vehicles, contribute to emissions from exhaust, brake wear, and tire wear, particularly in congested areas where vehicles may idle. Additionally, industrial activities associated with loading and unloading cargo can generate dust, while marine emissions from vessels, especially those using heavy fuel oil, release significant amounts of particulate matter into the atmosphere. Environmental factors, such as geographical location and seasonal variations, can exacerbate these emissions, as wind patterns may carry dust from nearby industrial sites. Furthermore, while DEFRA locations 1 and 4 are situated in more rural settings, they can still experience elevated PM_{10} levels due to their proximity to urban areas and the influence of regional traffic and agricultural activities. Collectively, these factors create a complex interplay that leads to higher PM_{10} concentrations, necessitating targeted air quality management strategies to mitigate their impact. Over the years, all locations show a decreasing trend in pollutant levels.

15.9 Impact Assessment

15.9.1 Do Nothing Scenario

In the event of a 'do-nothing' scenario regarding the proposed replacement of the existing temporary linkspan structure at the Stena Line ferry terminal in Fishguard, the current air quality conditions would remain unchanged. The existing temporary linkspan, which is nearing the end of its useful life, would continue to operate, potentially leading to increased emissions from idling vehicles and inefficient ferry operations during peak times. Without the proposed floating linkspan pontoon, the ferry terminal would face ongoing operational limitations, resulting in prolonged shutdowns and delays that could exacerbate congestion and air pollution in the surrounding area. Furthermore, the absence of necessary civil engineering works, such as dredging and land reclamation, would hinder the terminal's ability to accommodate modern vessels, ultimately affecting the efficiency of transport services and contributing to a stagnant air quality situation. Overall, the do-nothing approach would perpetuate existing air quality issues without providing any improvements or mitigation measures that the new infrastructure could offer.

15.9.2 Sensitive Receptors

15.9.2.1 People and Property

The air quality residential and non-residential sensitive receptors are illustrated in Figure 15.7, with a summary of their receptor ID and distance from site boundary demonstrated in Table 15-28 and Table 15-29. The nearest residential sensitive receptor is Residential Receptor ID 1 at approximately 16m. The nearest non-residential sensitive receptor have been chosen for completeness however are workspaces associated with the ferry terminal. Which may not be in operation during construction.

Figure 15.7: Residential and Non Residential Sensitive Receptors

Table 15-28: Residential Sensitive Receptors within 100m of Proposed Development

Receptor ID	Eastings	Northings	Distance to Boundary (m)
1	194871	238678	16
2	194781	238531	115
3	194744	238551	124
4	194737	238541	136
5	194709	238665	137
6	194740	238734	144
7	194740	238740	148
8	194700	238683	151
9	194742	238751	154
10	194688	238609	154
11	194742	238757	158
12	194683	238642	159

Receptor ID	Eastings	Northings	Distance to Boundary (m)
13	194723	238522	159
14	194875	238855	161
15	194840	238838	163
16	194871	238856	163
17	194743	238767	164
18	194718	238518	166
19	194835	238839	166
20	194866	238857	167
21	194744	238773	167
22	194860	238856	169
23	194716	238745	170
24	194829	238840	170
25	194717	238752	173
26	194890	238878	174
27	194851	238861	177
28	194887	238881	178
29	194706	238508	181
30	194752	238801	183
31	194883	238886	184
32	194880	238888	188
33	194701	238504	188
34	194793	238838	188
35	194796	238840	188
36	194800	238844	189
37	194802	238847	190
38	194806	238850	190
39	194809	238855	193
40	194876	238892	193
41	194819	238866	198
42	194873	238896	198
43	194822	238869	199
44	194825	238873	201
45	194841	238883	202
46	194829	238877	202
47	194689	238494	203
48	194832	238881	205
49	194835	238884	206
50	194719	238807	209
51	194719	238807	209
52	194684	238490	210
53	194841	238893	210
54	194843	238897	213
55	194845	238902	216
56	194752	238845	219
57	194848	238907	219
58	194729	238832	221
59	194756	238850	221

Receptor ID	Eastings	Northings	Distance to Boundary (m)
60	194761	238854	222
61	194849	238910	222
62	194765	238859	223
63	194768	238863	224
64	194772	238867	224
65	194778	238872	225
66	194672	238480	225
67	194781	238875	225
68	194784	238878	225
69	194850	238916	227
70	194790	238884	227
71	194679	238791	228
72	194794	238888	229
73	194798	238892	230
74	194913	239062	232
75	194667	238475	232
76	194801	238896	232
77	194914	239068	234
78	194909	239052	234
79	194914	239073	234
80	194805	238901	234
81	194916	239079	235
82	194918	239086	235
83	194859	238931	235
84	194906	239047	236
85	194904	239036	236
86	194919	239090	236
87	194809	238905	237
88	194903	239042	238
89	194861	238935	238
90	194900	239029	238
91	194814	238913	241
92	194897	239025	241
93	194862	238940	242
94	194894	239016	243
95	194814	238917	244
96	194892	239011	245
97	194838	238931	245
98	194864	238945	245
99	194868	238955	247
100	194890	239006	247
101	194870	238960	247
102	194885	238990	247
103	194816	238921	247
104	194872	238965	248
105	194888	239000	248
106	194874	238971	249

Receptor ID	Eastings	Northings	Distance to Boundary (m)
107	194879	238981	249
108	194876	238976	249
109	194818	238926	250
110	194820	238930	253
111	194822	238934	255
112	194681	238427	258
113	194828	238944	262
114	194889	239088	263
115	194884	239075	264
116	194882	239069	264
117	194890	239094	264
118	194829	238948	265
119	194880	239064	265
120	194878	239058	266
121	194890	239100	266
122	194876	239054	267
123	194874	239049	267
124	194673	238421	268
125	194891	239105	268
126	194831	238954	268
127	194869	239037	270
128	194891	239112	270
129	194834	238958	271
130	194867	239032	272
131	194866	239027	273
132	194668	238417	273
133	194891	239119	274
134	194863	239022	275
135	194835	238963	275
136	194862	239017	276
137	194837	238967	278
138	194663	238413	280
139	194843	238979	280
140	194845	238983	281
141	194854	239005	281
142	194852	239000	281
143	194846	238988	281
144	194890	239144	285
145	194755	238934	289
146	194652	238409	290
147	194611	238444	295
148	194645	238403	299
149	194645	238403	299
150	194770	238957	301
151	194607	238438	302
152	194628	238388	322
153	194730	238965	328

Receptor ID	Eastings	Northings	Distance to Boundary (m)
154	194758	238987	333
155	194618	238381	333

Table 15-29: Non-Residential Sensitive Receptors within 100m of Proposed Development

Receptor ID	Eastings	Northings	Distance to Boundary (m)
1	194887	238571	21
2	195228	239055	0

15.9.2.2 Ecological

The air quality ecological sensitive receptors are illustrated in Figure 15.8, with a summary of their receptor ID and distance from site boundary demonstrated in Table 15-30. The Proposed Development resides within West Wales Marine / Gorllewin Cymru Forol SAC.

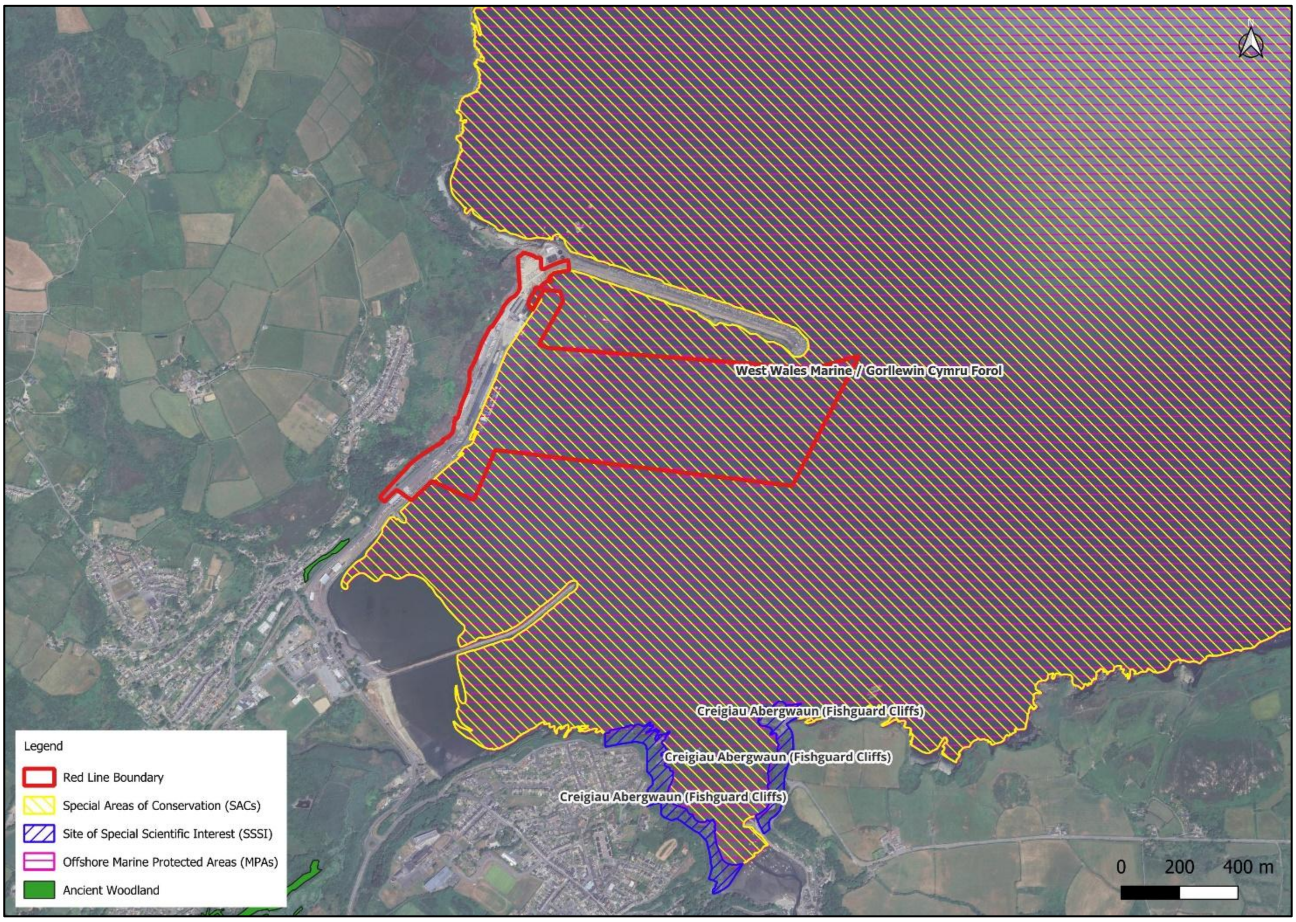

Figure 15.8: Ecological Sensitive Receptors

Table 15-30: Ecological Sensitive Receptor Distances

Receptor ID	Distance to Boundary (km)
West Wales Marine / Gorllewin Cymru Forol SAC	0
Creigiau Abergwaun (Fishguard Cliffs) SSSI	0.7

15.9.3 Assessment of Construction Effects

The terms effect and impact are defined here, where the definitions are drawn from the glossary of terminology within the IAQM Guidance on the assessment of dust from demolition and construction:

- **Impact**: The changes in airborne concentrations and/or dust deposition;
- **Effect**: The consequences of the changes in airborne concentrations and/or dust deposition for a receptor. These might manifest as annoyance due to soiling, increased morbidity or mortality due to exposure to PM_{10} or $PM_{2.5}$ or plant dieback due to reduced photosynthesis. The term 'significant effect' has a specific meaning in EIA regulations. The opposite is an insignificant effect. In the context of construction impacts any effect will usually be adverse, however, professional judgement is required to determine whether this adverse effect is significant based on the evidence presented.

In terms of this construction assessment the following IAQM guidance was used:

- Guidance on the assessment of dust from demolition and construction (August 2024); and
- A guide to the assessment of air quality impacts on designated nature conservation sites (May 2020).

These set out definitions against specific construction phase (setting our magnitude of impact, sensitivity of receptor and significance of effect). These are detailed in the following sections.

15.9.3.1 Construction Dust

The type of activities that could cause fugitive dust emissions are earthworks; handling and disposal of spoil; wind-blown particulate material from stockpiles; handling of loose construction materials; and movement of vehicles, both on and off site. The level and distribution of construction dust emissions will vary according to factors such as the type of dust, duration and location of dust-generating activity, weather conditions and the effectiveness of suppression methods.

The main effect of any dust emissions, if not mitigated, could be annoyance due to soiling of surfaces, particularly windows, cars and laundry. However, it is normally possible, by implementation of proper control, to ensure that dust deposition does not give rise to significant adverse effects, although short-term events may occur (for example, due to technical failure or exceptional weather conditions). The following assessment, using the IAQM methodology, predicts the risk of dust impacts and the level of mitigation that is required to control the residual effects to a level that is "not significant".

15.9.3.1.1 Risk of Impact and Sources

In accordance with the IAQM guidance the main sources of dust from construction sites are earthworks, construction and track-out. All earthworks and construction activities are assumed to occur within the site boundary. As such, receptors at distances within 20 m, 50 m, 100 m, 200 m and 350 m of the site boundary have been identified and are illustrated in Figure 15.9 and Figure 15.10. The sensitivity of the area has been classified and the results are provided in Table 15-31 - Table 15-32.

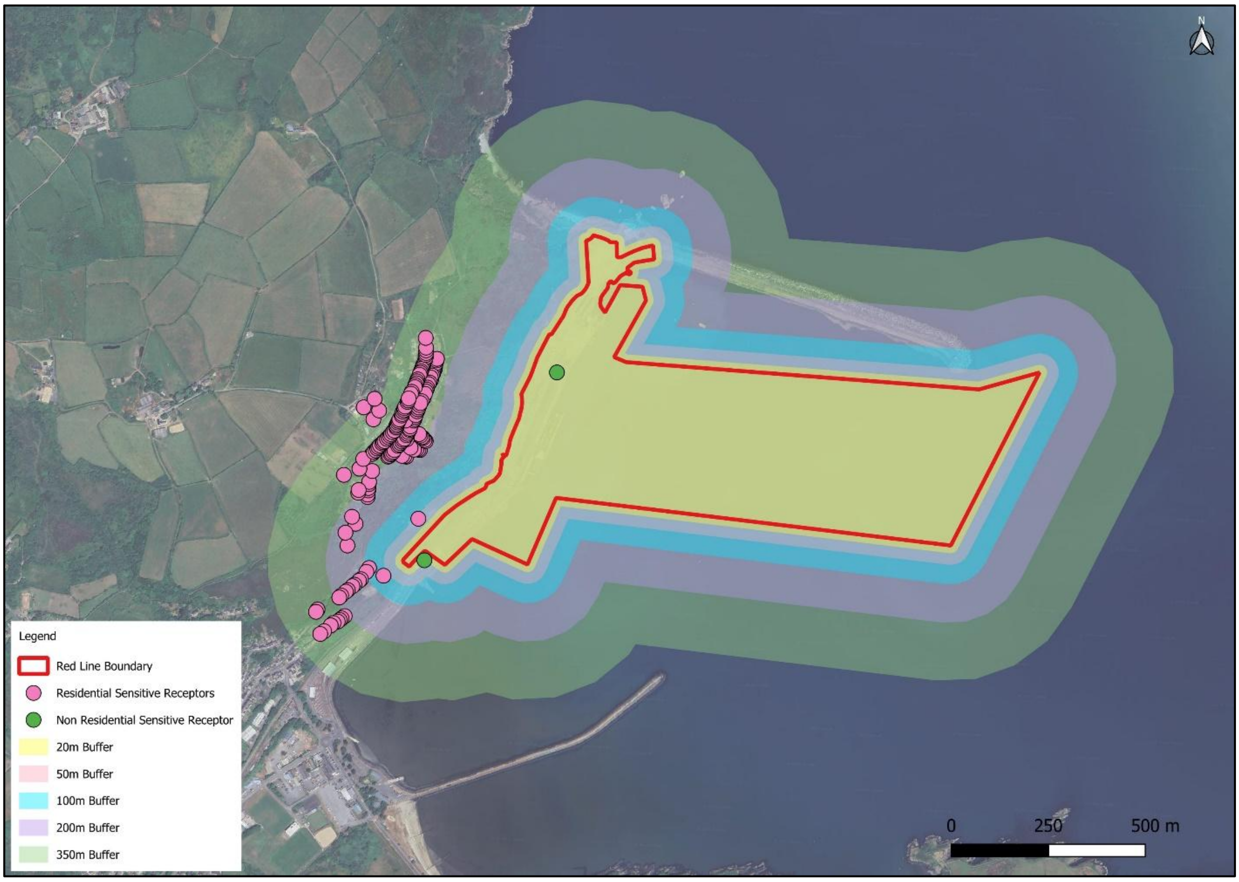

Figure 15.9: Construction Dust Assessment – Distance Bandings(m) from Site Boundary (Human)

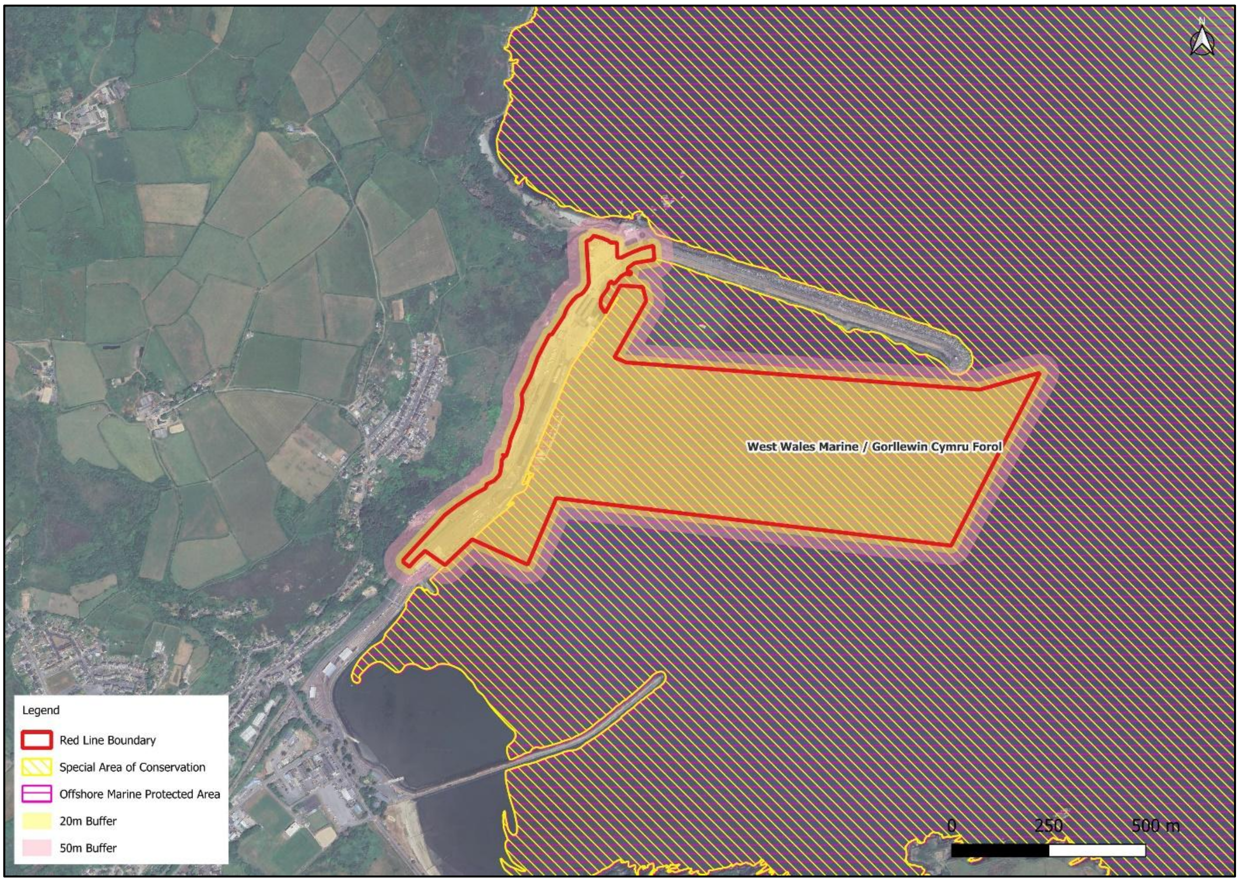

Figure 15.10: Construction Dust Assessment – Distance Bandings(m) from Site Boundary (Ecology)

Table 15-31: Sensitivity of the Surrounding Area for Demolition Earthworks and Construction

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust Soiling	**Medium**	1-10 High sensitivity receptor located within 20m of the site boundary
Human Health	**Low**	Background annual-mean PM_{10} concentration for the assessment = 8.14 µg.m^{-3} (taken from nearest DEFRA Location 2 within Table 15-23) 1-10 High sensitivity receptor located within 20m of the site boundary
Ecological	**High**	High Receptor Sensitivity is within the site boundary

The dust emission magnitude for track-out is classified as low and track-out may occur on roads up to 200m from the site. The sensitivity of the area has been classified and the results are provided in Table 15-32 below. Table 15-33 summarises the dust impact.

Table 15-32: Sensitivity of the Surroundings Area for Track-out

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust Soiling	**Medium**	1-10 High sensitivity receptor located within 20m of the site boundary
Human Health	**Low**	Background annual-mean PM_{10} concentration for the assessment = 8.14 µg.m^{-3} (taken from nearest DEFRA Location 2 within Table 15-23) 1-10 High sensitivity receptor located within 20m of the site boundary
Ecological	**High**	High Receptor Sensitivity is 2km of the site boundary

Table 15-33: Dust Impact Risk for Demolition, Earthworks, Construction and Track-out

Source	Dust Emission Magnitude	Receptor Sensitivity (Soiling, PM_{10})	Receptor Sensitivity (Ecological)	Risk of Dust Impacts (People and Property)	Risk of Dust Impacts (Ecology)
Demolition	Small	Medium	High	**Low Risk**	**Medium Risk**
Earthworks	Medium	Medium	High	**Medium Risk**	**Medium Risk**
Construction	Medium	Medium	High	**Medium Risk**	**Medium Risk**
Trackout	Small	Medium	High	**Negligible**	**Low Risk**

Taking the site as a whole, the overall risk is deemed to be **Medium Risk**. The mitigation measures appropriate to a level of risk for the site as a whole and for each of the phases are set out in Section 15.10.1. Mitigation measures are detailed in this report that will control dust during the construction phases of the Proposed Development this will reduce the risk to negligible/not significant. Provided this package of mitigation measures (set out in this report) are implemented, the residual construction dust effects will not be significant. The IAQM dust guidance states that;

"For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'." (IAQM, 2024).

The IAQM dust guidance recommends that significance is only assigned to the effect after the activities are considered with mitigation in place.

Demolition could cause fugitive dust emissions. The level and distribution of construction dust emissions will vary according to factors such as the type of dust, duration and location of dust-generating activity, weather conditions and the effectiveness of suppression methods.

The main effect of any dust emissions, if not mitigated, could be annoyance due to soiling of surfaces, particularly windows, cars and laundry. However, it is normally possible, by implementation of proper control, to ensure that dust deposition does not give rise to significant adverse effects, although short-term events may occur (for example, due to technical failure or exceptional weather conditions). The following assessment, using the IAQM methodology, predicts the risk of dust impacts and the level of mitigation that is required to control the residual effects to a level that is "not significant".

The IAQM dust guidance recommends that significance is only assigned to the effect after the activities are considered with mitigation in place. Areas of demolition are illustrated below in Figure 15.11.

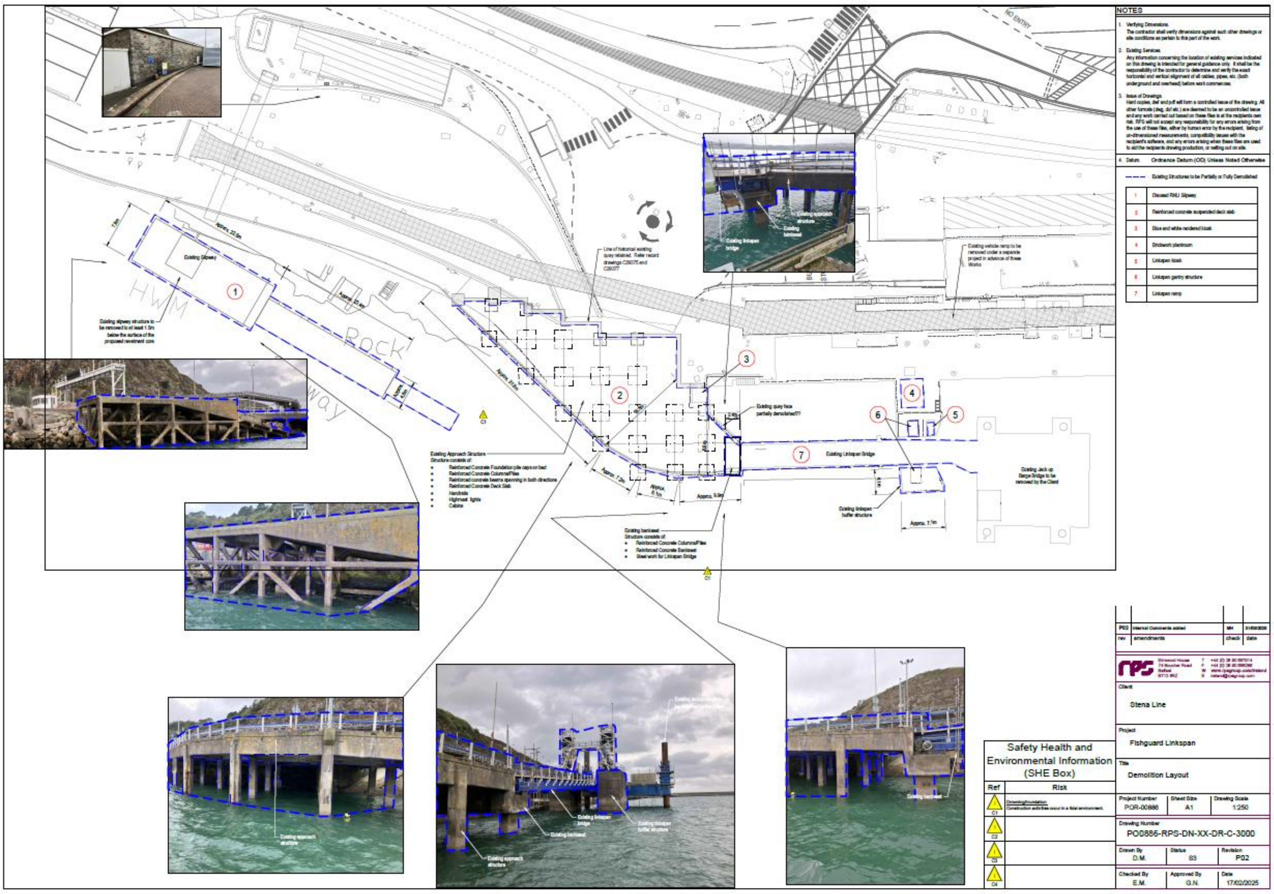

Figure 15.11: Site Clearance

15.9.3.2 Dredged Material

No dredging activities have been conducted in the harbour for the past ten years. The proposed project involves capital dredging, with the Client seeking a license for subsequent maintenance dredging over the next five years. The designated dredging areas will be dredged to depths ranging from -7.3mCD to -6.8mCD in the berth and channel, and -5.5mCD in the northern section of the harbour.

The total volume of capital dredging is estimated at 78,000m³, with operations anticipated to occur 24/7 over a 12-week period, potentially phased. Dredging methods will include the use of a backhoe excavator mounted on a pontoon for specific areas and a Trailer Suction Hopper Dredger (TSHD) for others. The dredged material, primarily consisting of silty sands and gravels, is considered unsuitable for reclamation fill due to potential settlement issues and the time required for drying. Subject to favourable geotechnical testing results, all dredged material will be disposed of at a licensed sea disposal site near Milford Haven (LU169) under the authorization of Natural Resources Wales (NRW).

It is important to note at the outset that one of the principal factors affecting dust generation and dust deposition relates to moisture content. Moisture increases the mass of a dust particle meaning particles are less friable and hence, less prone to dust dispersion. In most construction projects, the principal means of dust suppression is through maintaining a high moisture level on dust particles. In the case of the proposed works at Fishguard, all dredged material will inherently have high moisture content and hence a lower risk of dust impact.

The dredging operations are considered very low risk for dust impacts given that this material will have very high moisture content (circa 50% by weight). This is also the case for the transport of this material. As such, these operations are considered to have negligible dust impacts and are not considered further in this assessment.

15.9.4 Assessment of Operational Effects

15.9.4.1 Operational Phase Shipping Emissions

In addition to road transport, marine transport is also a potential source of GHG from the proposed development. Given the existing legal requirements around fuel and emissions for shipping, the extent of emissions per vessel are gradually reducing and will continue to reduce in future years. Given the existing legal requirements around fuel and emissions for shipping, the extent of emissions per vessel are gradually reducing and will continue to reduce in future years. Therefore, operational impacts are not likely to be significant.

In Wales, shipping emissions from ferries are governed by several key pieces of legislation, including the Clean Air Act, which provides a framework for air quality management; the Marine and Coastal Access Act 2009, which addresses environmental protection in marine resources; and the Environment (Wales) Act 2016, which promotes sustainable management of natural resources. Additionally, the Pollution Prevention and Control (PPC) Regulations require ports to obtain permits that manage emissions, while the EU's Marine Strategy Framework Directive influences policies on marine environmental protection. Internationally, the International Maritime Organization (IMO) regulations, particularly the MARPOL convention, set global standards for shipping emissions, which are implemented through UK national legislation, including in Wales. Together, these laws create a comprehensive regulatory framework for managing ferry emissions and protecting air quality.

The Local Air Quality Management Technical Guidance (TG22) highlights the significant impact of shipping and port operations on local air quality due to emissions from vessels, cargo handling equipment, and associated land transport activities. It identifies ships as major sources of pollutants such as nitrogen oxides (NOx), sulphur dioxide (SO_2), particulate matter (PM), and volatile organic compounds (VOCs). The guidance emphasizes the necessity for thorough assessments of air quality impacts, including operational emissions from vessels at berth and land-based activities. It recommends implementing mitigation measures, such as using cleaner fuels and shore power, optimizing logistics to reduce idling, and ongoing monitoring of air quality to ensure compliance with standards. Additionally, TG22 encourages collaboration among stakeholders, including port authorities and local communities, to develop effective air quality management strategies, ultimately aiming to protect public health and the environment.

15.9.4.2 Operational Phase Traffic Emissions

Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel size are not expected to increase above existing levels. The related number of generated vehicle movements are also not expected to increase above existing levels.

Therefore, there will be no traffic impact associated with the replacement Linkspan scheme once construction is completed and no requirement for an assessment of operational effects.

15.10 Mitigation

15.10.1 Construction Phase Mitigation Measures

The 2024 IAQM dust guidance list mitigation measures for low, medium and high dust risks.

As summarised in Table 15-33 above, the predicted Dust Impact Risk is classified as **Medium Risk** for Demolition, **Medium Risk** for Earthworks, **Medium Risk** for Construction and **Low Risk** for Trackout. Table 15-34 and Table 15-35 detailing specific mitigation for Demolition, Earthworks, Construction and Trackout.

Key to tables:

- **H** Highly recommended
- **D** Desirable
- **N** Not required

Table 15-34: Mitigation for all Sites: Communications

Mitigation measure	Low Risk	Medium Risk	High Risk
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.		H	
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.		H	
Site Management			
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.		H	
Make the complaints log available to the local authority when asked.		H	
Monitoring – No Dust Monitoring Proposed			
Preparing and Maintaining the Site			
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.		H	
Erect solid screens or barriers along boundaries nearest sensitive receptors, or the site boundary that are at least as high as any stockpiles on site.		H	
Avoid site runoff of water or mud.		H	
Keep site fencing, barriers and scaffolding clean using wet methods.		H	
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.		H	

Mitigation measure	Low Risk	Medium Risk	High Risk
Cover, seed or fence stockpiles to prevent wind whipping.		H	
Operating Vehicle/Machinery and Sustainable Travel			
Ensure all vehicles switch off engines when stationary - no idling vehicles.		H	
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.		H	
Operations			
Only use cutting, grinding, or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.		H	
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate.		H	
Use enclosed chutes and conveyors and covered skips.		H	
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.		H	
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.		H	
Waste Management			
Avoid bonfires and burning of waste materials.		H	

Table 15-35: Measures Specific to Demolition, Earthworks, Construction and Trackout

Mitigation Measure	Low Risk	Medium Risk	High Risk
Demolition			
Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.		H	
Avoid explosive blasting, using appropriate manual or mechanical alternatives.		H	
Bag and remove any biological debris or damp down such material before demolition.		H	
Earthworks			

Mitigation Measure	Low Risk	Medium Risk	High Risk
Minimise drop heights from loading or handling equipment/materials and use fine water sprays on such equipment wherever appropriate.		D	
Dampening methods will be used where necessary.		D	
Methods and equipment will be in place for immediate clean-up of spillages of dusty or potentially dusty materials.		D	
Construction			
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.		H	
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.		D	
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.		D	
Trackout			
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D		

The IAQM dust guidance states that with the recommended dust mitigation measures in place residual effect will normally be *"not significant",* and recommends the mitigation is secured by for example planning conditions, a legal obligation, or by legislation.

15.10.1.1 Complaints Procedure

All complaints received in relation to air quality and dust are during construction phases of the Proposed Development will be referred to the appointed contractor. Contact details of the appointed contractor foreman will be visible and accessible to nearest surrounding receptors. All complaints regarding dust emissions will be recorded and reported to the Site Manager, who will investigate the circumstances and ensure that the necessary corrective measures are taken.

15.10.2 Operational Phase Mitigation Measures

There are no operational mitigation measures predicted as there are no significant adverse impacts associated with the operational phase of the scheme and emissions to air.

15.10.3 Future Monitoring

No future monitoring is required during either the construction or the operational phase of the Proposed Development.

15.11 Assessment of Residual Effects

Construction stage impacts will be short duration, and upon completion, will have no further impact on the local environment. Mitigation measures have been outlined to control dust during the construction stage, to minimise the potential for impact. Following implementation of these measures, a short term, and localised minor impact is likely. Having considered the characteristics of the proposed development, the predicted impact from the operational phase on air quality are expected to be minimal. The new floating linkspan pontoon will enhance operational efficiency, reducing vehicle idling times and emissions during ferry operations. Additionally, the upgraded infrastructure will facilitate smoother traffic flow and improved access for both vehicles and pedestrians, further contributing to better air quality in the surrounding area.

15.12 Cumulative Effects

Should the construction phase of the proposed development coincide with the construction of any other proposed or permitted developments within 350m of the site then there is the potential for cumulative dust impacts to the nearby sensitive receptors. The mitigation measures outlined in Section 15.10 of this EIA should be applied throughout the construction phase of the proposed development, with similar mitigation measures applied for other proposed or permitted developments which will avoid significant cumulative impacts on air quality.

With appropriate mitigation measures in place, the predicted cumulative impacts on air quality associated with the construction phase of the proposed development are deemed short-term and not significant. If additional residential or commercial developments are proposed in the future in the vicinity of the proposed development, this has the potential to add further additional vehicles to the local road network. However, due to the location of the proposed development and as the traffic impact for the proposed development has an imperceptible impact on air quality, it is unlikely that other future developments of similar scale would give rise to a significant impact during the construction and operational stages of those projects.

15.12.1 In-combination effects

Future projects of a large scale would need to conduct an EIA to ensure that no significant impacts on air quality will occur as a result of those developments.

15.12.2 Effects interactions

All environmental factors are inter-related to some extent. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions may be influenced by the Proposed Development. An assessment of the interaction between environmental factors are required under Article 3(1)(e) of the EIA Directive –1. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

a. Population and human health;

b. Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

c. Land, soil, water, air and climate;

d. Material assets, cultural heritage and the landscape;

e. The interaction between the factors referred to in points (a) to (d).

The interactions between impacts on different environmental factors will be considered, addressed and outlined as relevant throughout the ES. Air quality is most likely to have an inter relationship with traffic, geology and soils (including contaminated land) and human health.

15.13 Limitations of the Assessment

All air quality assessment tools, whether models or monitoring measurements, have a degree of uncertainty associated with the results. The choices that the practitioner makes in setting-up the model, choosing the input data, and selecting the baseline monitoring data will decide whether the final predicted impact should be considered a central estimate, or an estimate tending towards the upper bounds of the uncertainty range (i.e. tending towards worst-case).

The atmospheric dispersion model itself contributes some of this uncertainty, due to it being a simplified version of the real situation: it uses a sophisticated set of mathematical equations to approximate the complex physical and chemical atmospheric processes taking place as a pollutant is released and as it travels to a receptor. The predictive ability of even the best model is limited by how well the turbulent nature of the atmosphere can be represented.

Each of the data inputs for the model, listed earlier, will also have some uncertainty associated with them. Where it has been necessary to make assumptions, these have mainly been made towards the upper end of the range informed by an analysis of relevant, available data to achieve an assessment that has a conservative bias overall. Where no significant effects are predicted, based on conservative assumptions, there is no need to revisit these assumptions, although the opportunity exists to do so.

15.14 Summary of Effects and Conclusion

In relation to air quality, for the construction phase, an important consideration is dust. In the absence of mitigation there is the potential for significant, negative, short-term impacts to nearby sensitive receptors as a result of dust emissions from the Proposed Development. The mitigation measures provided within this assessment will ensure that the risk of adverse dust effects is reduced to a level categorised as "**negligible**". Another important issue during the construction phase is construction traffic but due to the nature and scale of the project the construction traffic volumes will not be significant and the resultant air quality impact from construction traffic is "negligible", as detailed in Table 15-36.

Pollutant concentrations are predicted to be within the relevant health-based air quality objectives. Therefore, air quality is acceptable at the receptors surrounding the development site, making it suitable for its proposed uses. The operational impact of the Proposed Development on existing receptors is predicted to be 'negligible' taking into account the changes in pollutant concentrations and absolute levels. Using the significance criteria adopted for this assessment together with professional judgement, the operational air quality effects are considered to be 'not significant' overall."

Table 15-36: Construction and Operational Phases Effects and Conclusion

Description of impact	Phase C	Phase O	Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Dust Soiling	✓	×	The project includes measures to manage dust soiling during construction, such as using water sprays and dust suppressants during demolition and dredging and implementing traffic management to reduce congestion to ensure minimal impact on air quality and the surrounding community.	C: Medium O: N/A	C: High O: N/A	C: Moderate but with mitigation "**negligible**" O: N/A	None	None	None
Human Health	✓	×	The project incorporates measures to protect human health during construction by implementing dust control strategies, such as water sprays and dust suppressants, managing traffic to minimize congestion and emissions to ensure that any potential impacts on local residents are kept to a minimum.	C: Low O: N/A	C: High O: N/A	C: Minor but with mitigation "**negligible**" O: N/A	None	None	None
Ecological	✓	×	Refer to Chapter 7 Biodiversity Marine and 8 Biodiversity Terrestrial & Birds	C: High O: N/A	C: High O: N/A	C: Moderate but with mitigation "**negligible**" O: N/A	None	None	None

15.15 References

- Air Quality (Wales) Regulations 2000, as amended by the Air Quality (Wales) (Amendment) Regulations 2002;
- Air Quality in Wales 2023/2024 Report;
- Clean Air for Europe (CAFE) Directive (2008/50/EC) (European Parliament, 2008);
- Design Manual for Roads and Bridges. (National Highways, 2019);
- Environment (Air Quality and Soundscapes) (Wales) Act 2024;
- Local Air Quality Management (LAQM) Technical Guidance 2022;
- Pembrokeshire County Council 2023 Air Quality Progress Report;
- Well-being of Future Generations (Wales) Act 2015; and
- World Health Organisation Air Quality Guidelines 2005 (WHO, 2005).

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 16 Cultural Heritage

794-NI-POR-00886R
May 2025

16 CULTURAL HERITAGE

This chapter assesses the likely significant effects of the Proposed Development relating to historic assets, including archaeology and built heritage. It considers all phases of the Proposed Development's lifespan and impacts relating to both physical fabric and changes in setting.

16.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as "the Proposed Development") on cultural heritage assets. This chapter considers the potential impacts to cultural heritage from the Project during the construction and operational phases of the Proposed Development.

The main objectives of this assessment are to:

- Set out the baseline conditions with regards to known cultural heritage assets within the study area to assess baseline conditions;
- Assess the potential impact of the proposed construction and operation phases of the Proposed Development on cultural heritage assets;
- Identify mitigation measures which could reduce proposed construction and operational impacts where possible, and identify residual impacts; and
- Consider and assess potential cumulative impacts against an agreed set of schemes.

The assessment presented is informed by the following key chapters of the ES:

- Chapter 2: Project Description
- Chapter 20: Landscape and Visual Impact Assessment.

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

This chapter should be read in conjunction with the following appendices and figures, which have been used to inform the assessment:

- Appendix 16.1 Cultural Heritage Desk-Based Assessment;
- Figure 16.1 Heritage Assets Plot;

This chapter has been prepared by RPS Consulting, one of the UK's largest heritage consultancies. The RPS heritage team have extensive experience of undertaking impact assessments in the context of EIA for a wide range of developments including residential, logistics, infrastructure and renewables throughout the UK. RPS is a Registered Organisation of the Chartered Institute for Archaeologists (CIfA).

16.2 Purpose of this chapter

The primary purpose of the ES chapter is to provide an assessment of the likely direct and indirect significant effects of the Project on cultural heritage assets. In particular, this ES chapter:

- Presents the existing environmental baseline established from desk-based studies, relevant datasets and consultation (section 16.8);
- Presents an assessment of the potential likely significant effects on cultural heritage assets arising from the Proposed Development (section 16.9) based on the information gathered and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in section 16.12.
- Highlights any necessary mitigation measures (see section 16.10) to prevent, minimise, reduce or offset the likely significant environmental effects identified in the assessment (section 16.9).

16.3 Study Area

The baseline studies comprise a review of known historic assets within a 1km radius of the Site for non-designated heritage assets; a 2km radius for designated heritage assets; and a 5km radius for marine heritage assets. These study areas were agreed with the relevant heritage consultees from Heneb, Cadw, and the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW), with the study areas considered proportionate to identify historic assets in the surrounding area that might be adversely affected by the Development, taking into account their existing setting, its contribution to their cultural significance and intervisibility with the Proposed Development. It should be noted that the study area has been applied with a degree of professional judgement and not as an absolute cut off.

16.4 Policy Context

16.4.1 Planning policy context

- The Historic Environment (Wales) Act 2023
- Well-being of Future Generation (Wales) Act 2015
- Future Wales – the National Plan 2040 (February 2021)
- Planning Policy Wales (PPW)

16.4.2 Local planning policy

- Local Development Plan (LDP) for Pembrokeshire

16.5 Consultation

Table summarises the issues raised relevant to the historic environment, which have been identified during consultation activities undertaken to date, together with how these issues have been considered in the preparation of this ES chapter. Chapter 5: Scoping and Consultation provides details on the types of consultation activities undertaken for the Project and the consultees that were contacted.

Table 16-1: Summary of key consultation issues raised during consultation activities undertaken for the Project relevant to cultural heritage.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
12/11/2024	Neil Maylan, Cadw. By email	Scope of Study Area with regards to designated heritage assets,	Agreed that a 2km Study Area was appropriate for designated heritage assets. This was incorporated within the Cultural Heritage desk based assessment (Appendix 16.1 and in Section 16.6 below)
12/11/2024	Mike Ings, Heneb. By email	Scope of Study Area with regards to undesignated heritage assets.	Agreed that a 1km Study Area was appropriate for undesignated heritage assets. This was incorporated within the Cultural Heritage desk based assessment (Appendix 16.1 and in Section 16.6 below). The Cultural Heritage Desk Based Assessment was undertaken in line with a Written Scheme of Investigation submitted to, and

			approved by, both Heneb and the RCAHMW.
18/11/2024	Dr Julian Whitewright RCAHMW. By email.	Scope of study area and any particular assets of concern with regards to maritime heritage assets	Email of Scoping response of 19/11/2024 identifying a number of assets to consider in the assessment, and 08/01/2025 email informing Scoping response requesting a 5km Study Area for marine heritage assets. The assets and Study Area were incorporated within the Cultural Heritage desk based assessment (Appendix 16.1) and the latter incorporated within Section 16.6 below. The Cultural Heritage Desk Based Assessment was undertaken in line with a Written Scheme of Investigation submitted to, and approved by, both Heneb and the RCAHMW.

16.6 Methodology to inform the baseline

16.6.1 Desktop study

This chapter should be read in conjunction with the Cultural Heritage Desk Based Assessment (Appendix 16.1), which has been used to inform the assessment.

The baseline studies comprise a review of known historic assets within agreed study areas- 1km for undesignated terrestrial heritage assets, 2km for designated heritage assets and 5km for undesignated marine assets. The latter is proportionately larger to reflect the lack of accurate data when dealing with the location of shipwrecks. These study areas are considered appropriate to identify historic assets in the surrounding area that might be adversely affected by the development, taking into account their existing setting, its contribution to their cultural significance and intervisibility with the Site. It should be noted that the study area has been applied with a degree of professional judgement and not as an absolute cut off.

The following data sources were used in informing the assessment:

- Cadw data sets on designated historic assets;
- Heneb Historic Environment Record (HER);
- the National Monuments Record for Wales (NMRW), held by the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW);
- Coflein – The online catalogue of archaeology, buildings, industrial and maritime heritage in Wales
- Satellite imagery;
- Historic mapping;
- A model Zone of Theoretical Visibility (ZTV); and
- British Geological Survey.

16.7 Assessment Methodology

The methodology and associated impact assessment had regard to the general guidance regarding the undertaking of an EIA, as presented in Chapter 4: Environmental Impact Assessment Process and Methodology and the following historic environment specific guidance as follows:

- Cadw (2011) Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment in Wales;
- Cadw (2017a) Heritage Impact Assessment in Wales;
- Cadw (2017b) Setting of Historic Assets in Wales
- Welsh Government (2016) TAN12 Design; and
- Welsh Government (2017) TAN24 The Historic Environment.

16.7.1 Impact assessment criteria

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 4: Environmental Impact Assessment Process and Methodology.

16.7.1.1 Receptor Sensitivity/Value

The sensitivity of heritage receptors reflects their relative importance, which will depend on factors such as condition, rarity, potential as a data source, associations with events or people, architectural or historic interest. Importance, and hence sensitivity, has been defined here with reference to designation, where applicable, and professional judgement. Table 16-2 sets out the guideline criteria for assessing sensitivity.

Table 16-2: Example Definitions of Sensitivity or Value

Sensitivity	Typical Descriptors
Very High	Historic assets of international importance. World Heritage Sites and the individual attributes that convey their Outstanding Universal Value. Areas associated with intangible heritage and areas with associations with particular innovations, scientific developments, movements or individuals of global importance. Assets that can contribute significantly to acknowledged international research objectives.
High	Scheduled Monuments, Listed Buildings (Grade I, II*), Registered Historic Parks and Gardens (Grade I, II*), Registered Historic Landscapes, Registered Battlefields, Protected Wrecks, Protected Military Remains. Other listed buildings that can be shown to have exceptional qualities in their fabric or historical association not adequately reflected in the listing grade. Unscheduled sites and monuments of schedulable quality and/or importance including those discovered through the course of evaluation or mitigation. Archaeological assets that can contribute significantly to acknowledged national research objectives. Conservation Areas containing very important buildings. Undesignated structures of clear national importance. Deposits with a demonstrable high potential to contain artefactual and/or palaeoenvironmental material, possibly as part of a prehistoric site or landscape. Intertidal or maritime wreck sites and remains demonstrably of national importance
Medium	Conservation Areas, Grade II Listed Buildings and Registered Historic Parks and Gardens. Undesignated archaeological assets that can contribute to regional research objectives.

	Historic townscapes and landscapes with reasonable coherence, time depth and other critical factor(s). Unlisted assets that can be shown to have exceptional qualities or historic association. Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional value. Averagely well-preserved historic landscapes with reasonable coherence, time-depth or other critical factors. Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment. Intertidal or maritime wreck sites and remains demonstrably of regional importance
Low	Historic assets with importance to local interest groups or that contribute to local research objectives. Locally Listed Buildings and Sites of Importance within a district level. Robust undesignated assets compromised by poor preservation and/or poor contextual associations. Robust undesignated historic landscapes. Historic landscapes with importance to local interest groups. Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations. Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment. Intertidal or maritime wreck sites and remains demonstrably of local importance

16.7.1.2 Magnitude of Impact

The magnitude of impact is assessed with reference to the degree of change in the receptor's cultural significance. Guideline criteria for assessing magnitude of predicted change on historic assets are given in Table 16-3 below.

Table 16-3: Example Definitions of Magnitude

Impact	Typical Descriptors
High	Change to most or all key elements of the historic asset, or changes within the setting of the asset, such that the cultural significance of the asset is lost or substantially harmed.
	Change to most or all key elements of the historic asset, or changes within the setting of the asset, such that the cultural significance of the asset is substantially enhanced.
Medium	Change to elements of the historic asset, or changes within the setting of the asset, such that the cultural significance of the asset is clearly harmed.
	Change to elements of the historic asset, or changes within the setting of the asset, such that the cultural significance of the asset is clearly enhanced.
Low	Change to elements of the historic asset, or changes within the setting of the asset, such that the cultural significance of the asset is slightly harmed.
	Change to elements of the historic asset, or changes within the setting of the asset, such that the cultural significance of the asset is slightly enhanced.
Negligible	Change to elements of the historic asset, or changes within the setting of the asset, such that the significance of the asset is barely affected.
	Change to elements of the historic asset, or changes within the setting of the asset, such that the significance of the asset is barely affected.
No change	Change to elements of the historic asset or its setting that leave its cultural significance unchanged.

The sensitivity of the heritage receptor, together with the magnitude of impact, defines the significance of the effect (Table 16-4). The impacts could potentially be adverse, neutral or beneficial. The matrix (Table 16-4) is not intended to mechanise judgement of the significance of effect, but to act as a check to ensure that judgements regarding sensitivity, magnitude of impact and significance of effect are reasonable and balanced and hence aid professional judgement. In some cases, the matrix allows a choice of significance of effect when a magnitude of impact and a value are combined. In these cases, the individual attributes of a specific asset, along with any relevant Site-specific factors and consideration of other influencing elements, have been taken into account when considering which is the most appropriate significance of effect to apply.

16.7.1.3 Significance of Effects

Table 16-4: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

16.8 Baseline Environment

The following section provides a summary of the baseline conditions and identifies the historic assets that may be affected by the Proposed Development and hence have been carried through to assessment. The information presented here is summarised from the Cultural Heritage Desk-Based Assessment (Appendix 16.1).

Designated Historic assets within the site and the 2km Study area

The Fishguard Bay Hotel Registered Historic Park & Garden and Goodwick Conservation Area partially extend into the southern part of the Proposed Development. Both of these were scoped in for assessment.

There are no other designated historic assets (Registered Landscape of Outstanding Historic Interest, Scheduled Monuments, or Listed Buildings) located within the Site.

There are no World Heritage Sites, protected wrecks or Historic Battlefields within the 2km study area.

The designated historic assets within a 2km radius of the Site (see Appendix 15.1) comprise the following:

- One Registered Landscape of Outstanding Historic Interest of national significance
- Six Scheduled Monuments of national significance
- Two Registered Historic Park & Gardens of national significance
- 168 Listed Buildings of national significance
- Three Conservation areas of regional significance

In keeping with the approach espoused in Cadw guidance (2017b), the above have been reviewed in order to identify those that might be affected by the Proposed Development. This has been informed by a Zone of Theoretical Visibility (ZTV) that took into account the screening effect of buildings and woodland supported by site visits where necessary. A detailed description of the methods used in the production of the ZTV is presented in Chapter 20: Seascape, Landscape and Visual. This review concluded that the proposed development would result in change in the setting of seven designated heritage assets (Figure 16.1) comprising:

- Castle Point Old Fort Scheduled Monument (Cadw PE096)
- Fishguard Fort Grade II Listed Building (Cadw 12331)
- Fishguard Bay Hotel Grade II Listed Building (Cadw 12345)
- Fishguard Bay Hotel Registered Park and Garden (Cadw PGW(Dy)63(PEM))
- Bridge Cottages Grade II Listed Building (Cadw 12339)
- Goodwick Conservation Area
- Lower Town Conservation Area

Non-Designated Historic assets

Known Historic assets within the Site and Archaeological Potential

There is no evidence for Prehistoric, Roman, Early Medieval, Medieval activity recorded on the HER within the Site. The terrestrial element of the Site comprises Modern made ground, reclaimed in the early 20th century from the former coastline to form the quayside of Fishguard Harbour. On this basis, the potential for any hitherto unknown archaeological remains from these periods is considered to be negligible.

The HER data records several Post-Medieval and Modern features within the Site. The earliest features comprise the original lifeboat station (HER 30840 & 32129) located within the northern part of the Site. Following construction of Fishguard Harbour in 1902 additional features are recorded as an artificial quay (HER 32133); rail lines (HER 27970); a landing stage, rail sheds and railway station (HER 27973); engine sheds and marshalling yard (HER 32138); customs house (HER 27972); slipway (HER 32132); possible warehouses in addition to other smaller ancillary buildings (HER 30849 & 32135); and breakwater (HER 30842).

World War 1 saw additional war time related activities take place at Fishguard Harbour. A maritime factory was established at the northern end of the harbour facilities which converted steamships into hospital ships (HER 109300), alongside a flying boat base (HER 32131).

With the exception of the recorded rail sheds and railway station (HER 27973), and quay itself (HER 32133), a walkover of the study site has demonstrated that all remaining historic features recorded on the HER have been demolished. These features are considered to be of local significance. As the Proposed Development will not have a physical impact to the surviving non-designated heritage assets, they have been scoped out of further assessment.

Historic documents have identified that a replacement lifeboat station was constructed within the Site in 1930 (NMR 801200, Appendix 15.1; Figures 8 & 10). The lifeboat house was subsequently demolished, although the platform on which it sat, and the associated slipway is still present within the southern part of the Site (Appendix 15.1). These incomplete remains of the mid-20th century lifeboat station are considered to be of local to significance and therefore of low sensitivity.

The RCAHMW and Heneb record multiple potential shipwrecks and artificial intertidal features within the associated study areas. These are discussed in greater detail in the Cultural Heritage Desk Based Assessment (Appendix 16.A). The intertidal features comprise a number of possible fish traps along the beach at Goodwick. Such intertidal features comprise the remains of several wrecks (NMR 416723, NMR 704003), in addition to another immediately to the south east of Goodwick Quay (HER 32127). At Goodwick Beach the RCAHMW records two Post-Medieval fish traps (NMR 407699 & NMR 401338). A third features consisting of a possible fish trap or wall (NMR 409081|), is located between the aforementioned fish traps. All of these lie some way from the proposed linkspan and any associated dredging or construction work, and it is highly unlikely that there will be any changes to their depositional environment as a consequence of the proposed construction works or the operation of the linkspan.

In addition to these the RCAHMW records a number of wreck sites in the vicinity of the site, although the exact location of many of these wrecks is not known. These include the Constitution, a wooden sailing vessel reported as being driven ashore near Goodwick Quay in 1825 (HER 273344), and the Crystal, a wooden ketch built in 1863 and recorded as being lost in 1905 when driven onto the rocks close by the quay wall during a gale (HER 272671). An unnamed wreck is shown in 29ft of water marked on an historic chart within the study area (NMR 507266). The remaining shipwrecks recorded within the 5km study area are either located based on the converted documented latitude and longitude coordinates of the ships foundering, with the records scattered along the wider shoreline of Fishguard Bay (with a notable concentration within the bay at Lower Town c1km to the southeast of the study site) or recorded centrally within Fishguard Bay where the documentary sources have mentioned the bay in general. These records demonstrate that there is considered to be a moderate potential for the remains of Post-Medieval shipwrecks to be present within the Site. these could be of local or regional significance, and therefore potentially of low to medium sensitivity, although it must be noted that this potential is based on documentary sources alone, and there are no certainly located wrecks within the redline boundary for the site.

16.9 Impact Assessment

16.9.1 Do Nothing Scenario

In a Do Nothing Scenario any non-designated heritage assets located within the Site would remain in their current form, while the setting of designated heritage assets within the study area would remain unaltered. Overall, there would be no impact in relation to cultural heritage assets.

16.9.2 Assessment of Construction Effects

The Proposed Development may adversely affect heritage assets during the construction phase, when significance may be lost as a result of physical removal of a heritage asset or as a result of change in the setting of the asset.

Castle Point Old Fort is both a Scheduled Monument (Cadw PE096) and a Grade II Listed Building (12331) and is of high sensitivity. It was built to defend Fishguard in the late 18th century following an attack from an American privateer, and fired its guns once, to deter the French fleet in the failed invasion of 1797. It holds evidential value as a well preserved late 18th century coastal artillery fortification and historical value as a result of its role in deterring the French invasion force, as well as some aesthetic value as a result of its prominent headland location in the bay at the entrance to Fishguard Old Harbour. As a monument open to the public, and well served with interpretational material, it also has some communal value. Although sited on the other side of the bay to the ferry port, the entirety of the bay can be considered part of its setting. it still commands long views across the waters it was intended to protect. Its prominent physical location, the views it commands and the direct historical relationship it has with the bay all form part of its setting, and that setting contributes in a positive fashion to its significance. However, the long views across the bay already encompass the entirety of the busy ferry port and its infrastructure. Against this very busy and active backdrop the construction work will not alter the setting negatively. All construction will occur at a distance from the asset, and within the context of modern port activities, resulting in a **no change** magnitude of impact. As a result, the Proposed Development would result in a **no change** significance of effect. This is not significant in EIA terms.

The Grade II Listed Fishguard Bay Hotel (Cadw 12345) and its associated Registered Park and Garden (PGW(Dy)63(PEM) are both of medium sensitivity. The hotel incorporates an early 19th century gentleman's residence, which was first modified for use as a hotel late in the 19th century, and was then subsequently enlarged and purchased by the Great Western Railway for use as a railway hotel. It is a fine and substantial buildings designed to take advantage of views over Fishguard Bay to the east. The park and garden was designed around the house, and comprises an ornamental garden and tennis court on the lower level and a heavily wooded park with paths, small streams and large specimen trees. Cadw have identified a number of key views associated with this park and garden, predominantly to the east over Fishguard Bay, but also to the north east toward the ferry port. Although the redline boundary for the development partly overlaps the boundary of the Registered Park and Garden, there will be no related activities undertaken within the bounds of the Registered Park and Garden.

The hotel's heritage value lies largely in its evidential value – in the form and fabric of the building- in its historical value, through its history of use as a railway hotel, and in its aesthetic value, as a substantial late

Victorian and early 20th century hotel. The setting of the hotel largely comprises the park and garden, which is heavily wooded and restricts many longer views, but does allow longer views of Fishguard Bay to the east and oblique views to the north east, which do form part of the setting. This setting as a whole contributes positively to the significance of the hotel, both providing it with an enclosed secluded setting, as well as affording access to wider coastal views. The views to the north east, encompassing the ferry port do not contribute positively to the significance however, despite forming part of the overall setting. The construction works will add to the activity visible within the ferry port, and may add some additional noise, but these are unlikely to be noticeable within the context of the operation of the ferry port, resulting in a **negligible adverse** magnitude of impact of, resulting in a **negligible adverse** significance of effect. This is not significant in EIA terms.

The Registered Park and Garden has a relatively restricted setting, bound as it is by high ground to the west and north and the port and sea to the east. It lies on a heavily wooded slope, and the only wider views achievable are those to the east and north east, including towards the ferry port, and it was clearly designed both to provide an enclosed parkland setting for the hotel, and to take advantage of these longer views. Cadw has identified these as key views and overall they do contribute to the setting of the park and garden, Construction works will take place within these views, but will be hard to distinguish from the normal operations of a busy ferry port. As a result, it is considered that there will be a **negligible adverse** magnitude of impact resulting in a **negligible adverse** significance of effect. This is not significant in EIA terms.

Bridge Cottages (Cadw 12339) is a small rubble built domestic house built at the south eastern end of Goodwick beach, close to Goodwick Bridge. It is Grade II Listed and of medium sensitivity. The main façade of the house faces north west towards Goodwick, and there are only oblique views towards the proposed development as a result of nearby buildings. Its heritage value is largely evidential, arising from the form, fabric and siting of the building, and aesthetic. It has little in the way of historical or communal value. Its setting comprises the small group of buildings within which it sits, Goodwick Bridge and the longer views afforded across Goodwick Moor to Goodwick. Although oblique longer views are possible towards the ferry terminal, these do not form part of the setting and do not contribute to the significance of the building. Any construction activities will occur at a distance from the asset, and within the context of modern port activities, resulting in a **no change** magnitude of impact. As a result, the construction phase would result in a **no change** significance of effect.

The Goodwick Conservation Area partially extends into the redline boundary for the proposed development. It is of medium sensitivity. The Conservation area appraisal identified a number of key special characteristics for the conservation area, relating to the landform, diverse and unusual building form and type, architecturally distinct landmark buildings, a coherent central Victorian core, and the historic relationship with the sea, initially through fishing and latterly through the ferry port. This relationship with the ferry port and associated railway terminus is identified as a key driver to the town's development and success. It also identifies a number of key views from and towards the conservation area, but does not positively identify views towards the ferry port, which are limited from as a result of topography and heavily wooded slopes. There is clearly an historic relationship between Goodwick and the ferry port, and therefore the port does form part of its setting, and contributes positively to its setting. However, the construction phase of works will have no visual or other impact on the conservation area, and continued upgrading of port facilities will not impact the historical association between the two. As a result, it is considered that there will be a **no change** magnitude of impact resulting in a **no change** significance of effect. This is not significant in EIA terms.

The Lower Town Conservation Area covers the historic old harbour and lower town of Fishguard. It is of medium sensitivity. The Conservation area appraisal identified a number of key special characteristics for the conservation area, relating to the unique landform, diverse and unusual 18th and 19th century buildings, architecturally distinct landmark buildings, Victorian buildings and terraces, industrial buildings, Listed Buildings, narrow streets, sheltered harbour and river mouth, the marsh to the south of the bridge and the long historic relationship with the sea. It also identified a number of key views, but none in the direction of Fishguard Bay and the ferry terminal. Despite this, there is a fine view from the southern end of the Old Harbour looking north which takes in the harbour, breakwater and harbourside terraces and incorporates the ferry terminal in the background. However, the ferry port is only visible in long view, and the proposed construction works on the new linkspan will not have an impact upon the significance of the conservation area. As a result, it is considered that there will be a **no change** magnitude of impact resulting in a no change significance of effect. This is not significant in EIA terms.

The remains of the non-designated 1930s lifeboat platform and slipway (NMR 801200) is located within the site and is considered to be of low sensitivity. This asset is proposed for demolition during the construction of the Proposed Development which will result in a **high adverse** magnitude of impact. As a result, and exercising professional judgement, the construction phase would result in a **minor adverse** significance of effect to this historic feature. This is not significant in EIA terms

The assessment also has identified the potential for the remains of Post-Medieval shipwrecks of low to medium sensitivity to be present within the Site. The proposed dredging within the Site could result in an a potentially **medium to high adverse** magnitude of impact. As a result, the construction phase would result in a potentially **moderate adverse** significance of effect to such archaeological features, if present. This is not significant in EIA terms.

16.9.3 Assessment of Operational Effects

The Proposed Development may adversely or positively affect heritage assets during the operation phase, when significance may be lost or enhanced as a result of changes within the setting of the asset.

The Castle Point Old Fort Scheduled Monument (Cadw PE096) and Listed Building is of high sensitivity. The proposed linkspan is less visually obtrusive than the current infrastructure it will replace and will represent a slight improvement to the longer views from the fort in the direction of the ferry port. This will result in a **negligible beneficial** magnitude of impact and a **negligible beneficial** significance of effect for both the Scheduled Monument and Listed Building.

The Fishguard Bay Hotel (Cadw 12345) and Registered Park and Garden PGW(Dy)63(PEM), both have limited intervisibility with the proposed development and it forms part of their setting, albeit one which does not contribute positively to their significance. The proposed new linkspan will be less visually intrusive than the infrastructure it replaces, and as a result should represent a slight improvement to views of the ferry port both from the hotel and the park and garden. This will result in a **negligible beneficial** magnitude of impact for both assets during the operational phase, culminating in a **negligible beneficial** significance of effect for both the Fishguard Bay Hotel and the Registered Park and Garden.

Bridge Cottages (Cadw 12339) are of medium sensitivity, and the proposed development is not considered part of their setting and does not contribute to their significance. Therefore, although the proposed linkspan will be slightly less visually intrusive than the infrastructure replacing it, the operational phase will result in a **no change** magnitude of impact and a **no change** significance of effect.

The remains of the 1930s lifeboat station platform and slipway (NMR 801200) will have been removed during the construction phase. There will be no further impacts on this or on any maritime archaeological remains on the sea floor during its operational phase. There will therefore be no significance of effect for the operational phase of the scheme on either the former lifeboat station.

16.10 Mitigation

The assessment contained within this chapter has identified that construction impacts will result in a **minor adverse** significance of effect in relation to the remains of the 1930s lifeboat station, and a **moderate adverse** significance of effect in relation to any post-medieval maritime shipwrecks present within the Site.

In order to offset the recognised impacts to the former lifeboat station, a programme of archaeological recording will be undertaken. This will record all of the remaining structural elements of the lifeboat station and place them in an historical context. the result of this work would be a publicly accessible record of the structure, deposited with an appropriate organisation of archaeological record. This would allow the remaining archaeological potential in the structure to be realised through its recording and dissemination.

There is a theoretical potential that the site may contain archaeological remains, including possible wrecks within the seabed. In order to guard against the possibility that construction work might disturb or damage such remains, it is recommended that a Protocol for Archaeological Discoveries to be agreed with the maritime archaeological advisor at the RCAHMW prior to construction, and that all construction activities with the potential to affect buried archaeological remains on the seabed be undertaken in accordance with it. this will ensure that any archaeological remains encountered during the course of the construction works can be recorded appropriately, and the results of that recording can be disseminated publicly in order to realise their archaeological potential.

It is anticipated that once construction is complete, the proposed linkspan will be less visually intrusive that the infrastructure it replaces, and therefore no further mitigation is proposed for the operational phase.

16.11 Assessment of Residual Effects

Residual effects identified include a negligible beneficial significance of effect for the Castle Point Old Fort Scheduled Monument and Listed Building and the Fishguard Bay Hotel and Registered Park and Garden. No residual effects are identified for the Bridge Cottages Listed Building, the Goodwick Conservation Area or the Lower Town Conservation Area, the remains of the lifeboat station within the site or any potential marine remains within the site following the construction phase and implementation of the proposed mitigation.

16.12 Cumulative Effects

A list of other similar major projects has been agreed for assessment for cumulative effects (Appendix 4.A). None of these projects are sufficiently close to the heritage assets identified within this chapter to have any impact upon them. As a result, no intra site effects have been identified and there will be no cumulative effects.

16.13 Limitations of the Assessment

This assessment relies partially on the accuracy of third-party datasets and sources, although such limitations are unlikely to affect the conclusions reached.

16.14 Summary of Effects and Conclusion

This chapter has considered the likely significant effects of the Proposed Development upon cultural heritage receptors (both archaeological and built heritage) during its construction and operation.

In relation to the assessment of designated heritage assets, it has been determined that the construction phase will result in a **no change** significance of effect to the Castle Point Old Fort Scheduled Monument and Grade II Listed Building, to the Grade II Listed Bridge Cottages and to the Goodwick and Lower Town Conservation Areas. There will, however, be a **negligible adverse** significance of effect to the Grade II Listed Fishguard Bay Hotel and Grade II Registered Park and Garden. None of these are significant in EIA terms.

The construction phase would also have a **minor adverse** significance of effect on the remains of an undesignated former lifeboat station and slipway within the site, which is proposed for demolition, and a theoretical **moderate adverse** significance of effect on any maritime remains beneath the seabed. These will not be significant in EIA terms.

With regards to the operational phase, it is considered that there will be a **no change** significance of effect to the Grade II Listed Bridge Cottages and to the Goodwick and Lower Town Conservation Areas and a negligible beneficial significance of effect on the Castle Point Old Fort Scheduled Monument and Grade II Listed Building and the Fishguard Bay Hotel and Registered Park and Garden. None of these are significant in EIA terms.

Following the implementation of mitigation measures comprising a programme of survey and recording, and as the agreement and provision of a Protocol for Archaeological Discoveries, it is considered that the Proposed Development will have no significant effects upon archaeological receptors.

No potential cumulative effects have been identified.

Receptor	Phase C	Phase O	Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Castle Point Old Fort Scheduled Monument and Listed Building	✓	✓	None	C: No Change O: Negligible beneficial	C: High O: High	C: No Change O: Negligible Beneficial	N/A	Negligible Beneficial	None
Fishguard Bay Hotel Listed Building and Registered Park and Garden	✓	✓	None	C: Negligible adverse O: Negligible beneficial	C: Medium O: Medium	C: Negligible adverse O: Negligible Beneficial	N/A	Negligible Beneficial	None
Bridge Cottages Listed Building	✓	✓	None	C: No change O: No change	C: Medium O: Medium	C: No change O: No change	N/A	None	None
Goodwick Conservation Area	✓	✓	None	C: No change O: No change	C: Medium O: Medium	C: No change O: No change	N/A	None	None
Lower Town Conservation Area	✓	✓	None	C: No change O: No change	C: Medium O: Medium	C: No change O: No change	N/A	None	None
1930s lifeboat slipway	✓	×	None	C: High O: N/A	C: Low O: N/A	C: Minor adverse O: N/A	Programme of survey and recording	None	None
Post-Medieval maritime shipwrecks	✓	×	None	C: Medium to High O: N/A	C: Low to Medium O: N/A	C: Moderate adverse O: N/A	Provision of Protocol for Archaeological Discoveries	None	None

16.15 References

Cadw (2011) Conservation Principles for the Sustainable Management of the Historic Environment in Wales, March 2011.

Cadw (2017a) Heritage Impact Assessment in Wales, May 2017.

Cadw (2017b) Setting of Historic Assets in Wales, May 2017.

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FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 17 Soils, Geology and Hydrogeology

794-NI-POR-00886R
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17 SOILS, GEOLOGY AND HYDROGEOLOGY

17.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as "the Proposed Development") on Soils, Geology and Hydrogeology. This chapter considers the potential impacts to Soils, Geology and Hydrogeology from the Project during the construction and operational phases of the Proposed Development.

The main objectives of this assessment are to:

- Undertake a desktop study of the existing soils, geology and hydrogeology to assess current environmental baseline conditions locally and nationally;
- Assess the potential impact of the proposed construction and operation phases of the Proposed Development on soils, geology and hydrogeology; and
- Recommend mitigation measures in relation to the proposed construction and operational and phases, if necessary, and predict residual impacts.

The assessment presented is informed by the following key chapters of the ES

- Chapter 2: Project Description

Other aspects relevant to soils, geology and hydrogeology are addressed in the specific chapters of the ES, namely:

- Chapter 11: Water Quality
- Chapter 21: Waste

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

17.2 Purpose of this Chapter

The primary purpose of the ES chapter is to provide an assessment of the likely direct and indirect significant effects of the Project on climate. In particular, this ES chapter:

- Presents the existing environmental baseline established from desk studies, relevant datasets and consultation (section 17.8);
- Identifies any limitations encountered in compiling the environmental information (section 17.13);
- Presents an assessment of the potential likely significant effects on soils, geology and hydrogeology arising from the Proposed Development (section 17.9) based on the information gathered and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in section 17.12.

17.3 Study Area

The application site is located within Goodwick/Fishguard, Pembrokeshire (central grid reference 195171.227: 238812.970). The site is a parcel of land spanning an area of approximately 36 hectares of the harbour, to include the existing linkspan, hinterland and within the bay foreshore.

17.4 Policy Context

17.4.1 EU Legislation and Policy

European legislation is a significant consideration in assessing the effects of a scheme on the geological and hydrogeological attributes of a site and is outlined below.

The Water Framework Directive (2000/60/EC), which was transposed into Welsh law in The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (Statutory Instrument

2003 No. 3242) for England and Wales, establishes a framework for community action in the field of water policy. The main objective of the Directive is for all groundwater, surface water and coastal water bodies to achieve ‘good’ status by 2015. The Directive introduced new broader ecological objectives as well as aims to prevent deterioration of all water bodies. The Directive must be considered in any scheme that has the potential to impact on any part of the water environment.

Directive 2004/35/EC of the European Parliament and of the Council on environmental liability with regard to the prevention and remedying of environmental damage (“the Environmental Liability Directive”) was transposed into Welsh legislation by the Environmental Damage (Prevention and Remediation Regulations) (Wales) Regulations 2009, SI 2009/995. The Regulations require those carrying out certain activities to prevent, limit and remediate significant environmental damage to protected species, natural habitats, ASSIs, surface water, groundwater and land. Operators of activities such as discharges to water sources and water impounding are liable for any significant environmental damage, regardless of whether or not they intended to cause the damage or were negligent.

The Groundwater Directive (2006/118/EC) on the protection of groundwater against pollution and deterioration, transposed into Welsh law by The Groundwater (England and Wales) Regulations 2009, classifies groundwater bodies, establishes pollutant threshold values, and identifies trends and starting points for their reversal.

17.4.2 National Legislation and Policy

Part 2A of the Environmental Protection Act defines contaminated land as;

> “any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that –
>
> (a) significant harm is being caused or there is a significant possibility of such harm being caused; or
>
> (b) significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused.”

The Contaminated Land (Wales) Regulations 2006, The Contaminated Land (Wales) (Amendment) Regulations 2012, Contaminated Land Statutory Guidance for Wales 2012 (Welsh Government, 2012) and the Defra Circular 01/2006 (Defra 2006) also govern contaminated land assessment in Wales.

17.5 Consultation

This chapter has been informed by screening opinions provided by Natural Resources Wales. This screening opinion consulted with the bodies deemed relevant by Natural Resources Wales and reached the conclusions that an Environmental Impact Assessment was required.

Chapter 5: Scoping and Consultation provides details on the types of consultation activities undertaken for the Project between 5th November and 5th March and the consultees that were contacted.

No specific consultation issues were raised with regard to soils, geology and hydrogeology.

17.6 Methodology to inform the baseline

17.6.1 Desktop Study

Information on soils, geology and hydrogeology within the Study Area was collected through a detailed desktop review of existing studies and datasets. The Preliminary Risk Assessment (PRA) desk study is contained within Appendix 17.A. These sources provide the most up to date data for this assessment.

Table 17-1 Summary of key desktop reports.

Title	Source	Year

Linkspan Replacement – Fishguard Harbour. Preliminary Risk Assessment (Desk Study) Report	RPS	2025

17.6.2 Site-Specific Surveys

In order to inform the ES, site-specific surveys were undertaken. A summary of the surveys undertaken to inform the soils, geology and hydrogeology impact assessment is outlined in Table 17-2 Summary of site-specific survey data.

Table 17-2 Summary of site-specific survey data

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Fishguard Marina Marine GI	Marine Ground Investigation	Thirteen (13) light cable tool percussion boreholes to a maximum depth below sea bed level of 25.00 metres continued with rotary coring to a maximum depth below sea bed level of 37.50 metres Seven (7) light cable tool percussion boreholes to a maximum depth below sea bed level of 4.00m to obtain CEFAS (Centre for Environment Fisheries and Aquaculture Science) samples A single rotary open hole with rotary coring follow on to a maximum depth below sea bed level of 33.50 metres Seven (7) static cone penetration tests to a maximum depth below sea bed level of 21.13 metres	Fugro Seacore Ltd	2015	See Chapter section 16.8.5
Fishguard Port Linkspan Replacement. Factual Report on Ground Investigation	Land based ground investigation	Excavation of two (2) land based boreholes (BHL02 and BHL03) advanced to a maximum depth of 21.20m bgl (metres below ground level) using cable percussion drilling technique	Geotechnical Engineering Ltd	2017	See Chapter section 16.8.6
Geotechnical Site Investigation for the Fishguard	Marine ground investigation	Five (5) sediment grab samples for environmental testing	In Situ Site Investigation Ltd	March 2025	See Appendix 16.B and Section 16.8.7

Linkspan Project	Ten (10) vibrocores to a maximum depth of 6m

17.7 Assessment Methodology

The methodology and associated impact assessment had regard to the general guidance regarding the undertaking of an EIA, as presented in Chapter 4: Environmental Impact Assessment Process and Methodology and the following soils, geology and hydrogeology specific guidance as follows:

- Land contamination risk management (LCRM) - How to assess and manage the risks from land contamination. Environment Agency, 2023.

Underpinning the guidance within LCRM is a source-pathway-receptor methodology, which is used to identify Significant Pollutant Linkages (SPLs). The following definitions apply:

- Source: identification of contamination source;
- Pathway: the means by which the contamination can come into contact with the receptor; and,
- Receptor: the entity which is vulnerable to harm from the contamination source.

A phased approach in line with LCRM guidance has been taken with regard to the assessment of contaminated land at the proposed development site. As part of this phased approach, a Preliminary Risk Assessment (PRA) desk study of available information was carried out. The PRA desk study report is provided in Appendix 17.A.

An important thread throughout the overall process of risk assessment is the need to formulate and develop a conceptual model for the site, which supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of the PRA, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process. A risk is present only when a source-pathway-receptor linkage is present and active.

17.7.1 Impact Assessment Criteria

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 4: Environmental Impact Assessment Process and Methodology.

The criteria for defining impact magnitude in this chapter are outlined in below.

Table 17-3 Definition of terms relating to the magnitude of an impact.

Magnitude of impact	Definition	Examples
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).	Irreversible loss of high proportion of local high fertility soils/sediments. Large loss/ degradation of Agricultural Land Classification (ALC) Grade 1 or 2 soils. Pollution of potable sources of water abstraction. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Loss of, or extensive change, to nationally important geological features.

		Sterilisation of high quality mineral resource. Long-term (chronic) risk to human health or short-term (acute) risk to human health. Short- term risk of pollution of sensitive water resources. Extensive damage to buildings / infrastructure (on or off site). Generation of significant quantities of waste sediment or soils for landfill. Contamination of offsite soils. Substantial geomorphology changes due to cutting.
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).	Irreversible loss of moderate proportion of local high fertility soils/sediments. Large loss/ degradation of ALC Grade 3 soils, minor loss/ degradation of ALC Grade 1 or 2 soils. Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. Partial loss or change to an aquifer. Partial loss of the integrity of groundwater supported designated wetlands. Permanent loss of, regionally important geological features, or substantial changes to nationally important geological features. Sterilisation of low quality mineral resources. Easily preventable, permanent health impacts on humans or medium-term (chronic) risk to human health. Medium long-term risk of pollution of sensitive water resources. Localised damage to buildings/ infrastructure (on or off site).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key	Irreversible loss of small proportion of local high fertility soils/sediments and/or high proportion of local low fertility soils/sediments.

	characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).	Moderate loss/ degradation of ALC Grade 4 or 5 soils. Minor or moderate loss/ degradation of ALC Grade 3 soils. Changes to made ground deposits only. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Minor effects on groundwater supported wetlands. Loss of, or extensive change, to locally important geological features. Easily preventable, non-permanent health impacts on humans. Minor low-level and localised contamination of on-site soils/sediments. Pollution of non-sensitive water resource or low long term risk of pollution to sensitive water resource. Easily repairable damage to buildings / infrastructure
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).	No measurable impact upon surface waters or groundwater. No measurable impact on geological features. No measurable impact on soils/sediments. No discernible change with regards to contaminated land.

The criteria for defining receptor sensitivity in this chapter are outlined in below.

Table 17-4 Definition of terms relating to the sensitivity of the receptor.

Sensitivity	Definition	Examples
High	High importance and rarity, national scale, and limited potential for substitution. Those affected will not be able to adapt to changes and continue to maintain-pre impact status.	Geology: World Heritage Sites or site protected under EU or UK wildlife legislation (SAC, SPA, SSSI, Ramsar site). Soils: Agricultural land of Grade 1 or 2 quality. Controlled Water: Groundwater vulnerability is classified as high; Principal aquifer providing a regionally or locally important resource or supporting site protected under wildlife legislation.

		Future site users: Sensitive land uses proposed such as residential housing with gardens, allotments, schools. Built Environment: Sites of international Importance, World Heritage Sites, Listed Buildings, and Scheduled Monuments.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution. Able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.	Geology: Regionally Important Geological Sites (RIGS). Soils: Agricultural land of Grade 3 quality. Controlled Water: Moderate classification of groundwater vulnerability; Secondary aquifer providing water for agricultural or industrial use with limited connection to surface water. Future site users: Moderately sensitive land uses such as residential housing without gardens, commercial developments and open spaces. Built Environment: Sites with local interest for education or cultural appreciation.
Low	Low or medium importance and rarity, local scale Those affected are able to adapt with relative ease and maintain pre-impact status.	Geology: Rock exposures. Soils: Agricultural land of Grade 4&5 quality. Controlled Water: Deep Secondary aquifer with poor water quality not providing baseflow to rivers; Aquifer not used for water supplies (public or private). Future Site Users: Low sensitivity land use such as Industrial Sites, highways, ports and rail. Built Environment: Infrastructure (e.g. Roads, railways, ports and tramways).
Negligible	Very low importance and rarity, local scale Those affected are able to adapt easily and maintain pre-impact status.	Geology: No rock exposures. Soils: Urban classified soils. Controlled Water: Non-aquifer/Unproductive Strata Future Site Users: No sensitive land use proposed

The significance of the effect upon soils, geology and hydrogeology is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 17-5. Where a range of significance of effect is presented in Table 17-5, the final assessment for each effect is based on calculated assessment and professional judgement.

For the purposes of this assessment, any effects with a significance level of slight or less have been concluded to be not significant in terms of the EIA Regulations.

Table 17-5 Matrix used for the assessment of the significance of the effect.

		Sensitivity of Receptor / Receiving Environment to Change / Effect			
Magnitude of Change		High	Medium	Low	Negligible
	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

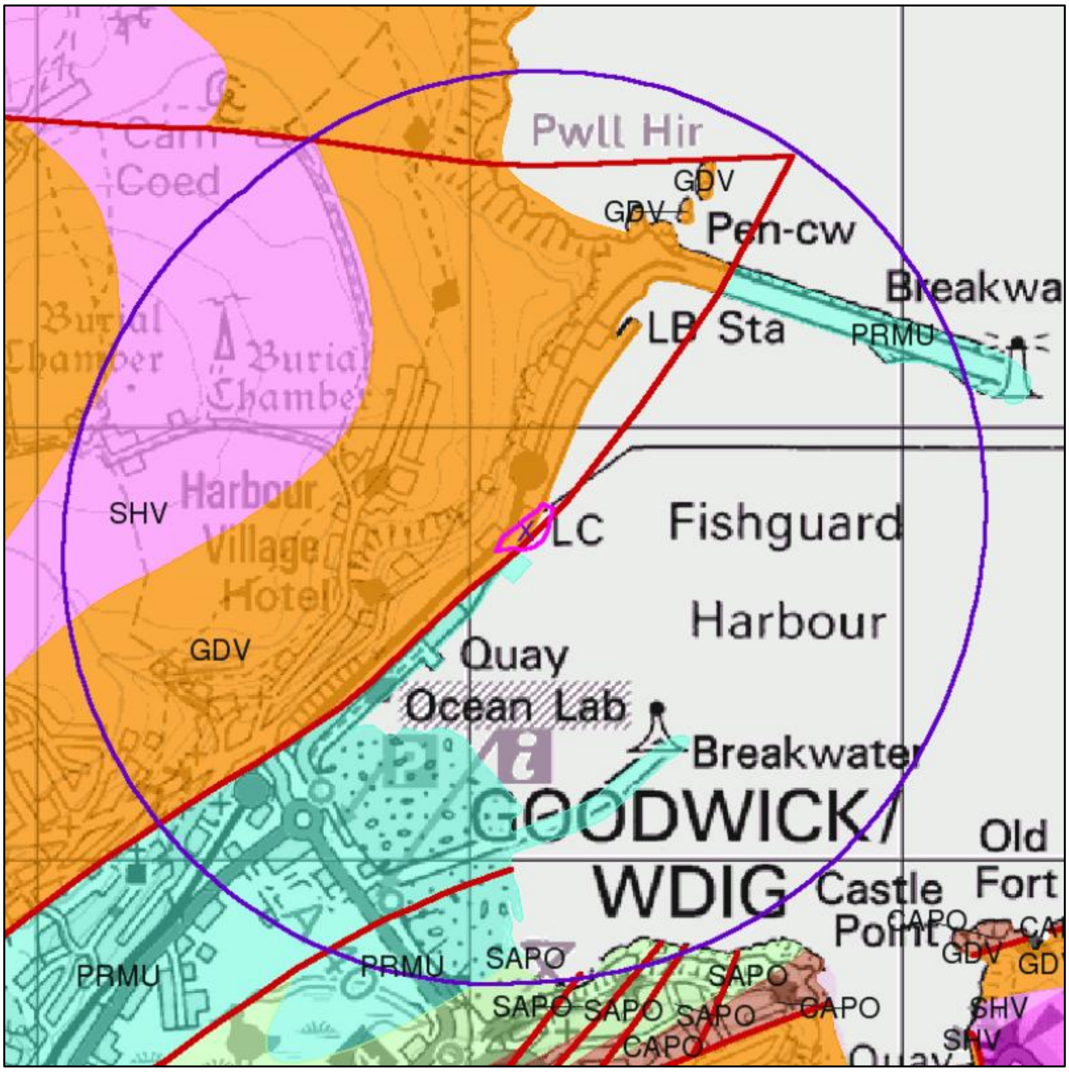
17.8 Baseline Environment

A Preliminary Risk Assessment (PRA) desk study of available information was carried out. The PRA desk study report is provided in Appendix 17.A. A marine ground investigation was undertaken to sample and test sediment material which will be dredged as part of the proposed development. The ground investigation report is provided in Appendix 17.B.

17.8.1 Bedrock Geology

As shown on Figure 17.1, the proposed development site falls on a fault line which separates the Penyraber Mudstone Formation to the south east from the Goodwick Volcanic Formation to the north west.

Figure 17.1 Bedrock Geology

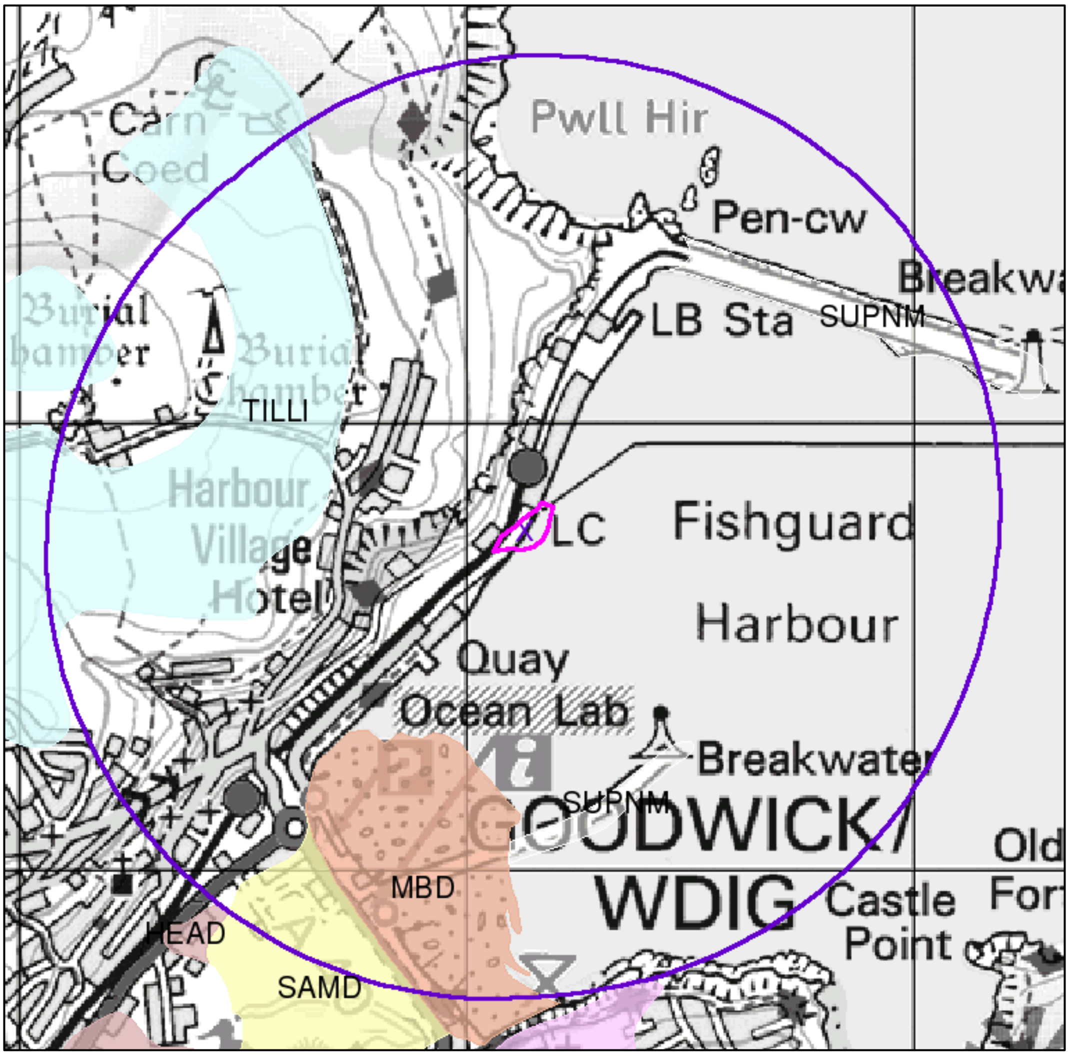


Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	PRMU	Penyraber Mudstone Formation	Mudstone	Caradoc - Caradoc
	SAPO	Saddle Point Member	Siltstone	Caradoc - Caradoc
	CAPO	Castle Point Member	Sandstone	Caradoc - Caradoc
	GDV	Goodwick Volcanic Formation	Rhyolite	Abereiddian - Abereiddian
	SHV	Strumble Head Volcanic Formation	Basalt, Lava-Pillowed	Abereiddian - Abereiddian
	GDV	Goodwick Volcanic Formation	Sandstone	Abereiddian - Abereiddian
		Faults		

17.8.2 Superficial Geology

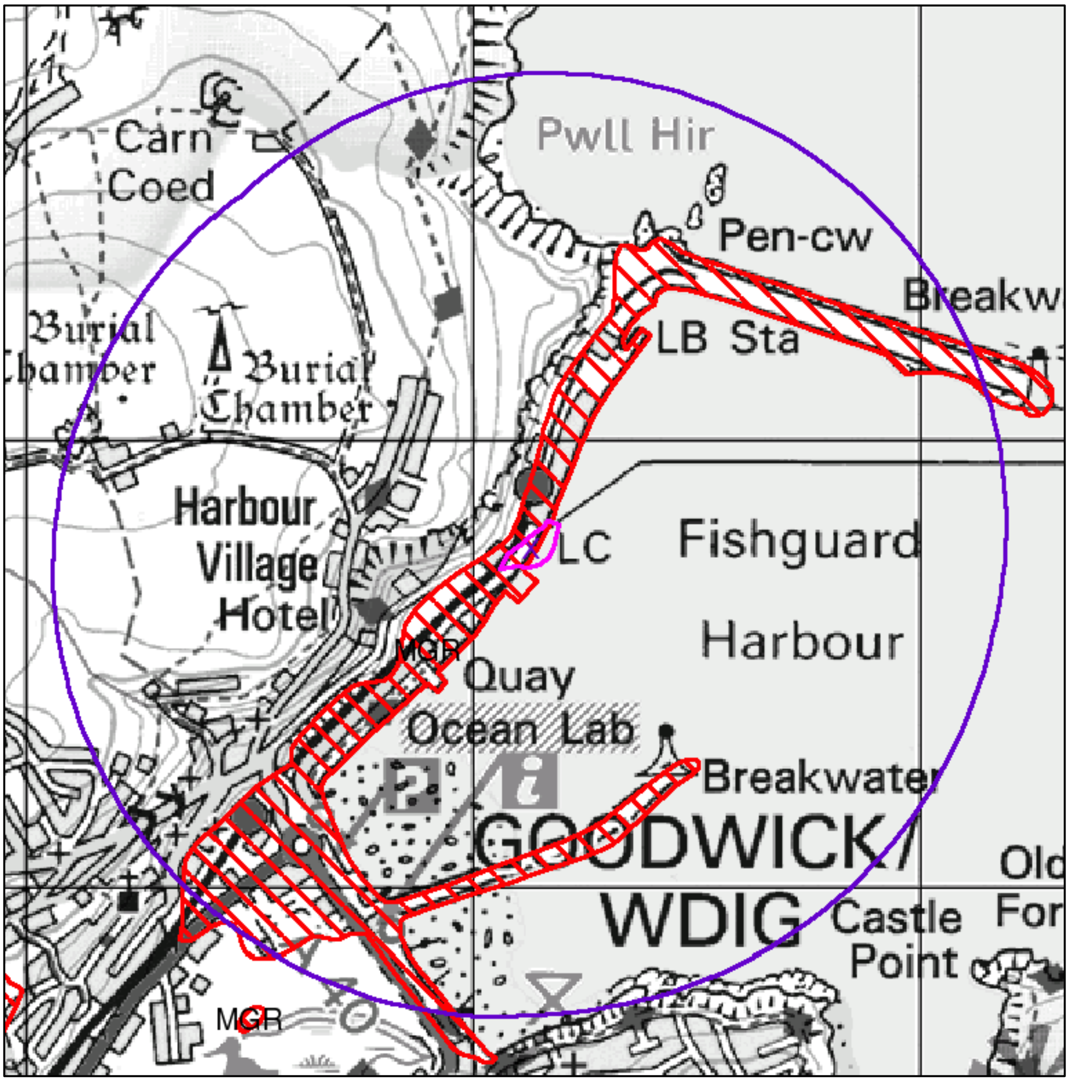
As shown on Figure 17.2 Superficial Geology and Figure 17.3 Infilled or Made Ground, made ground is anticipated to overlie bedrock in the vicinity of the site.

Figure 17.2 Superficial Geology



Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	SAMD	Saltmarsh Deposits	Sand, Silt and Clay	Holocene - Holocene
	GFICI	Glaciofluvial Ice Contact Deposits, Devensian (Irish Sea Ice)	Sand and Gravel	Devensian - Devensian
	GFDIS	Glaciofluvial Deposits, Devensian (Irish Sea Ice)	Sand and Gravel	Devensian - Devensian
	TILLI	Till (Irish Sea Ice)	Diamicton	Pleistocene - Pleistocene
	MBD	Marine Beach Deposits	Sand and Gravel	Quaternary - Quaternary
	HEAD	Head	Clay, Silt, Sand and Gravel	Quaternary - Quaternary

Figure 17.3 Infilled or Made Ground



Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	MGR	Made Ground (Undivided)	Artificial Deposit	Holocene - Holocene

17.8.3 Hydrogeology & Groundwater Vulnerability

As shown in Figure 17.4 Bedrock Aquifer, the bedrock aquifer underlying the site is categorised as a Secondary B aquifer. This refers to predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water bearing parts of the former non-aquifers.

A superficial aquifer is not considered to be present in the vicinity of the proposed development site. No source protection areas were identified within a 1000m buffer of the site.

As shown on Figure 17.5 Groundwater Vulnerability, this is considered to be a non-aquifer of negligible permeability.

Figure 17.4 Bedrock Aquifer

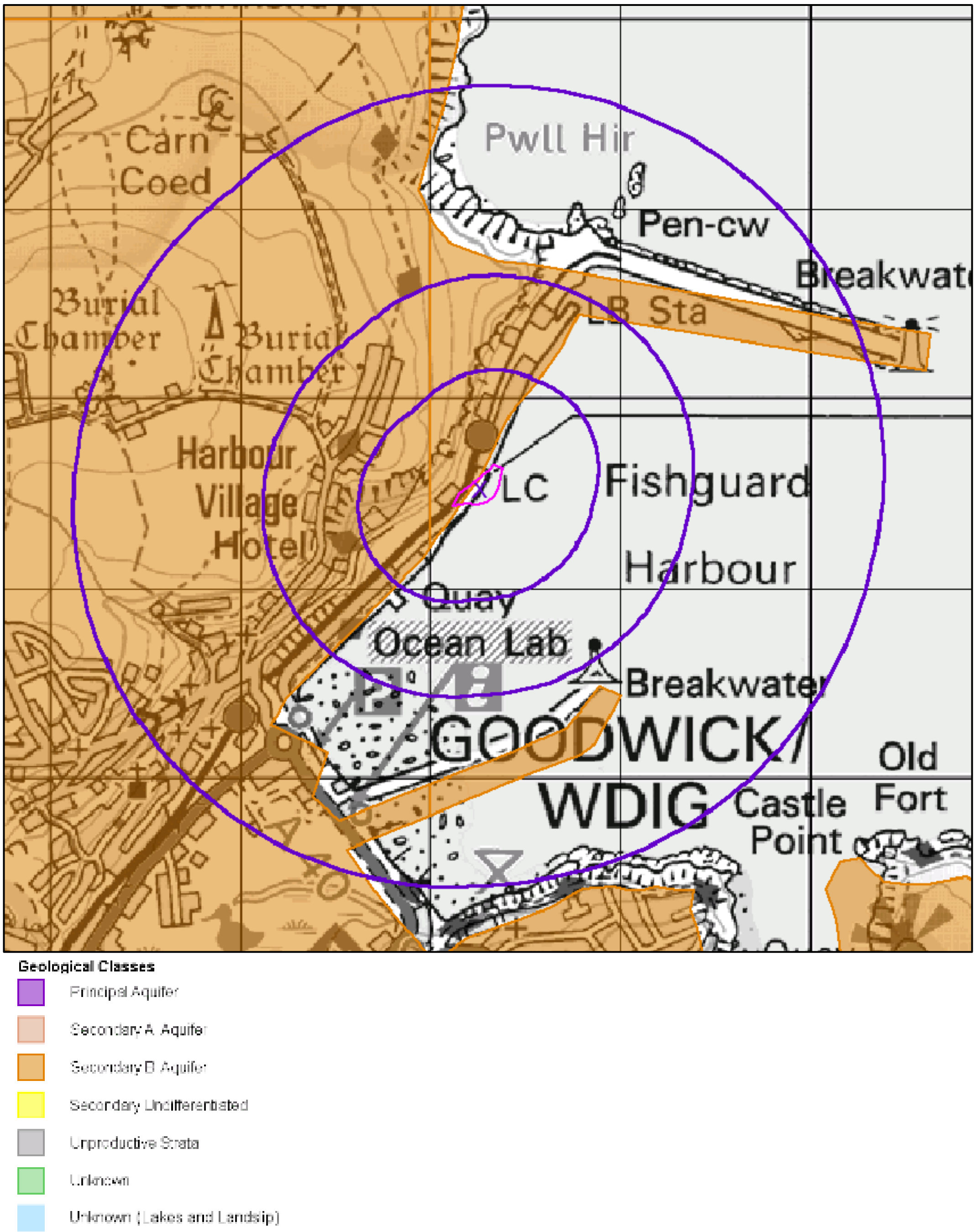
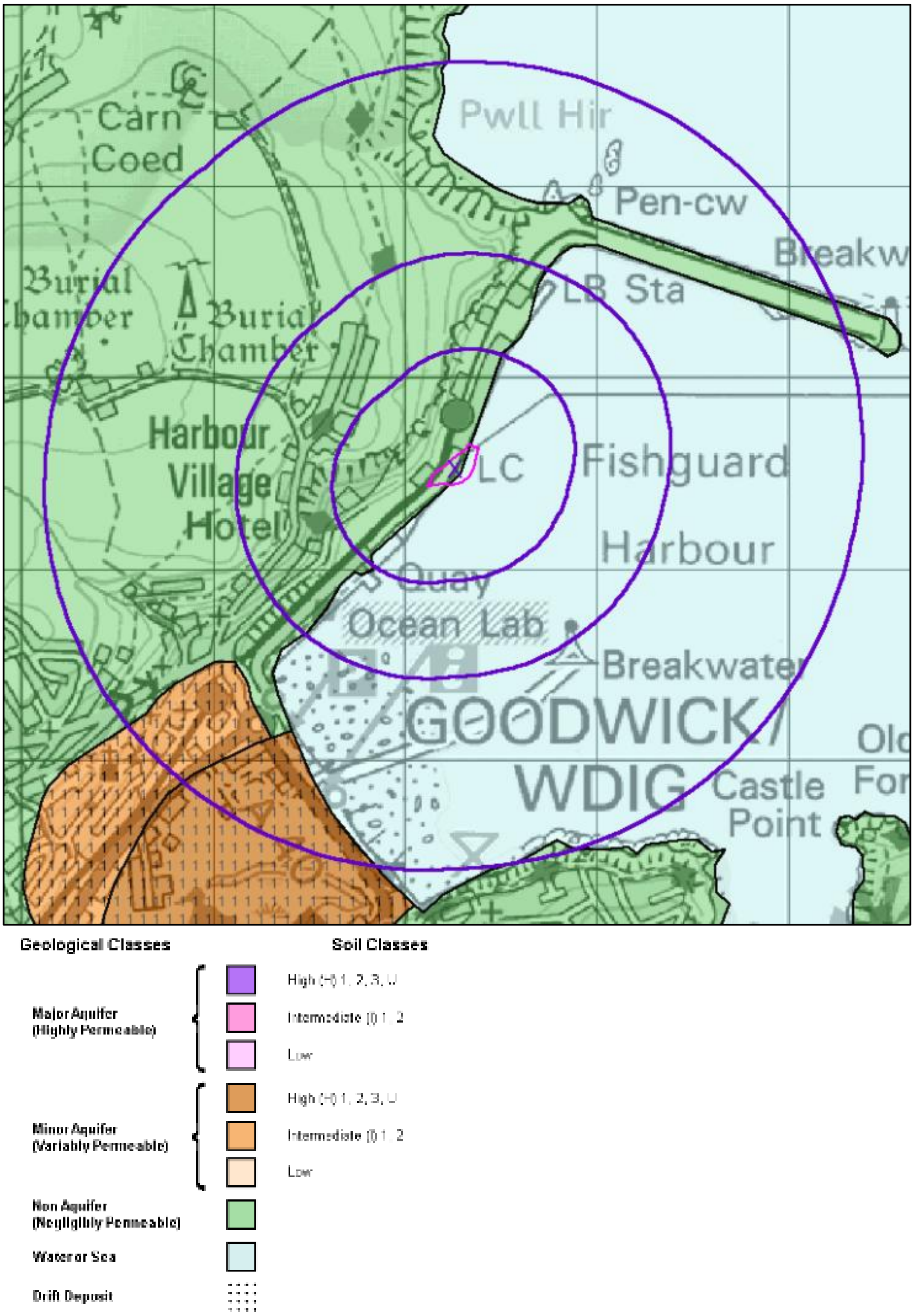


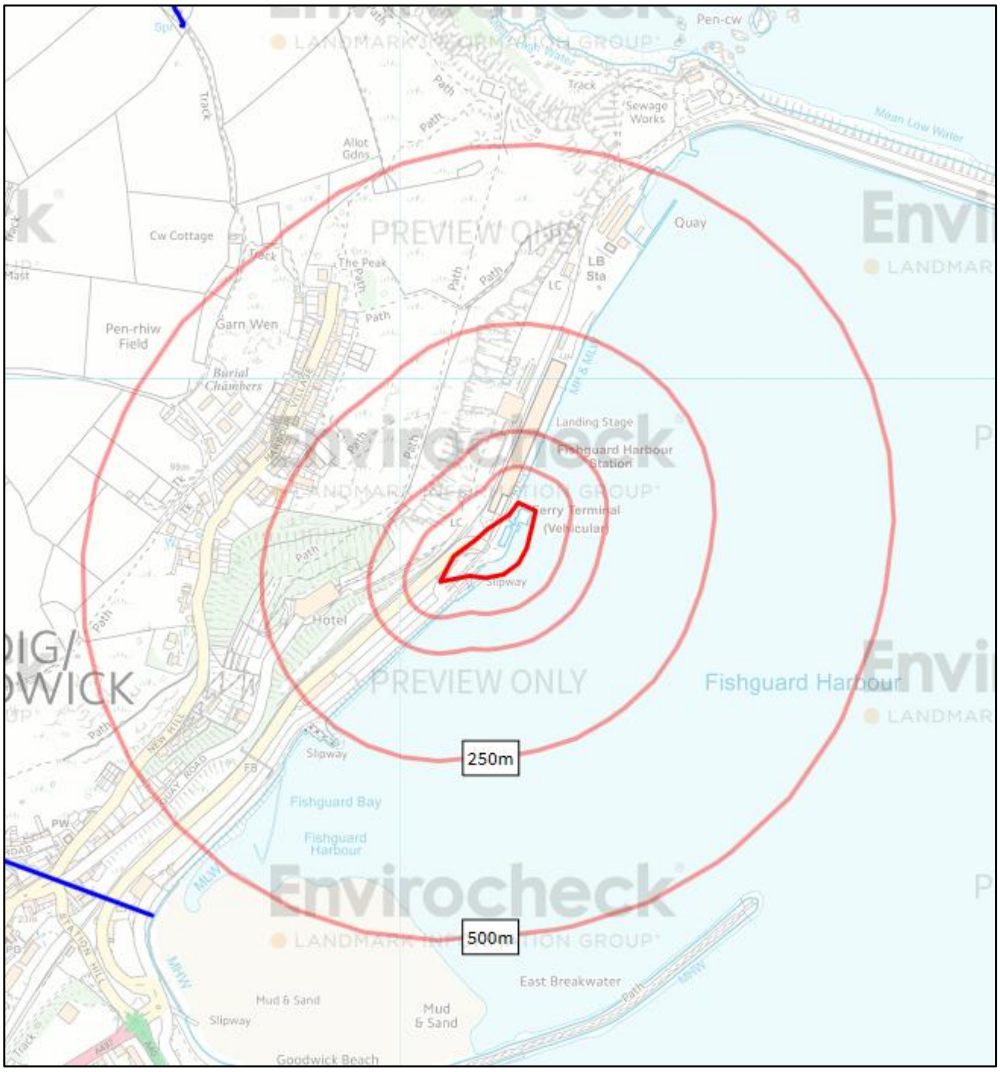
Figure 17.5 Groundwater Vulnerability



17.8.4 Hydrology

No inland watercourses are present within 500m of the proposed development site – see Figure 17.6 Hydrology.

Figure 17.6 Hydrology



17.8.5 Previous Ground Investigation - 2015

An intrusive land and marine ground investigation was undertaken by Fugro Seacore Ltd (FSCL) at Fishguard Marina in April and May 2015. The investigation comprised;

- Thirteen (13) light cable tool percussion boreholes to a maximum depth below sea bed level of 25.00 metres.
  Seven (7) light cable tool percussion boreholes to a maximum depth below sea bed level of 4.00m to obtain CEFAS (Centre for Environment Fisheries and Aquaculture Science) samples.
- Thirteen (13) light cable tool percussion boreholes continued with rotary coring to a maximum depth below sea bed level of 37.50 metres.
- A single rotary open hole with rotary coring follow on to a maximum depth below sea bed level of 33.50 metres
- Seven (7) static cone penetration tests to a maximum depth below sea bed level of 21.13 metres.

Three marine boreholes (BH09, BH10 and BH33) were advanced in the area of the Stena Line terminal. The sediment material comprised, silts, sands and gravels to a maximum depth of 22.30m bgl whereby strong light grey basalt was encountered.

17.8.6 Previous Ground Investigation - 2017

An intrusive land and marine based ground investigation was undertaken by Geotechnical Engineering Limited in September 2017. The ground investigation comprised the following;

- Excavation of two (2) land based boreholes (BHL02 and BHL03) advanced to a maximum depth of 21.20m bgl (metres below ground level) using cable percussion drilling technique.
- Six (6) Sediment Grab Samples.

The site investigation identified that the proposed development site is underlain by made ground and in-filled material with a mixed lithology. The made ground ranges from ground level to a maximum recorded depth of 16.20mbgl in BHL02.

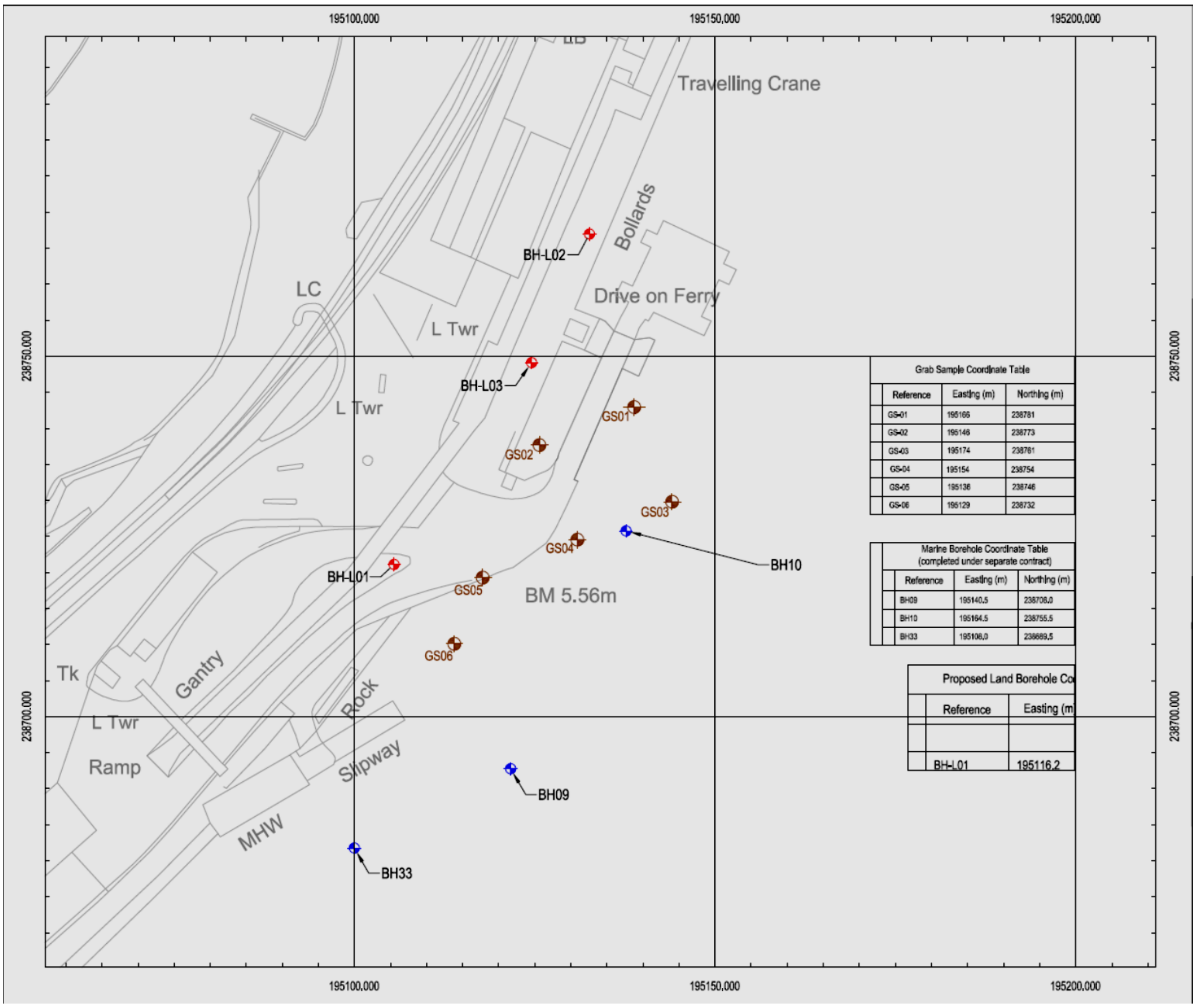
The made ground encountered comprises; steel reinforced concrete, fine to coarse sand and gravel and cobbles and boulders.

The in-filled material is directly underlain by bedrock comprising medium strong dark grey basalt.

Groundwater strikes and seepages were encountered in BHL02 and BHL03 at a depth of 7-8m bgl

The investigation locations are shown in Figure 17.7 2017 Ground Investigation Locations.

Figure 17.7 2017 Ground Investigation Locations



17.8.7 2025 Ground Investigation

An intrusive marine ground investigation was undertaken in March 2025 by In Situ Site Investigation Ltd. The investigation comprised the following;

- Five (5) sediment grab samples (GS003, GS006, GS008, GS009 and GS010) for environmental testing
- Ten (10) vibrocores (VC001 – VC101) to a maximum depth of 6m

The ground investigation report is included in Appendix 17.B.

17.8.7.1 Ground conditions encountered

The ground conditions encountered in the vibrocores are summarised below.

Surface Layer (0.00 - 0.35 m)
Composed of dark brownish grey silty fine to medium sand with occasional angular to subangular fine gravel size shell fragments. This layer is non-calcareous.

Subsurface Layers (0.35 - 5.22 m)
Silty Clay and Sand Layers - The subsurface is characterized by extremely low strength, very soft dark grey sandy silty clay, and dark grey and brownish grey silty fine to medium sand. These layers contain occasional angular to subangular gravel size shell fragments and are non-calcareous.

Gravelly Sand Layers - There are layers of dark grey and black silty gravelly sand, with gravel being a mix of angular to subangular shell fragments and black coal. These layers are slightly calcareous.

Organic Material - Some layers contain organic debris, such as black fibrous organic material and rootlets, indicating past biological activity^1^.

Deeper Layers (3.35 - 5.22 m)
Gravelly Sand with Limestone - The deeper layers include dark grey slightly clayey silty gravelly sand with a significant portion of dark grey limestone fragments. These layers are calcareous

17.8.7.2 Sediment sampling and laboratory analysis

Twenty-Four (24) sediment samples were taken and analysed for a suite of parameters. The suite followed the requirements of a sampling plan provided by Natural Resources Wales, to support the Marine Licence application for dredging and subsequent disposal of material, under license, at sea. The samples were analysed by Socotec which is a UKAS accredited, and Marine Management Organisation (MMO) approved laboratory.

The 24 sediment samples were analysed for the following parameters. The laboratory analytical certificates are contained within Appendix 17.C.

Table 17-6 Sediment testing suites.

Determinand	Limit of Detection
Organic Matter (Total Organic Carbon) 0.02 %	0.02 %
Total Organic Matter by LOI 0.20 %	0.20 %
Particle Size Distribution %	%
Metals Suite (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn) 0.01 – 2 mg/kg	0.01 – 2 mg/kg
Chromium VI 0.1 mg/kg	0.1 mg/kg
Organotins (DBT, TBT) 0.001 mg/kg	0.001 mg/kg
PAHs (DTI 2-6 Ring Aromatics + EPA 16) 1 µg/kg	1 µg/kg
Total Hydrocarbon Content 1 mg/kg	1 mg/kg
PCBs (25 Congeners inc. ICES 7) 0.00008 mg/kg	0.00008 mg/kg
Brominated Flame Retardents (inc. BDE209) 0.0001 mg/kg	0.0001 mg/kg
Organochlorine Pesticides 0.0001 mg	0.0001 mg/kg

17.8.7.3 Sediment contamination

In accordance with the OSPAR Guidelines for the Management of Dredged Material at Sea, contaminant levels for a number of primary contaminants (as indicated within Technical Annex I of the OSPAR Guidelines) were screened against Action Levels. The Action Levels have been set by CEFAS and are provided as Level 1 and Level 2 Action Levels. The action levels are used to determine the contaminant loading of the material with Level 1 being most conservative and Level 2 less conservative.

The screening tables are contained within Appendix 17.C.

A number of samples recorded concentrations above Action Level 1 for metals including Nickel, Mercury, Lead, Cadmium and Zinc. One sample from VC003 recorded a concentration for Zinc above Action Level 2. Samples from VC003 and VC009 also recorded PAH concentrations above Action Level 1. VC003 is in a area where sediment will need to be removed to facilitate the pontoon and therefore sediment from around VC003 will not be considered for disposal at sea.

A drawing showing a summary of the contamination exceedances is provided in Appendix 17.C.

17.8.8 Preliminary Risk Assessment

A Preliminary Risk Assessment (Appendix 17.A) was prepared to ascertain the potential for contaminated land pollutant linkages to be present at the site of the proposed development. The PRA report concluded that no potential pollutant linkages are present in relation to human health and environmental receptors.

17.9 Impact Assessment

17.9.1 Do Nothing Scenario

The 'Do Nothing' scenario will have a **Negligible** impact on soils, geology and hydrogeology as there will be no impact on geology, soils, sediments and groundwater.

17.9.2 Assessment of Construction Effects

The impact to soils and geology are considered to be **Negligible** as no significant land based earthworks are proposed. Approximately 5,600 m3 of clean fill material will be imported to form the reclamation area in the vicinity of the old RNLI slipway.

The dredging of marine sediments will have a **Minor** effect due to the irreversible loss of a high proportion of local low fertility sediments. Dredged marine sediments will be disposed at sea to an appropriately licensed dumping at sea facility. (Milford Haven LU169).

No significant land based earthworks will be undertaken. Piling will be undertaken to support the construction of the reinforced concrete bankseat. It is anticipated that steel tubular piles of 0.914m diameter may be employed to support the structures on the underlying rock.

The impact to groundwater is considered to be **Negligible** as piling will be undertaken in the marine environment only.

Construction activities may also include waste, noise, dust, odour and site traffic generation problems as well as potential contamination issues arising with the use of fuel storage tanks, vehicles and the use of paints and oils. Impacts in terms of waste, traffic, air quality and noise are assessed in Chapters 21, 19, 15 and 13 of the ES respectively.

17.9.3 Assessment of Operational Effects

As part of the preliminary contamination assessment, the Conceptual Site Model (CSM) developed for the site could not identify any soil source-pathway-receptors linkages in relation to human health and therefore the risk to human health (future site workers and site users) from ground contamination is considered to be negligible. It is anticipated that there will be no impacts on the geology during the operational phase of the site.

Groundwater will not be extracted as part of the proposed development, therefore the proposed development will have a **Negligible** impact on groundwater during the operational phase of the development

17.10 Mitigation

Measures that are embedded into the design of the project including normal good practice guidance e.g. for dust, noise control, pollution control, or a landscape and planting strategy must be specified here.

17.10.1 Construction Phase Mitigation Measures

The construction activities should be conducted in a safe environmentally conscious manner and in line with all health and safety guidelines. The following practical steps will be followed:

- Fuel storage tanks, paints and oils will be stored in clearly labelled and bunded areas.
- Refuelling of all plant and machinery will only take place in designated areas away from surface waters and drains. Spill kits will be placed within the designated re-fuelling areas to contain any accidental spillages of fuel.

- An emergency plan to deal with accidental spillages will be drafted prior to construction and implemented to prevent contamination of groundwater and surface water.

17.10.2 Operational Phase Mitigation Measures

No operational mitigation measures are required.

17.10.3 Future Monitoring

No future monitoring is required.

17.11 Assessment of Residual Effects

The residual effects of the Proposed Development considering the mitigation measures are determined to be **Not Significant.**

17.12 Cumulative Effects

An assessment of the cumulative effects with other projects (listed in Appendix 4.A) has been undertaken. No cumulative effects are predicted.

17.13 Limitations of the Assessment

There are no known limitations to the assessment presented in this chapter of the ES.

17.14 Summary of Effects and Conclusion

The proposed development will have a **Negligible** effect on soils, geology and hydrogeology during both the construction and operational phase of the development. There will be a **Minor** effect on marine sediments due to the irreversible loss of a high proportion of local low fertility sediments during the construction phase. The effects are summarised in Table 17-7 Summary of Construction and Operational Effects.

Table 17-7 Summary of Construction and Operational Effects

Description of impact	Phase C	Phase O	Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Dredging and disposal of marine sediments	✓	×	None	C: Low	C: Low	C: Minor	None	Not significant	None

17.15 References

1. Fugro Seacore Ltd (2015). "Fishguard Port Linkspan Replacement. Factual Report on Ground Investigation."

2. Geotechnical Engineering Ltd (2017). "Geotechnical Site Investigation for the Fishguard Linkspan Project."

3. In Situ Site Investigation Ltd (March 2025). "Marine ground investigation."

4. Environment Agency (2023). "Land contamination risk management (LCRM) - How to assess and manage the risks from land contamination."

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 18 Land Use and Material Assets

794-NI-POR-00886R
May 2025

18 LAND USE AND MATERIAL ASSETS

18.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as “the Proposed Development”) on land use and material assets. This chapter considers the potential impacts on land use and material assets from the Project during the construction and operational phases of the Proposed Development.

The phrase ‘material assets’ has a broad scope, which may include assets of human or natural origin, valued for socio-economic or heritage reasons. This may include physical resources and infrastructure, including land, buildings, utilities and land use that contribute to the socio-economic, cultural, and environmental framework of the area.

In this context, this assessment focuses on land use and existing infrastructure within and directly adjoining the study area.

The main objectives of this assessment are to:

- Undertake a desktop study of the existing land use services and infrastructure;
- Assess the potential impact of the proposed construction and operation phases of the Proposed Development on land use and material assets; and
- Recommend mitigation measures in relation to the proposed construction and operational and phases, if necessary, and predict residual impacts.

Material assets in the context of land and soil are addressed within Chapter 17: Soils

Material assets in relation to traffic infrastructure are addressed within Chapter 19: Traffic and Transport.

Architectural and archaeological heritage was previously considered to be a subcategory of material assets under Directive 2011/92/EU. However, Directive 2014/52/EU amended this to consider those as components of cultural heritage. Cultural assets of a physical type and cultural heritage of a social type are addressed in Chapter 15 Cultural Heritage.

This chapter is supported by the following Figures located in Volume III Design Drawings & Figures.

- Figure 18.1 - Water & Sewage Infrastructure
- Figure 18.2 - Electrical infrastructure
- Figures 18.3 - Figures 18.5 - Openreach Telecoms Assets
- Figures 18.6 – 18.8 - Lighting

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

18.2 Purpose of this Chapter

The primary purpose of the ES chapter is to provide an assessment of the likely direct and indirect significant effects of the Project on land uses and material assets. In particular, this ES chapter:

- Presents the existing environmental baseline established from desk studies, relevant datasets and consultation (section 18.8);
- Identifies any limitations encountered in compiling the environmental information (section 18.13);
- Presents an assessment of the potential likely significant effects on land uses and material assets arising from the Proposed Development (section 18.10.3) based on the information gathered and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in section 18.12.
- Highlights any necessary monitoring (section 18.10) and/or measures (see section 18.10.1 and section 18.10.2) to prevent, minimise, reduce or offset the likely significant environmental effects identified in the assessment (section 18.9).

18.3 Study Area

There are no guidelines or criteria to define the size of the study area for the assessment of material assets. The material assets study area has been defined by RPS for the purpose of this assessment as the area in which there is potential for direct and indirect impact on material assets as a result of the Proposed Development. This includes the area within the proposed planning application boundary as shown in **Figure 18.1 Material Assets Study Area** below.

Figure 18.1 Material Assets Study Area

18.4 Policy Context

The consideration of land use and material assets has followed the overall methodology and guidance relating to EIA process and preparation as set out in Chapter 4 EIA Methodology. Theis section summarises the legislation, policy, and guidance applicable to land use and material assets.

18.4.1 EU Legislation and Policy

The EIA Directive 2014/52/EU sets out the requirements to consider the vulnerability of a project (or Development) on land and material assets. With regard to materials assets;

'*material assets can be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes transport infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils'*.

Reg 5(2) and (3) of the EIA Regs:

5(2) The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of the proposed development on the following factors —

(d)material assets

(e)the interaction between the factors referred to in sub-paragraphs (a) to (d).

(3) The effects referred to in paragraph (2) on the factors set out in that paragraph shall include—

(a)the operational effects of the proposed development, where the proposed development will have operational effects;

The description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development…

18.4.1.1 European Union Guidance 2017 - Environmental Impact of Project Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)

The 'European Union Guidance 2017 - Environmental Impact of Project Guidance on the preparation of the Environmental Impact Assessment Report' provides useful guidance on the key changes from Directive 2011/92/EU as amended by Directive 2014/52/EU specifically Annex IV points 4 and 8. It specifically emphasises natural resources as an environmental factor to be considered.

18.4.2 National Legislation and Policy

18.4.2.1 The Welsh Marine Plan 2019

The Welsh National Marine Plan was published in 2019 with the vision that Welsh seas are clean, healthy, safe, productive and biologically diverse. The Plan sets out areas of potential sector resource around the coastline identifying Fishguard as an aquaculture: water column area.

Policy ECON 01: sustainable economic growth encourages proposals that provide employment opportunities for coastal communities; and protecting and creating employment.

Policy ECON 02: Coexistence seeks proposals to demonstrate coexistence with other compatible sectors and potential opportunities at the land-sea interface.

Policy SOC 01: Access to the marine environment ensures people get to take part in activities and services provided by the marine environment and therefore supporting recreation and wellbeing.

Policy SOC 02: Wellbeing of coastal communities recognises that development has the potential to effect socio-economic factors including cultural identify and wellbeing.

Policy GOV 02 cross border and plan compatibility seeks regards to applicable policy in the marine plan; applicable policy in terrestrial development plans or related documents; the Natural Resources Policy; relevant well-being plans and assessment and any relevant NRW Area Statements.

Policy T&R 01 Tourism and recreation policy supports proposals that demonstrate positive contribution on these opportunities

18.5 Consultation

Table summarises the issues raised relevant to land use and material assets, which have been identified during consultation activities undertaken to date, together with how these issues have been considered in the preparation of this ES chapter. Chapter 5: Scoping and Consultation provides details on the types of consultation activities undertaken for the Project between 16.12.24 and 16.01.25 and the consultees that were contacted.

Table 18-1: Summary of key consultation issues raised during consultation activities undertaken for the Project relevant to land use and material assets.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter

31.01.25	NRW	Include assessment of the impacts	Section 18.9

18.6 Methodology to inform the baseline

18.6.1 Desktop Study

Information on material assets within the Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 18-2 Summary of key desktop reports. These sources provide the most up to date data for this assessment.

Table 18-2 Summary of key desktop reports.

Title	Source	Year
Built service provider's existing assets datasets to inform baseline mapping for the assessment	Openreach	2025
Built service provider's existing assets datasets to inform baseline mapping for the assessment	National Grid	2025
Built service provider's existing assets datasets to inform baseline mapping for the assessment	Welsh Water	2025

18.6.2 Site-Specific Surveys

No site-specific baseline surveys were undertaken as part of the assessment for climate. The baseline data presented in this section is derived from National Grid, Openreach and Welsh Water.

18.7 Assessment Methodology

The methodology and associated impact assessment had regard to the general guidance regarding the undertaking of an EIA, as presented in Chapter 4: Environmental Impact Assessment Process and Methodology.

The scope for the assessment will be informed by desktop analysis, consultation with statutory consultees, bodies with environmental responsibility and other interested parties at scoping stage and during the pre-application community consultation.

With regards to existing land uses, consideration will be given to the existing character and type of land use, and the location of any sensitive neighbouring occupied premises likely to be directly affected by the proposed development. This includes educational, community, recreational, health care and those uses related to religious groups / activities. The assessment will focus on direct land take which would occur through the implementation of the proposed development. This will be undertaken following a desktop study, review of aerial photography, and review of OS base mapping.

With respect to land with development potential, future planned changes to land use following the grant of planning permission are relevant to the assessment. A planning history search will be carried out to establish planning applications within and directly adjacent to the study area.

18.7.1 Impact assessment criteria

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 4: Environmental Impact Assessment Process and Methodology.

The criteria for defining impact magnitude in this chapter are outlined in below.

Table 18-3 Definition of terms relating to the magnitude of an impact.

Magnitude of impact	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).

The criteria for defining receptor sensitivity in this chapter are outlined in below.

Table 18-4 Definition of terms relating to the sensitivity of the receptor.

Sensitivity	Definition
High	High importance and rarity, national scale, and limited potential for substitution. Those affected will not be able to adapt to changes and continue to maintain-pre impact status.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution. Able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.
Low	Low or medium importance and rarity, local scale

	Those affected are able to adapt with relative ease and maintain pre-impact status.
Negligible	Very low importance and rarity, local scale Those affected are able to adapt easily and maintain pre-impact status.

The significance of the effect upon material assets and land use is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 18-5. Where a range of significance of effect is presented in Table 18-5, the final assessment for each effect is based on calculated assessment and professional judgement.

For the purposes of this assessment, any effects with a significance level of slight or less have been concluded to be not significant in terms of the EIA Regulations.

Table 18-5 Matrix used for the assessment of the significance of the effect.

		Sensitivity of Receptor / Receiving Environment to Change / Effect			
Magnitude of Change		High	Medium	Low	Negligible
	High	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

18.8 Baseline Environment

The land use study area within Fishguard Port is dominated by the built form of the two closely associated settlements of Goodwick and Fishguard. Both settlements have a strong coastal and maritime association and character with extensive and elevated views across Fishguard Bay and along the Pembrokeshire Coast. The existing Port at Fishguard lies at the western side of the Harbour and consists of extensive tarmac area used by traffic queuing for ferries. Fishguard train station and platform lies to the west of the harbour and a number of buildings serving the RNLI and Stena offices to the North. The baseline environment is defined as the existing environment against which future changes can be measured.

The assessment of potential impacts on existing and future land use considers if there will be severance, loss of rights of way or amenities, conflicts, or other changes likely, which may alter the character and use of the surroundings.

The assessment of potential impacts on material assets focuses on resources that are valued and are intrinsic to a place - these may be of either human or natural origin, and the value may arise for either economic or cultural reasons.

The assessment of potential impacts for utilities and services will comprise all areas of proposed construction work including areas where utility and infrastructural diversions are proposed.

The matters assessed within this section of the EIA focus on the environmental effects on the following resources:

- Existing Land Use (e.g. Education / community/ open space);
- Land with development potential and adjoining land use;

- Facilities used by the local community and
- Utilities and services.

The following forms a summary of the data collated, and work undertaken to date.

- Preliminary review of legislative and policy context;
- Review of the land use designations (extant and emerging)
- Initial planning application history search
- Preliminary utility provision baseline

With regards to existing land uses, consideration will be given to the existing character and type of land use, and the location of any sensitive neighbouring occupied premises likely to be directly affected by the proposed development. This includes educational, community, recreational, health care and those uses related to religious groups / activities. The assessment will focus on direct land take which would occur through the implementation of the proposed development. This will be undertaken following a desktop study, review of aerial photography, and inspection of planning and land registry records.

With respect to land with development potential, future planned changes to land use following the grant of planning permission are relevant to the assessment. A planning history search will be carried out to establish planning applications within and directly adjacent to the study area.

The assessment of material assets will involve a desk study to identify properties, resources, and amenities etc. that may be affected by the proposed development. Consultation will be made with stakeholders in the local area.

Consultation will take place with the relevant utility providers to determine the exact location and depth, prior to commencement of works. Utility providers will be consulted well in advance and provided with design drawings to determine the extent of their utilities. If present, they may be required on site to monitor the works. All proposed designs and diversions will be undertaken in agreement with the service providers to ensure that the network and assets are protected, and customer service is maintained and safeguarded.

18.8.1 Land Use

18.8.1.1 Existing Land Use

The existing land use comprises the Fishguard Harbour, lies within Fishguard Bay, Pembrokeshire. It is a privately run Port, owned by Stena Line who operate a twice daily Ro Ro ferry service to Rosslare, Co. Wexford. Access to the ferry is currently via a single lane linkspan, which is accessed via the A40 to the south. The Port area is protected by two large man-made breakwaters.

The existing Port lies at the western side of the Harbour and consists of extensive tarmac area used by traffic queuing for ferries. There are no proposed changes to the train station and associated infrastructure nor the RNLI building or Stena office buildings.

During the construction of the Proposed Development, the existing linkspan and vehicle ramp will be removed through site clearance and therefore directly and permanently impacted.

18.8.1.2 Adjoining Land Use

To the south of Fishguard Port lies the settlement of Goodwick and the A40 that follows the shoreline in lower-lying flat land and promenade area with car parking to the rear. The watersports centre and visitor / information centre (Ocean Lab) are located in this area adjacent to the A40. The settlement of Goodwick is largely located on steep wooded cliffs with houses set out across the hillside overlooking Fishguard Bay. Fishguard Bay Hotel is a Grade II listed building set within a Grade II registered park / garden located immediately west of the ferry terminal area. above the existing ferry terminal on the cliff tops to the north is Harbour Village that consists of small cottages overlooking the Bay.

Buildings and infrastructure associated with the ferry terminal are also very noticeable in views along and across the Harbour area.

To the east of the Port lies rocky cliffs that are not as steep as those on the western side and the small settlement of Fishguard with small bungalows hugging the rocky cliffs at Penyraber. Fishguard is closely associated with Goodwick but is separated from Goodwick by a small green area of woodland and fields.

Further east lies the rocky promontory of Fishguard Fort with direct views across Fishguard Harbour and Bay and towards the existing ferry terminal area. This section of the coast is crossed by the Pembrokeshire Coastal Path.

The existing adjoining areas may experience construction noise during the construction phase of the Proposed Development. A detailed noise impact assessment has been undertaken in Chapter 13: Noise and Vibration. As construction noise is temporary, there is no long-term noise impact on noise sensitive receptors. Although adjoining areas will experience impact from construction noise, this will not affect the use of the lands.

18.8.2 Material Assets

Indicative information in relation to their existing services within or adjacent to the Proposed Development site has been provided by a number of the main utility providers. Please refer to Volume III Figures.

18.8.2.1 Water & Sewage Infrastructure

Details of the existing Water assets within and adjacent to the Proposed Development can be found in Volume III Figure 18.1. The existing infrastructure is as follows:

- Main sewer line runs along the western boundary
- Storm water runs along the eastern side gable of railway station building to the south
- Sewer line dissects the mid portion of the site (land side)
- Outfall located within mid portion of site (land side)

There are no private water supplies located within or in close proximity to the Proposed Development site.

18.8.2.2 Electrical Infrastructure

Information was provided by National Grid with respect to the existing underground electrical infrastructure.

Details of existing National Grid assets within the adjacent to the Proposed Development can be found in Volume III Figure 18.2. The existing infrastructure is as follows:

- High voltage Cable (11kV) runs along the western boundary of the site
- Lighting masts within the existing linkspan structure

18.8.2.3 Telecommunications Infrastructure

Information was provided by Openreach Maps on demand portal with respect to the existing telecommunication infrastructure.

Details of existing Openreach assets within the adjacent to the Proposed Development can be found in Volume III Figure 18.3 – 18.5. The existing infrastructure is as follows:

Duct running along the western boundary with associated joint boxes.

18.9 Impact Assessment

This section sets out effects that would occur during the construction and operational phase of the Proposed Development, with respect to land use and material assets.

18.9.1 Do Nothing Scenario

The "do nothing scenario" refers to the potential outcomes if the project does not proceed. Without the Proposed Development, it is assumed the site would remain unchanged and there would be no anticipated change to the baseline conditions. Ongoing issues would continue, and no benefits would be realised from investment in infrastructure and amenities.

The "do nothing scenario" highlights the importance of the Proposed Development in aligning with the Pembrokeshire County Council Local Development Plan objectives.

18.9.2 Assessment of Construction Effects

18.9.2.1 Existing Land Use

The nature of the development requires the whole of the site to be impacted temporarily during construction from a material assets and land use perspective.

The predicted magnitude of impact is considered to be **Medium** with a receptor sensitivity of **Low**, as the site is currently a Port. The significance of the environmental effect is therefore considered to be **Minor**.

18.9.2.2 Adjoining Land Use

The existing residential and commercial areas in close proximity to the Proposed Development site will be impacted by construction noise and traffic during the construction phase of the Proposed Development. A detailed noise impact assessment has been undertaken in Chapter 13: Noise and Vibration. As construction noise is temporary, there is no long-term noise impact on noise-sensitive receptors. Noise mitigation measures are recommended, as discussed in Section 13.10 of Chapter 13.

Although the adjoining areas will experience impact from construction noise and traffic, this will not affect the use of the land as residential and commercial. The predicted magnitude of impacts is considered **Negligible**, with a receptor sensitivity of **High**. The significance of the environmental effect is therefore considered to be **Negligible**.

18.9.2.3 Material Assets

18.9.2.3.1 Water & Sewage

One proposed outfall from the Proposed revetment will connect into the existing water infrastructure.

The predicted magnitude of impacts is considered low, with a receptor sensitivity of low. The significance of the environmental effect is considered to be low/minor beneficial.

18.9.2.3.1.1 Electrical Infrastructure

Underground cables run through the Proposed site as detailed in Figures 18.3 – 18.5.

Existing 12m lighting column within the present linkspan will be removed and replaced within the Proposed revetment with 25m high columns as detailed in Figures 18.6 – 18.8 and lighting assessment in Appendices 18.A and 18.B.

The predicted magnitude of impacts is considered low, with a receptor sensitivity of medium. The significance of the environmental effect is considered to be Moderate given the possible disruption to essential electrical infrastructure.

18.9.2.3.1.2 Telecommunications Infrastructure

Any telecommunication infrastructure in or surrounding the Proposed Development site, including poles and boxes, and any planned proposals.

The predicted magnitude of impacts is considered Medium, with a receptor sensitivity of medium. The significance of the environmental effect is considered to be Minor given the possible disruption to essential telecommunications.

18.9.3 Assessment of Operational Effects

18.9.3.1 Existing Land Use

The majority of the existing land use of the site will see a positive, permanent change from the existing Fishguard linkspan once the Proposed Development is operational. The existing linkspan pontoon and jack up barge does not provide a long-term solution for the ferry at the berth as it is approaching its practical end of life. Therefore, the proposed replacement linkspan pontoon and associated civil and marine infrastructure to allow the continuation of ferry service from the Fishguard Port.

The vision of the Pembrokeshire County Council Local Development Plan states;

““To ensure that Pembrokeshire is prosperous and that it remains vibrant and special by creating: a network of strong urban and rural communities in Hub Towns, Service Centres, Service and Local Villages supported by a robust, sustainable, diverse high value-adding economy underpinned by the Area’s unique environment, maritime access to the Milford Haven Waterway and Fishguard Harbour and internationally important energy and tourism opportunities.”

As such the predicted magnitude of impacts are considered **High Beneficial**. The significance of the environmental effect is therefore considered the land use is considered to be **highly beneficial** impact

18.9.3.2 Adjoining Land Use

There will be **No Impact** to adjoining land use during the operational phase of the Proposed Development.

As such the predicted magnitude of impacts of considered No change. The significance of the environmental effect is therefore considered to be Negligible.

18.9.3.3 Material Assets

18.9.3.3.1 Water & Sewage Infrastructure

One proposed outfall from the Proposed revetment will connect into the existing water infrastructure.

This will provide an efficiency, designed to current standards and protocols. Once an adequate connection is operational the magnitude of the impact is considered to be Low. The significance of the environmental effect is therefore Minor beneficial.

18.9.3.3.2 Electrical Infrastructure

Installation of additional lighting masts and underground cabling will improve the safety and security of the Harbour and embarkment of passengers and traffic.

This work will be undertaken in accordance with industry standard construction methods with minimal disruption to the surrounding area. Works will adhere to specific guidelines to ensure safety and accessibility.

The predicted magnitude of impacts is considered Low. The significance of the environmental effect is therefore considered to be low.

18.9.3.3.3 Telecommunications Infrastructure

There is telecoms infrastructure in the surrounding the Proposed Development site, including ducts and boxes. Works will adhere to specific guidelines to ensure safety and accessibility, and to avoid interference with telecoms infrastructure.

The predicted magnitude of impacts is considered Low. The significance of the environmental effect during the operational phase is considered to be negligible.

18.10 Mitigation

18.10.1 Construction Phase Mitigation

18.10.1.1 Adjoining Land Use

The existing residential areas adjoining the Proposed Development site, or in close proximity will be impacted by construction noise during the construction phase of the Proposed Development. A detailed noise impact assessment has been undertaken in Chapter 13: Noise and Vibration. As construction noise is temporary, there is no long-term noise impact on noise-sensitive receptors. Noise mitigation measures are recommended, as discussed in Section 13.10 of Chapter 13.

18.10.1.2 Water & Sewage Infrastructure

In respect of the water infrastructure, further surveys will be undertaken during the final detailed design stage, to confirm and verify the location of all services within the site. Methods such as Ground Penetrating Radar (GPR) within the Proposed Development site will be used to verify and locate any previously unidentified existing services.

In relation to any water installation work, this is be carried out by Welsh Water or Welsh Water contractors using their pre-established safe systems of work and procedures. Mitigation measures will be for Welsh Water to determine at a later stage of the scheme redevelopment. These will include any specific environmental issues determined within this report. Where mitigation measures above are employed, the potential magnitude of the impact on water infrastructure will be reduced to minor and thus reducing the significance of environmental effect to Minor beneficial/negligible.

18.10.1.3 Electrical Infrastructure

Proposed lighting masts and associated underground cables will be constructed in accordance with industry standard construction methods with minimal disruption to the surrounding area.

In relation to electrical installation work, this will be carried out by National Grid or their approved contractors using their pre-established safe systems of work and procedures. Mitigation measures will be for National Grid to determine at a later stage of the Proposed Development.

A proactive and consistent communication process will be established and maintained with the key statutory agencies in regard to the potential impacts and disturbance on existing infrastructure. This will ensure that works are discussed and planned in a collaborative manner and programmed accordingly to ensure minimal disruption to existing residents, neighbouring land users and service provision.

Where mitigation measures listed above are employed, the potential magnitude of the impact on electrical infrastructure will be reduced to *low* thus reducing the significance of environmental effect to Negligible.

18.10.1.4 Telecommunications Infrastructure

To ensure the protection of telecommunication infrastructure during the construction phase, a comprehensive survey of existing telecommunication assets should be conducted to identify and map out all relevant infrastructure within the construction zone. This will allow for careful planning and avoidance of any potential damage.

Clear communication protocols must be established, ensuring that all construction personnel are aware of the locations of these assets and the importance of avoiding them. It is crucial that telecoms engineers are consulted prior to any works to assess the condition of the infrastructure and provide guidance on best practices for safeguarding it during construction.

Protective barriers and signage should be erected around sensitive areas to deter unauthorized access and minimise the risk of accidental disruption. Regular monitoring and coordination with telecommunication providers throughout the construction process will address any issues and maintain service continuity. Where mitigation measures listed above are employed, the potential magnitude of the impact on telecoms will be reduced to low thus reducing the significance of environmental effect to Negligible.

18.10.2 Operational Phase Mitigation Measures

No mitigation measures are proposed in relation to material assets for the operational phase as there are no significant adverse impacts expected as a result of the operation of the Proposed Development.

18.10.3 Future Monitoring

During the operational phase of the Proposed Development, monitoring under the terms and conditions of the discharge consents (if applicable) in relation to drainage and sewer networks will be conducted to ensure compliance with the emission limit values set which will ensure the quality of the receiving environment is not impacted.

On completion, the storm drainage network for the site will be offered to Welsh Water for adoption. They will then become responsible for the monitoring and maintenance of the network.

18.11 Assessment of Residual Effects

The residual effects associated with the change in land use of the scheme during the construction and operational phase are considered highly beneficial and align with policies within the Pembrokeshire County Council Local Development Plan. Some of these policies include:

- SP 2 Port and Energy Related development
  - Development at the Ports of Milford Haven and Fishguard will be permitted for port related facilities and infrastructure, including energy related development.
- GN.21 Marinas
  - Sites for marinas are located within the existing harbours and docks at Fishguard Harbour and Pembroke Dock.
  - Proposals for new of extended marinas will be permitted where the following criteria are met:
    1. The development is located within or adjoining an existing settlement;
    2. The development would not have a significant detrimental impact on the landscape character of the coast;
    3. Ancillary proposals will not undermine the vitality or viability of facilities in existing centres; and
    4. The proposal would not conflict with the sustainable management of the coast.

The residual effects are therefore deemed **'Significant'** beneficially, for both the construction and operation of the Proposed Development after considering the mitigation outlined above.

18.12 Cumulative Effects

Consideration has been given to a number of other projects which may have the potential to overlap with the Proposed Development based on available information. The scope of the other projects that have been considered as part of this cumulative assessment have been identified through a desk study involving general internet searches and in particular, scrutiny of the Citizen Portal Planning for Pembrokeshire County Council (https://planning.agileapplications.co.uk/pembrokeshire/) and Pembrokeshire Coast National Park (https://planning.agileapplications.co.uk/pcnpa). These are detailed in **Table 18-6** below.

Table 18-6: Cumulative projects

Planning Application Reference	Description of Development	Site Address	Status of Application	Distance	Direction
11/0739/PA	Mixed use development comprising commercial marina, residential apartments, ancillary retail/commercial facilities, together with land reclamation (including the provision of a development	Fishguard Harbour, The Parrog, Goodwick, SA64 0DE	Approved	1.5km	South

Planning Application Reference	Description of Development	Site Address	Status of Application	Distanc e	Direction
	platform), infrastructure (including accesses) and landscaping.				
15/1049/PA	Construction of reclamation platform, breakwaters and revetments, dredged marina basin & channel, public slipway, boat hoist/jetty & service quay, and floating pontoons (Phase 1 Reserved matters of Planning Consent reference 15/1283/PA).	Fishguard Harbour, The Parrog, Goodwick, SA64 0DE	Approved	0.5km	Northeast
15/1283/PA	Variation of conditions and removal of conditions of reference 11/0739/PA	Fishguard Harbour, The Parrog, Goodwick, SA64 0DE	Approved	0.5km	Northwest

18.12.1 In-combination effects

No significant cumulative effects on land use or material assets are expected to arise during either the construction or operational phases of the Proposed Development. However, it is recognized that future developments requiring a connection to Welsh Waters network will need to ensure that adequate infrastructure is in place to accommodate the additional demand.

18.12.2 Effects interactions

The combined or synergistic effects caused by the combination of a number of effects on a particular receptor (taking into consideration effects at the site preparation and earthworks, construction and operational phases), which may collectively cause a more significant effect than individually. A theoretical example is the culmination of disturbance from dust, noise, vibration, artificial light, human presence and visual intrusion on sensitive fauna (e.g. certain bat species) adjacent to a construction site.

18.13 Limitations of the Assessment

There were no limitations that would affect the robustness of the assessment for EIA purposes.

18.14 Summary of Effects and Conclusion

The Proposed Development will not be changing the land use of the site, it will be improving the existing Fishguard linkspan. The redevelopment of the land use once the Proposed Development is in operation is considered highly beneficial and aligns with objectives within the Pembrokeshire County Council Local Development Plan. The improved public utilities will enhance accessibility and functionality, further benefiting the surrounding area.

Provided mitigation measures identified are adhered to the Proposed Development will have no adverse significant impact on material assets and land use. Consultation with relevant utility providers and government bodies will be necessary to minimise disruption to existing infrastructure within and surrounding the site during the construction phase. A summary of the effects of the Proposed Development is included below in Table 18-7.

Table 18-7: Summary of Effects

Description of impact	Phase C	Phase O	Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Water and Sewage Infrastructure	✓	×	Outfall to tie in with existing carried out by Welsh Water or contractor	C: low	C: low	C: Low	None	Negligible	N/A
Electrical Infrastructure	✓	×	Lighting assessment undertaken	C: low	C: medium	C: medium	None	Negligible	N/A
Telecommunication Infrastructure	✓	×	Survey and mapped prior to construction Safety barriers and controls	C: medium	C: Medium	C: Minor	None	Negligible	N/A

18.15 References

The Welsh Marine Plan (Welsh Government, 2019)

Environmental Impact of Project Guidance on the preparation of the Environmental Impact Assessment Report (European Union, 2017)

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 19 Transportation

794-NI-POR-00886R
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19 TRANSPORTATION

19.1 Introduction

This chapter of the ES comprises a transportation assessment of the proposed replacement linkspan at Fishguard Port.

Natural Resource Wales (NRW) have confirmed that Transport should be scoped into the EIA and considers that the ES should include an assessment of the impacts as set out in the Scoping Report which focused on the impacts during the construction phase of the project as the Proposed Development will not result in any additional sailings or increased usage of the Ferry Terminal over the existing levels and therefore the operational phase will have a negligible impact upon the surrounding road network.

The traffic flows generated by Fishguard Port relate to the number vessel sailings and the times of the sailings. Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel sizes will not increase above existing levels, therefore the number of vehicle movements generated by the Port are also not expected to increase above existing levels, resulting in a negligible traffic impact in the operational phase of the Proposed Development.

The construction works will occur over a 12-month period with a 3-month ferry service shutdown. For the first 8 months the ferry services will remain online while the construction works are being carried out, then the ferry services will be offline for 3no. months and then back online for the last month of the construction period. The works will be carried out by approximately 10-15no. construction related staff that will be present at the site.

This chapter contains an assessment which determines that the impact of this construction traffic on the road network during peak times will be negligible, and when the ferry services are offline (3no. months) there will be a temporary increase in road capacity.

Ferry services will return to normal service following the works. The transport networks are not affected by the proposed development, either during the construction stage or the operational stage.

The potential cumulative impact of the proposed development with the committed neighbouring mixed-use development has been considered in this chapter and determines that the cumulative impact will also be negligible.

19.2 Purpose of this chapter

The primary purpose of this chapter of the ES is to provide an assessment of the likely direct and indirect significant effects of the Project on traffic and transport during the construction period as the operational period will be no more onerous in traffic terms than currently occurs on the highway network.

19.3 Study Area

The study area has considered the following junctions which provide the direct linkage between the Proposed Development site and the external road network.

- A487 Wern Road / A40 The Parrog / Station Hill / Local Road
- Local Road / Fishguard Ferry Port / Fishguard Pier Car Park
- Fishguard Ferry Port Access

19.4 Policy Context

The report takes account of the methodology set out in the Chartered Institution of Highways & Transportation (CIHT) Guidelines for Traffic Impact Assessment 1994.

19.4.1 National legislation and policy

The following legislation and policy has been considered within this assessment:

- Planning Policy Wales (2002)

- Technical Advice Note 12: Design (2002)
- Technical Advice Note 18: Transport (2007)
- Guidelines for Traffic Impact Assessment (Chartered Institution of Highways & Transportation; 1994)
- Draft Regional Transport Plan (RTP) South West Wales.

19.5 Consultation

Natural Resource Wales (NRW) have confirmed that Transport should be scoped into the EIA and considers that the ES should include an assessment of the impacts as set out in the Scoping Report which focused on the impacts during the construction phase of the project as the Proposed Development will not result in any additional sailings or increased usage of the Ferry Terminal over the existing levels and therefore the operational phase will have a negligible impact upon the surrounding road network.

The authors have also liaised closely with Stena Line and EIA team to understand the site specific construction methodology being proposed at the site. This has allowed an estimation of construction related vehicles to be calculated for the duration of the construction programme.

19.6 Methodology to inform the baseline (Data Acquisition)

The following data has been acquired to carry out this assessment:

- The existing number of vessel sailings and the sailing schedule;
- The existing traffic volumes at the double access roundabout at the Harbour Access / A40 The Parrog / A487 Wern Road / Station Hill junction;
- The proposed construction programme and associated estimated volumes of construction related vehicles;
- Proposed numbers of construction related staff and the associated traffic flows;
- Proposed working hours for the construction of the scheme.

19.6.1 Desktop study

A desktop study was undertaken of the existing access routes to the operational port. Given that the existing port does accommodate HGV freight, then the surrounding road network is suitable to accommodate construction related traffic.

19.6.2 Site-specific surveys

In order to inform the ES, site-specific traffic surveys were undertaken at a number of junctions on the surrounding road network to inform the traffic and transport assessment as indicated in Table 19.1.

Table 19.1 Summary of site-specific survey data

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Traffic Survey	Local Road / A40 The Parrog / A487 Wren Road / Station Hill	Classified Junction Count & Queue length survey	MHC Traffic Limited	30/01/25 – 31/01/25	
Traffic Survey	Local Road / Ferry Port Access Road	Classified Junction Count & Queue Length Survey	MHC Traffic Limited	30/01/25 – 31/01/25	

Traffic Survey	Ferry Port Access	Classified Junction Count & Queue Length Survey	MHC Traffic Limited	30/01/25 – 31/01/25

19.7 Assessment Methodology

The assessment methodology has followed the approach set out in the Guidelines for Traffic Impact Assessments (CIHT). These guidelines indicate a 10% threshold for uncongested roads and this is the threshold considered within this assessment.

19.7.1 Impact assessment criteria

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 4: Environmental Impact Assessment Process and Methodology.

The criteria for defining impact magnitude in this chapter are outlined in Table 19.2.

Table 19.2 Definition of terms relating to the magnitude of an impact.

Magnitude of impact	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).

The criteria for defining receptor sensitivity in this chapter are outlined in Table 19.3.

Table 19.3 Definition of terms relating to the sensitivity of the receptor.

Sensitivity	Definition
High	High importance and rarity, national scale, and limited potential for substitution. Those affected will not be able to adapt to changes and continue to maintain-pre impact status.

Medium	High or medium importance and rarity, regional scale, limited potential for substitution. Able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.
Low	Low or medium importance and rarity, local scale Those affected are able to adapt with relative ease and maintain pre-impact status.
Negligible	Very low importance and rarity, local scale Those affected are able to adapt easily and maintain pre-impact status.

The significance of the effect upon traffic and transport is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 19.4. Where a range of significance of effect is presented in Table 19.4, the final assessment for each effect is based on calculated assessment and professional judgement.

For the purposes of this assessment, any effects with a significance level of low or less have been concluded to be not significant in terms of the EIA Regulations.

Table 19.4 Matrix used for the assessment of the significance of the effect.

		Sensitivity of Receptor / Receiving Environment to Change / Effect			
Magnitude of Change		**High**	**Medium**	**Low**	**Negligible**
	High	**Major**	**Major**	**Moderate**	Negligible
	Medium	**Major**	**Moderate**	Minor	Negligible
	Low	**Moderate**	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Based on the proposed volume of traffic associated with the construction phase the magnitude of impact is predicted to be negligible and the sensitivity is also deemed to be negligible. Therefore, the overall significance of effect in relation to traffic and transport is deemed to be negligible.

19.8 Baseline Environment

19.8.1 Existing Vehicular Access to Fishguard Harbour

Vehicular access to the port is currently provided via a double roundabout at the Harbour Access / A40 The Parrog / A487 Wern Road / Station Hill junction. The junction location is shown in Figure 19.1.

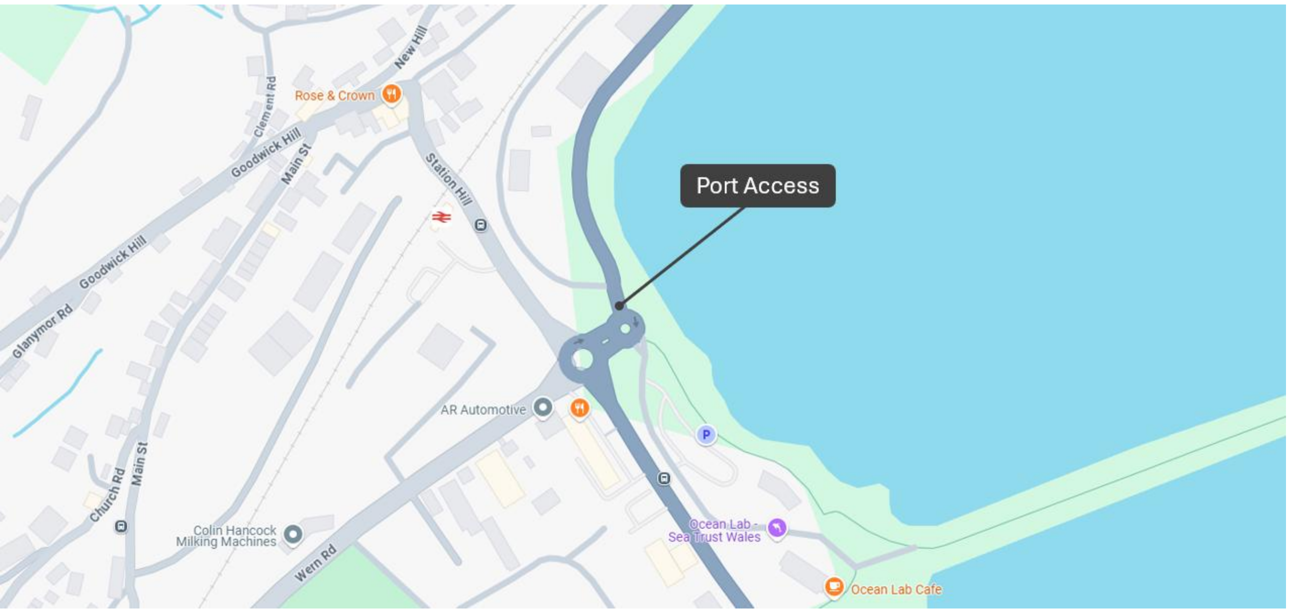

Figure 19.1: Location of Existing Port Access (Source - Google Maps)

The eastern roundabout of the double configuration currently serves as the primary port access and access to an adjacent public car park. The western roundabout acts as the main through route connecting to the wider road network and towards Fishguard town centre.

The western roundabout is approximately 31 metres in diameter, with single lane approaches on the north, west and south arms, and a singular circulatory carriageway. The eastern approach arm, which serves as an exit route from the public car park and port, has a two-lane approach, approximately 12 metres in length. Splitter islands are also provided on all approach arms of the roundabout as shown in Figure 19.2.

Figure 19.2: Illustration of Existing Port Roundabout Access (Google Maps)

The existing site is very well located in relation to access to the strategic road network. In the vicinity of the site, the A40 is a single carriageway two-way road, which is subject to a 30mph speed limit. The carriageway is approximately 7.3 metres wide with footways provided on both sides of the carriageway. Street lighting is also provided to the east of the carriageway. As well as providing access to Fishguard Port, the A40 The Parrog serves as a link between Fishguard town centre and residents areas to the north and west of the site.

19.8.2 Identify Peak Traffic Times Using Ferry Sailing Times

Fishguard Port accommodates vehicles and freight that travel on and off the vessel on wheels. These are known as Ro-Ro movements - an abbreviation of Roll On - Roll Off. Traffic generated by Ro-Ro ports is directly linked to the number of sailings per day, the time of the sailings, and the throughput of each vessel i.e. the number of passenger vehicles and freight vehicles. Therefore, an understanding the vessel sailings timetable helps to interpret the likely traffic flow profile and identify the peak traffic times.

Currently, Fishguard Port provides services using the Ro-Ro ferry MS Stena Europe, which is 149 metres long and has 1,120 lane metres, seen in Figure 19.3 below.

Figure 19.3: MS Stena Europe Currently Operational at Fishguard Port

The vessel sails twice daily between Fishguard and Rosslare in the Republic of Ireland. Table 19.5 illustrates the sailings timetable over a typical day as it travels between Fishguard and Rosslare Harbour.

Table 19.5: Sailings Timetable over a Typical Day between Fishguard and Rosslare

24 Hours	Fishguard Harbour	Rosslare Harbour
00:30	Check in for next departure closes at 00:30	
01:00		
01:30	Vessel departs Fishguard at 01:30	
02:00		
03:00		
04:00		
05:00		
05:30		Vessel arrives at Rosslare at 05:30
06:00		
07:00		
08:00	Typical AM peak hour for external traffic 08:00-09:00	
08:15		Vessel departs Rosslare at 08:15
09:00		
10:00		
11:00		
11:45	Vessel arrives at Fishguard at 11:45	
12:00	Traffic will disembark from vessel shortly after	
13:00	Check in for next departure closes at 13:00	
14:00	Vessel departs Fishguard at 14:00	
15:00		
16:00		
17:00	Typical PM peak hour for external traffic 17:00 – 18:00	
17:30		Vessel Arrives at Rosslare at 17:30
18:00		
19:00		
19:30		Vessel departs Rosslare at 19:30
20:00		
21:00		
22:00		
23:00	Vessel arrives at Fishguard at 23:00	
24:00	Traffic will disembark from vessel shortly after	

Table 19.5 shows that the peak ferry activity, and therefore the peak traffic activity associated with the harbour, will occur between 11:15 - 13:10 and between 21:25 - 23:45.

The peak times on an external road network occur during the typical weekday AM and PM commuter peak hour periods. Therefore, the ferry schedule already contributes towards minimising the impact of port traffic on the local external road network at peak times simply by the nature of the sailing times.

The analysis shown on Table 19.5 identifies the 3 peak traffic periods that will occur while the proposed development is under construction:

- External Road Network Weekday AM peak hour;
- Inter-peak caused by the Midday sailing activity at the Port;
- External Road Network Weekday PM peak hour.

The nighttime sailing, causing activity between 21:25 - 23:45, will occur at an off-peak time for the external road network and won't be considered as a peak period. In addition, the proposed construction working hours finish at 19:00 for the weekday and there won't be any interaction between harbour traffic and construction traffic after this time.

19.8.3 Existing Traffic Flows

Stena Line has advised that typically the highest freight and passenger flows occur on Thursday / Friday and therefore in order to determine the existing traffic flows at the harbour, new classified traffic count surveys were undertaken by MHC Traffic Ltd on Thursday 30th January and Friday 31st January 2025 at the A40 The Parrog / A487 Wern Road / Station Hill / Fishguard Port double roundabout access junction and the existing access to the Ferry Port. Traffic surveys were carried out for the 12-hour period between 07:00-19:00 on both days to ensure that the AM, PM and interpeak times were surveyed and to cover the 12-hour working day proposed for the construction works. The traffic flows diagrams are contained in Volume III, Appendix 19.1.

The surveyed traffic flows have been converted to Passenger Carrier equivalent Units (PCU) using the conversion factors from the Transport for London (TfL) Traffic Modelling Guidelines as shown in Table 19.6. PCUs are industry standard unit for traffic flows.

Table 19.6: PCU Conversion Factors: TfL Traffic Modelling Guidelines

Mode	PCU Value
Pedal Cycle	0.2
Motorcycle	0.4
Passenger Car	1.0
Light Goods Vehicle (LGV)	1.0
Medium Goods Vehicle (MGV)	1.5
Buses and Coaches	2.0
Heavy Goods Vehicle (HGV)	2.3
Articulated Buses	3.2

Figure 19.4 below indicates the traffic flow profile (in 15-minute time segments) for the 12-hour period 07:00 to 19:00 (both Thursday and Friday). The flows shown are the two-way flows at the harbour access arm of the roundabout.

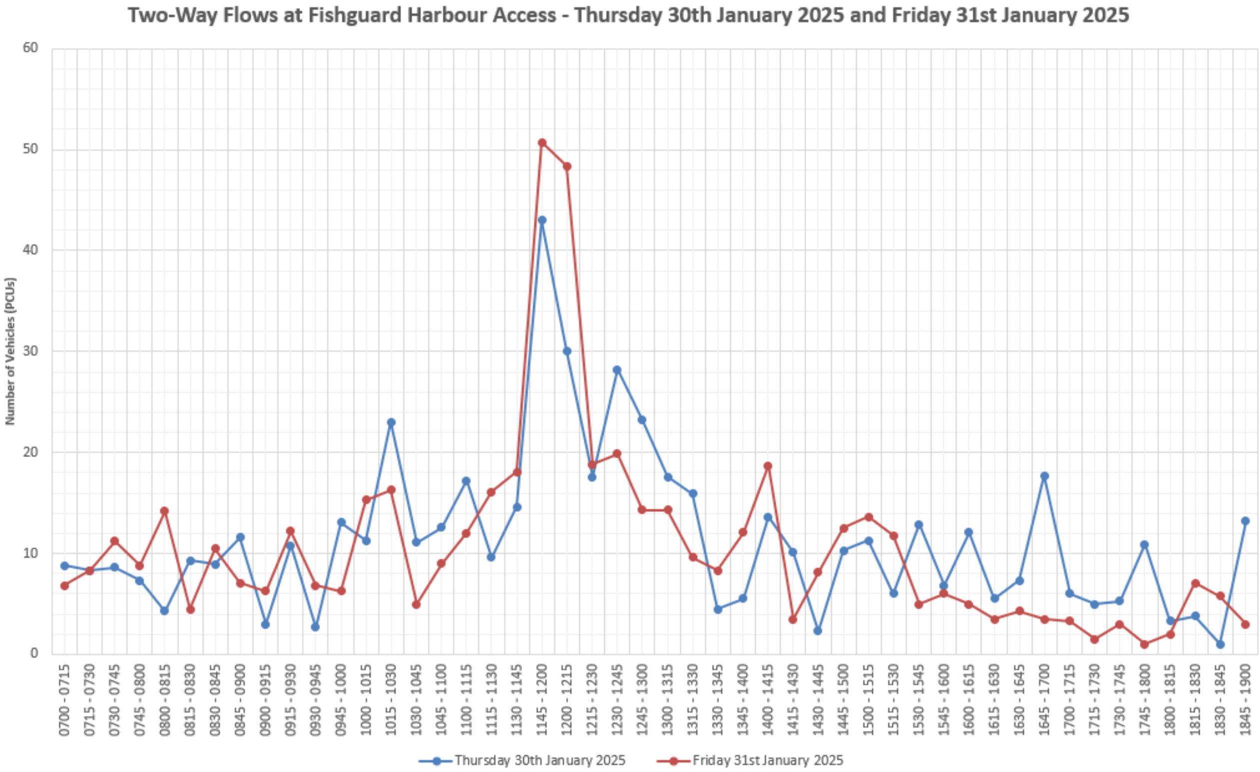

Figure 19.4: Two-Way Traffic Flows at Fishguard Port Access - Thursday 30th and Friday 31st January 2025 - 07:00 to 19:00

Figure 19.4 confirms that the traffic profile at the access is consistent with the ferry timetable summarised in Table 19.5 above. Figure 19.4 indicates that there is a continuous low flow of traffic associated with the Ferry Port access throughout the day with traffic activity increasing in connection with the ferry sailing timetable, spiking to a maximum of 51PCU in the 15-minute period (1145 – 1200) when the vessel disembarks shortly after arriving at the harbour.

Table 19.7 below summarises the total number of vehicles in PCUs at the harbour access between 07:00 and 19:00 for Thursday 30th and Friday 31st January 2025. These figures are confirmed in the traffic flow diagram contained in Volume III, Appendix 19.1.

Table 19.7: Two-Way Traffic Flows at Fishguard Port Access for Thursday 30th January 2025 and Friday 31st January 2025 - 12 hours between 07:00 to 19:00

Date	No. of Vehicles (PCUs) – 12 Hours between 07:00 to 19:00		
	Arrivals	Departures	Totals
Thursday 30th January 2025	298	248	546
Friday 31st January 2025	264	249	513

The results in Table 19.7 indicate a similar level of overall traffic (arrivals and departures) on both Thursday and Friday survey days.

The traffic survey found that the peak hours on the road network surveyed as part of this Proposed Development (for both days) are:

- 0815 - 0915 External Road Network Weekday AM peak hour
- 1145 - 1245 (associated with the Midday sailing activity at the port)
- 1645 - 1745 External Road Network Weekday PM peak hour

Peak hour traffic flows at the at the A40 The Parrog / A487 Wern Road / Station Hill / Fishguard Port double roundabout access junction for each of the peak hours are contained in Volume III, Appendix 19.1.

19.9 Impact Assessment

19.9.1 Do Nothing Scenario

The Do-Nothing Scenario will result in no impact upon the surrounding highway network as the Ferry Port will continue to operate as it currently does.

19.9.2 Assessment of Construction Effects

The construction works are anticipated to occur over a 12no. month period. For months 1-8no. and month 12no. the ferry service will remain online while the construction works are being carried out. For the months 9-11no. of the construction period the existing ferry services will be suspended. The construction programme is seen in Table 19.8.

During the proposed construction, working hours will be:

- Monday to Sunday – 07:00 to 19:00 hrs;

No significant construction noise activities shall be permitted outside of these hours except as necessary for operational or safety reasons.

Table 19.8 - Estimation of Construction Traffic during the 12-Month Construction Programme

Construction Activity	Unit	Quantity (approx)	Unit weight (t)	Density		TotalWgt (t)	Wgt per Vehicle	Total No. Of Vehicles	Total No. Of Two-way Trips	Ship Online								Ship Offline			Ship Online	Comments
										Jan-26 (two-way trips)	Feb-26 (two-way trips)	Mar-26 (two-way trips)	Apr-26 (two-way trips)	May-26 (two-way trips)	Jun-26 (two-way trips)	Jul-26 (two-way trips)	Aug-26 (two-way trips)	Sep-26 (two-way trips)	Oct-26 (two-way trips)	Nov-26 (two-way trips)	Dec-26 (two-way trips)	
Mobilisation	nr	1						**20**	**40**	20	20											
Pile Setup	nr							**10**	**20**				6	14								
Steel Deliveries for Piling	t	266				266	20	**13**	**27**			28										
Mesh and rebar Deliveries for Concrete Operations	t	49				49	20	**2**	**5**			2	2	0								
Concrete (Dolphin / Bankseat Structures)	m3	259		2.4	t/m3	622	20	**13**	**26**				12	14								
Asphalt	m3	600		2.4	t/m3	1440	20	**30**	**60**						20	30	10					
Rock Armour deliveries	m3	8500		2.65	t/m3	22525	26	**327**	**654**		120	240	294									inc underlayer x 1:1.5 slope Rock armour to be stockpiled within the first month
Rockfill Core Deliveries	m3	15000		1.8	t/m3	27000	26	**577**	**1154**		200	554	400									Rockfill core to be stockpiled within the first month
Demolition Vehicles								**70**	**140**			40						60	40			
Linkspan Services/Personell								**40**	**80**									10	70			
Onshore works								**150**	**300**					40	40	40	40	60	60	20		
Site Cars (staff)										400	400	400	400	400	400	400	400	600	600	400	200	
Total (All Vehicles)								**1103**	**2205**	**420**	**740**	**1264**	**1114**	**468**	**460**	**470**	**450**	**730**	**770**	**420**	**200**	
Total HGV								**1253**	**2505**	**20**	**340**	**864**	**714**	**68**	**60**	**70**	**50**	**130**	**170**	**20**	**0**	
Total No. of Construction Related Vehicles (Cars + HGV) Two-way Trips Per Day									Total Trips	**14**	**26**	**41**	**37**	**15**	**15**	**15**	**15**	**24**	**25**	**14**	**6**	
Total No. of Site Cars (staff) Two-way Trips Per Day									Total Site Cars	**13**	**14**	**13**	**13**	**13**	**13**	**13**	**13**	**20**	**19**	**13**	**6**	Working 7 Days a Week
Total No. of HGVs Two-way Trips Per Day									Total HGV Trips	**1**	**12**	**28**	**24**	**2**	**2**	**2**	**2**	**4**	**5**	**1**	**0**	
Total No. of HGVs Two-way Trips Per Hour									Total HGV Trips	**0.05**	**1.01**	**2.32**	**1.98**	**0.18**	**0.17**	**0.19**	**0.13**	**0.36**	**0.46**	**0.06**	**0.00**	12 Hour Work Days

19.9.2.1 Proposed Construction Staff Vehicles

The proposed development will be carried out by approximately 10-15 construction related staff that will be present at the site.

On a workday, when the working hours are 07:00 to 19:00, a worst case assumption would be that 10-15 private staff vehicles arrive prior to 07:00 and depart after 19:00. This could be considered as a robust assessment as it assumes that each staff member arrives in their own car with no shared trips by staff and all members of construction staff don't necessarily start at the same time.

These traffic volumes are low, and as the arrivals and departures would fall outside of the peak hour traffic flows on the external road network and therefore would have a negligible impact. For months 1-8no. and month 12no. of the construction period, when the ferry services remain online, the construction staff vehicles avoid the midday interpeak traffic activity at the Port and therefore are a negligible impact.

For the 3no. months of the construction period when the ferry service is offline there will be large overall decrease in traffic flows at the port.

In summary, even for a worst case assessment the impact of the traffic generated by the 10-15 staff members would be minimal and occur at off peak times.

19.9.2.2 Proposed Construction Vehicles

Table 19.8 provides an estimation of construction related vehicles during the 12no. month construction period. It breaks the programme into monthly activities and indicates the number of construction vehicles (two-way trips) per month, then the average per day and per hour.

As indicated in Table 19.8 the most onerous construction period is identified as Month 3 (March 2026) when there is predicted to be an average of 28no. total (two-way trips) HGVs per working day (working 7 days a week) and 2.3no. HGVs per hour (based on a 12no. hour working day). The other months of the construction programme generate significantly less HGVs and therefore the assessment is based on the worst case month for a robust assessment.

Assuming that each construction vehicle has a PCU value of 2.3, which is the most robust conversion value selected from Table 19.6 above, equates to (28 x 2.3) 64no. total PCUs at the site per day and therefore 32no. PCUs arriving to the site and 32no. PCUs departing the site each day between 07:00 and 19:00.

Table 19.9 below summaries the existing traffic flows for the 12 hours between 07:00 and 19:00, as shown diagrammatically in Volume III, Appendix 19.1. It adds in the worst case construction traffic, 32 PCUs arriving and 32 PCUs departing while the vessels are still online and operational. Table 19.9 also identifies the percentage impact on the three main approaches to the Ferry Port (assuming one third of arriving / departing construction traffic comes from each approach route), and shows the percentage impact in traffic flows on the three approach roads to the site – Station Hill, A40 The Parrog and A487 Wren Road.

Table 19.9: Two-Way Traffic Flows at Fishguard Port Access Junction for Thursday 30th January 2025 and Friday 31st January 2025 - 12 hours between 07:00 to 19:00

		The 12 Hour Period Between 07:00 and 19:00											
		No. of Existing Vehicles (PCUs)			Worst Case No. of Generated Construction Related Vehicles (PCUs)			Proposed No. of Vehicles (PCUs) during the Construction Period			Worst Case Percentage Impact		
Approach Route to Fishguard Harbour	Peak Day	Arrive	Depart	Total	Arrive	Depart	Total	Arrive	Depart	Total	Arrive	Depart	Total
Station Hill	Friday	1393	1687	3080	11	11	22	1404	1698	3102	1.0%	0.8%	0.9%
A40 The Parrog	Friday	2735	2819	5555	11	11	22	2746	2830	5577	0.5%	0.5%	0.5%
A487 Wren Road	Friday	1642	1243	2885	11	11	22	1653	1254	2907	0.9%	1.1%	1.0%

Table 19.9 indicates that the proposed construction traffic will have a minimal impact upon the surrounding highway network during the construction period.

Furthermore, even if all construction vehicles arrive / departed via only one of the approach routes as indicated above, the impact would still be insignificant as it would fall within the 10% daily variance of traffic flows, as indicated within the Guidelines for Traffic Impact Assessments as presented below.

- Station Hill 64/3080 x 100 = 2.1%
- A40 The Parrog 64/5555 x 100 = 1.2%
- A487 Wren Road 64/2885 x 100 = 2.2%

The Chartered Institution for Highways & Transportation has published Guidelines for undertaking Traffic Impact Assessments. These Guidelines have been used as a basis for the assessment of the traffic generated by the proposed development. Guidelines recommend that a Traffic Impact Assessment should be produced when one or more of the following thresholds are exceeded:

- Traffic to and from the development exceeds 10% of the existing two-way flow on the adjoining highway;
- Traffic to and from the development exceeds 5% of the existing two-way flow on the adjoining highway, where traffic congestion exists or will exist within the assessment period, or in other sensitive locations.

In this context the robust worst case percentage impacts of between 2.2% and 1.2% on any of the 3no. approach routes do not breach the identified thresholds and therefore indicates an insignificant impact with no further analysis required.

The percentage impacts shown in Table 19.9 are based on existing traffic flows collected in 2025. The construction is anticipated to occur over a 12-month period. During this time background traffic growth may be experienced on the road network, but this will only serve to reduce the percentage impacts further.

19.9.3 Assessment of Operational Effects

Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel size are not expected to increase above existing levels. The related number of generated vehicle movements are also not expected to increase above existing levels.

Therefore, there will be no traffic impact associated with the replacement Linkspan scheme once construction is completed and no requirement for an assessment of operational effects.

19.10 Mitigation

As is typical to the construction process, the appointed Contractor will liaise with the Local Highway Authority to agree the proposed construction traffic management measures prior to the start of the construction period. This will ensure the proposed construction activities and working hours assessed within this chapter can be implemented. However, there is no mitigation associated with the proposed construction period as the surrounding road network can accommodate the predicted levels of HGV traffic.

19.10.1 Construction Phase Mitigation Measures

There is no mitigation associated with the proposed construction period as the surrounding road network can accommodate the predicted levels of HGV traffic.

19.10.2 Operational Phase Mitigation Measures

There is no mitigation associated with the operational phase of the proposed development as the proposal will not result in an increase in the number of trips associated with the Ferry Port.

19.10.3 Future Monitoring

There are no proposals for future monitoring as once the Proposed Development is completed the Ferry Port will continue to operate as it currently does.

19.11 Assessment of Residual Effects

The Proposed Development will not result in any increase in operational traffic at the Ferry Port once the construction phase is completed and therefore it is predicted that there will be no residual impacts from the Proposed Development in relation to traffic and transport.

19.12 Cumulative Effects

There are no cumulative projects which could result in a cumulative effect on the surrounding highway network.

19.12.1 In-combination effects

It is considered that there will be no in combination effects in transportation terms associated with the proposed development.

19.12.2 Effects Interactions

It is predicted that there will be no effects interactions associated with the Proposed Development in relation to traffic and transport. The Ferry Port currently accommodates HGV traffic volumes and therefore the predicted increase associated with the construction phase is well within the identified daily variance as indicated in the Guidelines for Traffic Impact Assessments.

19.13 Limitations of the Assessment

There are no known limitations which would affect the robustness of this assessment for the purposes of the EIA.

19.14 Conclusion

Traffic generated by Ro-Ro ports is directly linked to the number of sailings per day, the time of the sailings, and the throughput of each vessel i.e. the number of passenger vehicles and freight vehicles. This chapter has undertaken an assessment of the vessel sailings timetable to interpret the likely traffic flow profile and identify the peak traffic times.

In order to determine the existing traffic flows at the harbour, new classified traffic count surveys were undertaken by MHC Traffic Ltd on Thursday 30th and Friday 31st January 2025 at the A40 The Parrog / A487 Wern Road / Station Hill / Port double roundabout access junction and the access to the Ferry Port for the 12-hour period between 07:00 and 19:00. This time period covered:

- External Road Network Weekday AM peak hour;
- Interpeak caused by the Midday sailing activity at the Port;
- External Road Network Weekday PM peak hour;
- The 12-hour proposed weekday construction working hours of 07:00-19:00.

Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel sizes are not expected to increase above existing levels, therefore the number of vehicle movements generated by the Ferry Port (the operational phase) are also not expected to increase above existing levels, resulting in a negligible traffic impact.

An estimation of construction related vehicles calculated for the duration of the construction programme has been derived based on the proposed working hours for the construction phase.

The construction works will occur over a 12-month period. For 9no, months of the 12no. month construction period the Ferry Port will remain operational, and will only be offline for 3no. months. During the most onerous month of construction, it is predicted that there will be an average of 28no. total HGV movements at the site per day (working 7 days a week) and an average of 2.3no. total HGV movements per hour (based on a 12no.

hour working day). Therefore, this has been assessed above and determine to have an insignificant impact upon the surrounding road network.

The works will be carried out by approximately 10-15 construction related staff that will be present at the site, the staff are likely to arrive and depart outside of the main construction hours and will have an insignificant impact upon the surrounding highway network.

As part of the construction phase, the appointed Contractor will liaise with the Local Highway Authority to agree the proposed construction traffic management measures prior to the start of the construction period. This will ensure the proposed construction activities and working hours assessed within this chapter can be implemented.

This chapter therefore concludes that the impact of the scheme in transportation terms is negligible.

Description of impact	Phase C	Phase O	Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Employment growth arising from the Project	✓	✗	None	C: Medium O: Low	C: Medium O: Low	C: Moderate adverse O: Minor adverse	None	Slight beneficial	None
Traffic Impact during Construction	C		None	O	O	O	None	Nil Net Change	None
Operational Impacts	O		None	O	O	O	None	Nil Net Change	None

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 20 Seascape, Landscape and Visual Impact Assessment

794-NI-POR-00886R
May 2025

20 SEASCAPE, LANDSCAPE AND VISUAL IMPACT

20.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as “the Proposed Development”) on Seascape, Landscape and Visual (SLV) resources in the surrounding area. This chapter considers the potential impacts to the seascape and landscape from the Project during the construction and operational phases of the Proposed Development.

The main objectives of this assessment are to:

- Undertake a desktop study to identify existing landscape resources and visual receptors within the study area to assess current baseline conditions locally and nationally;
- Assess the potential impact of the proposed construction and operation phases of the Proposed Development on landscape and visual resources; and
- Recommend mitigation measures in relation to the proposed construction and operational and phases, if necessary, and predict residual impacts.

The assessment presented is informed by the following key chapters of the ES:

- Chapter 2: Project Description

Other aspects relevant to flood risk are addressed in the specific chapters of the ES, namely:

- Chapter 5: Scoping and Consultation
- Chapter 7: Human Health and Population
- Chapter 9: Terrestrial Ecology
- Chapter 10: Coastal Processes; and
- Chapter 16: Archaeology, Architectural and Cultural Heritage.

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

20.2 Purpose of this chapter

The primary purpose of this ES chapter is to provide an assessment of the likely direct and indirect significant effects of the Proposed Development on seascape, landscape and visual receptors. This ES chapter:

- Presents the existing seascape, landscape and visual baseline established from desk studies, relevant datasets and consultation (section 20.3);
- Identifies any limitations encountered in compiling the information;
- Presents an assessment of the potential likely significant effects on seascape and landscape receptors (section 20.6) and visual receptors (section 20.7) arising from the Proposed Development based on the information gathered and the analysis and assessments undertaken.
- Highlights any necessary monitoring and/or measures to prevent, minimise, reduce or offset the likely significant environmental effects identified in the assessment.

20.3 Study Area

Using terrain-modelling techniques combined with the Proposed Development specification a map has been created which identified areas from which the Proposed Development may theoretically be visible. This Zone of Theoretical Visibility (ZTV) is the area within which views of the Proposed Development can theoretically be obtained, determined by the topography of the area and is representative of a theoretical worst-case scenario in line with current guidance.

The ZTV (refer to Volume III Figure 20.1) forms the basis for the Seascape, Landscape and Visual Impact Assessment (SLVIA) study area associated with the Proposed Development. It is noted that the ZTV does not consider local features such as; hedgerows, field boundary hedgerows, woodland planting, coniferous forestry or buildings. In practice the actual visibility of the Proposed Development is considerably less in extent than the theoretical one, since individual elements of the proposal are difficult to focus on at long distances and localised changes in topography, hedges, trees, woodland and built form tend to restrict views.

The ZTV was assessed against the elements of the Proposed Development, the footprint of the Proposed Development, the receiving landscape and the perceptibility of elements of the Proposed Development. Site surveys and assessment established that vertical elements associated with the Proposed Development are not easily perceived within the wider landscape.

20.4 Policy Context

20.4.1 Local Planning Policy

The site for the Proposed Development falls within Pembrokeshire County Council, and as such the policies contained within the Pembrokeshire County Council Local Development Plan (PCCLDP) are of relevance to this Seascape, Landscape and Visual Impact Assessment (SLVIA). The current PCCLDP was adopted in February 2013 and Pembrokeshire County Council is currently reviewing the PCCLDP, but it is expected that the findings of the review and the adoption of the LDP2 will not take place until 2026. Until then, the current PCCLDP that was adopted in 2013 is still the extant PCCLDP and has been used for this assessment and policy review. Additionally, the Pembrokeshire Coast National Park LDP 2 is also applicable to this development.

Following a review of the PCCLDP and the Pembrokeshire Coast National Park LDP 2, the following Policies are considered relevant to this SLVIA;

- **Policy GN.1 General Development Policy**:

Development will be permitted where the following criteria are met:

1. *The nature, location, siting and scale of the proposed development is compatible with the capacity and character of the site and the area within which it is located;*
2. *It would not result in a significant detrimental impact on local amenity in terms of visual impact, loss of light or privacy, odours, smoke, fumes, dust, air quality or an increase in noise or vibration levels;*
3. *It would not adversely affect landscape character, quality or diversity, including the special qualities of the Pembrokeshire Coast National Park63 and neighbouring authorities;*
4. *It respects and protects the natural environment including protected habitats and species;*
5. *It would take place in an accessible location, would incorporate sustainable transport and accessibility principles and would not result in a detrimental impact on highway safety or in traffic exceeding the capacity of the highway network;*
6. *Necessary and appropriate service infrastructure64, access and parking can be provided;*
7. *It would not cause or result in unacceptable harm to health and safety;*
8. *It would not have a significant adverse impact on water quality; and*
9. *It would neither contribute to the coalescence of distinct settlements nor create or consolidate ribbon development.*

- **Policy GN.2 Sustainable Design:**

Development will be permitted where relevant criteria are met:

1. *It is of a good design which pays due regard to local distinctiveness and contributes positively to the local context;*

2. *It is appropriate to the local character and landscape/townscape context in terms of layout, scale, form, siting, massing, height, density, mix, detailing, use of materials, landscaping and access arrangements / layout;*
3. *It incorporates a resource efficient and climate responsive design through location, orientation, density, layout, land use, materials, water conservation and the use of sustainable drainage systems and waste management solutions;*
4. *It achieves a flexible and adaptable design;*
5. *It creates an inclusive and accessible environment for users that addresses community safety;*
6. *It provides a good quality, vibrant public realm that integrates well with adjoining streets and spaces and*
7. *It contributes to delivering well-designed outdoor space with good linkages to adjoining streets, spaces and other green infrastructure.*

- **Policy GN.34 Protection and Creation of Outdoor Recreation Areas:**

Outdoor recreation areas, which include public open spaces, leisure routes and recreational facilities, are protected. Development will be permitted on outdoor recreation areas where:

1. *The area has no significant public recreational value; or*
2. *A suitable replacement facility is to be made available; or*
3. *The recreational facilities will be enhanced through the redevelopment of part of the site.*

New outdoor recreation area(s) will be permitted where the following criteria are met:

1. *It is well located to serve community needs;*
2. *It is of appropriate size, design and form to meet the needs of the people it is intended to serve; and*
3. *Provision is made for the future management and maintenance of the site / route.*

- **Policy GN. 35 Protection of Open Spaces with Amenity Value:**

Development which would adversely affect the appearance, character or local amenity value of areas of public and private open space will not normally be permitted. In exceptional circumstances, where the proposal will bring clear social and/or economic benefits to the local community and make a positive contribution to the built environment, development may be permitted where it can be demonstrated that no suitable alternative site is available.

- **Policy GN. 36 Green Wedges**

In order to prevent the In order to prevent the coalescence of settlements Green Wedges have been identified at the following locations:

- *Haverfordwest / Merlins*
- *Bridge (east)*
- *Haverfordwest / Merlins*
- *Bridge (west)*
- *Haverfordwest / Portfield*
- *Gate*
- *Neyland / Llanstadwell*
- *Fishguard / Goodwick*
- *Fishguard / Lower Town*
- *Tenby / Penally*

These areas have particular importance in maintaining the distinct identities of separate communities. Within the Green Wedges there will be a general presumption against inappropriate development.

- **Policy GN. 37 Protection and Enhancement of the Historic Environment**

Development that affects sites and landscapes of architectural and/or historical merit or archaeological importance, or their setting, will only be permitted where it can be demonstrated that it would protect or enhance their character and integrity.

- **Policy 8 Special Qualities**

The special qualities of the Pembrokeshire Coast National Park will be conserved and enhanced. The priorities will be to ensure that:

a) *The sense of remoteness and tranquillity is not lost and is wherever possible enhanced (see Policy 9).*
b) *The identity and character of towns and villages is not lost, through coalescence and ribboning of development or through the poor design and layout of development and is wherever possible enhanced. The identification of Green Wedges will assist in achieving this priority.*
c) *The pattern and diversity of the landscape is protected and wherever possible enhanced (see Policy 14).*
d) *The historic environment is protected and where possible enhanced.*
e) *Development positively enhances the National Park's ecosystems and the components that underpin them. The protection and enhancement of links between sites or the creation of links where sites have become isolated is of particular importance (see Policy 10, Policy 11, Policy 12 and Policy 29).*
f) *Development conserves and wherever possible enhances Geological Conservation Review sites or any other important geological resource (see Policy 12).*
g) *Species and habitats are conserved and enhanced for their amenity, landscape and biodiversity value.*
h) *The Welsh language remains an important component in the social, cultural and economic life of many communities in the Park (see Policy 13).*
i) *Development of the undeveloped coast is avoided and sites within stretches of the developed coast are protected for uses that need a coastal location (see Policy 17, Policy 18, Policy 33) and Policy 38).*
j) *The National Park's network of green infrastructure both new and existing is protected and enhanced (see Policy 10, Policy 11, Policy 12, and Policy 15).*

In assessing the impact upon the special qualities of the National Park, matters of detail and cumulative impact will be given special consideration.

20.5 Methodology to inform the baseline

20.5.1 Desktop study

Information on seascape, landscape and visual resources within the SLVIA Study Area was collected through a detailed desktop review of existing studies and datasets.

Baseline conditions have been identified and assessed through an analysis of;

- Up to date digital copies of Ordnance Survey Discovery Series raster and OS vector maps, to aid in the identification of existing soft and hard landscape features including woodland areas and areas of built form;
- Aerial photography, to aid in the identification of features contained within the surrounding landscape context such as hedgerows, woodland planting, areas of built form and scattered residential development and road networks; Pembrokeshire Coast National Park Local Development Plan;
- LANDMAP;
- Supplementary Planning Guidance: Seascape Character Assessment December 2023;
- Welsh seascapes and their sensitivity to offshore developments (Countryside Council for Wales 2009); and
- Local Development Plans to identify and review the policies applicable to the development site and the proposed development form. Review of the local development plan also undertaken to identify any landscape designations within the study area associated with the Proposed Development ;
- Drawings of the Proposed Development to aid in the assessment of the potential impacts of the Proposed Development on landscape features and elements contained within and adjacent of the development site boundary.

20.5.2 Site-specific surveys

To inform this chapter of the ES, a site visit was undertaken to assess the existing environment, to establish the existing visual resource and to identify sensitive receptors, i.e. residential properties, scenic viewpoints. The site visit was also used to consider the potential effects on seascape / landscape character and visual impacts arising because of the Proposed Development as indicated in Table 20-1.

Table 20-1 Summary of site-specific survey data

Title	Extent of survey	Overview of survey	Survey contractor	Date	Reference to further information
Photographic Survey	Study Area	Undertaking site photography and visual appraisal within the SLVIA Study Area	RPS	24/10/2024	Photomontages provided in Volume III

20.6 Assessment Methodology

General Approach

The methodology and approach to the assessment contained within this chapter has been based on the relevant guidance described in the following documents;

- Guidelines for Landscape and Visual Impact Assessment, Third Edition (The Landscape Institute and Institute of Environmental Management & Assessment, 2013) (GLVIA3);
- Technical Guidance Note 06/19 Visual Representation of Development Proposals (The Landscape Institute, 2019).

GLVIA3 recommends that an LVIA *'concentrates on principles and process' and 'does not provide a detailed or formulaic 'recipe"* to assess effects, it being the '*responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand*' (preface to the third edition).

The effects on the landscape resources or visual receptors (people) are assessed by considering the proposed change in the baseline conditions (the impact of the proposal) against the type of landscape resource or visual receptor (including the importance and sensitivity of that resource or receptor). The methodology is set out in detail below and summarised Figure 20-1 Assessment Methodology Summary.

These factors are determined through a combination of quantitative (objective) and qualitative (subjective) assessment using professional judgement.

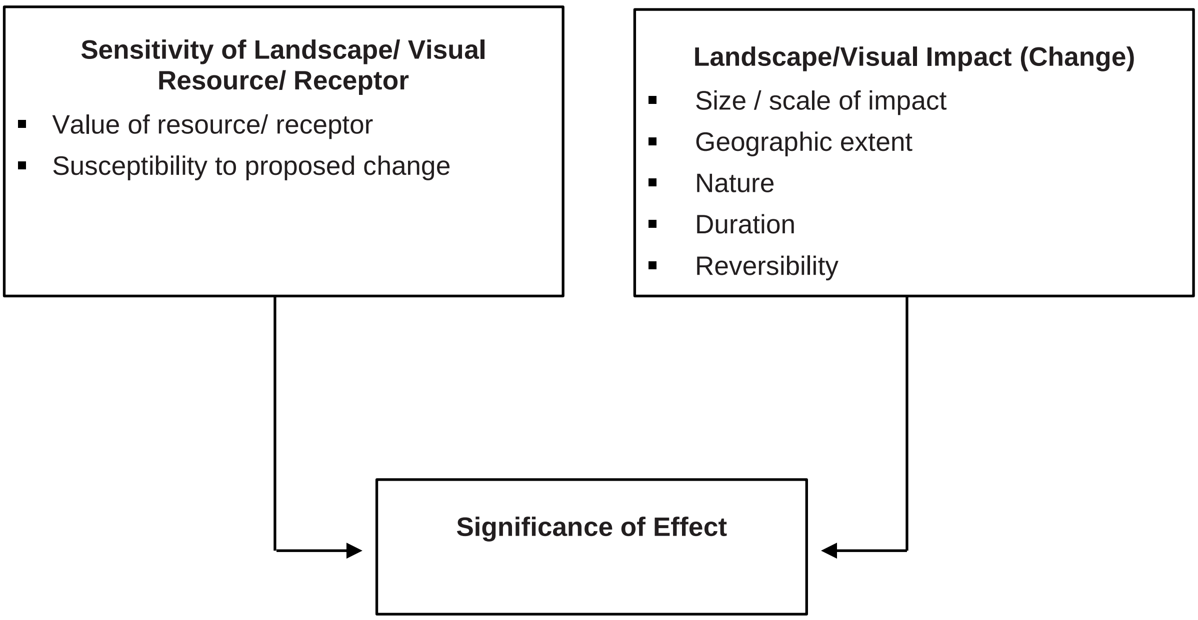

Figure 20-1 Assessment Methodology Summary

The LVIA considers the potential effects of the project upon:

- Individual landscape features and elements;
- Landscape and seascape character; and
- Visual amenity and the people who view the landscape.

20.6.11 Identifying Effects

Assessing the significance of an effect is a key component of the LVIA and is an evidence-based process combining professional judgment on the nature of a landscape or visual receptor's sensitivity, their susceptibility or ability to accommodate change and the value attached to the receptor. It is important to note that judgments in this SLVIA are impartial and based on professional experience and opinion informed by best practice guidance.

The effects of a proposed development are of variable duration and have been assessed as being of either short-term, medium-term or long-term duration, and permanent or reversible. Effects are long-term during the operational phase of the development, whilst operations and infrastructure works apparent during the construction and initial operating period have been assessed as temporary, short-term effects.

The reversibility of an effect is also variable. The effects on the landscape and visual resource that occurs during the construction period, such as the use of construction machinery have been considered as being reversible.

Where effects arise during the construction period, these are most likely to be because of: movement of construction machinery within the landscape; construction activities associated with the formation of new structures and construction activities within the site boundary all of which are considered to be short-term in duration.

To avoid repetition, the duration and reversibility of effects are not reiterated throughout the assessment.

20.6.12 Assessment Criteria

The objective of the assessment process is to identify and evaluate the predicted significant effects arising from a proposed development. Significance is a function of the:

- Sensitivity of the affected landscape or visual receptors, determined through consideration of the susceptibility of the receptor to the type of change arising from the specific proposals and the value attached to the receptor; and
- Secondly its Scale or Magnitude, derived from a consideration of the size / scale, geographical extent, duration and reversibility of the Proposed Development.

These definitions recognise that landscapes vary in their capacity to accommodate different forms of development according to the nature of the receiving landscape and the type of change being proposed.

As with any new development, it is acknowledged that the introduction of a development into the existing landscape or visual context could cause either a deterioration, improvement or neutral impact on the existing landscape or visual resource.

20.6.13 Landscape Impact Assessment

The SLVIA firstly assesses how a development would impact directly on any seascape and or landscape features and resources. This category of effect relates to specific elements and features (e.g. woods, trees, walls, hedgerows, watercourses) that are components of the seascape / landscape that may be physically affected by the development, such as the removal or addition of trees and or alterations to ground cover or elements.

The LVIA then considers impacts on landscape character at two levels. Firstly, consideration is given to how the landscape character is affected by the removal or alteration of existing features and the introduction of new features. This is a direct impact on landscape character.

Secondly, the indirect impacts of a development on the wider landscape are considered. The assessment of impacts on the wider landscape is discussed using the surrounding character areas identified in the relevant landscape character assessments. It is acknowledged there is an overlap between perception of change to landscape character and visual amenity, but it should be remembered that landscape character is generally derived from the combination and pattern of landscape elements within the view.

The significance of effects on landscape features and character is determined by considering both the sensitivity of the feature or landscape character and the magnitude of impact.

Consideration of the sensitivity of the landscape resource against the magnitude of impact caused by the proposed development is fundamental to landscape and visual assessment and these two criteria are defined in more detail below.

20.6.14 Landscape Sensitivity

The determination of the sensitivity of the landscape receptor is based upon an evaluation of the elements or characteristics of the landscape likely to be affected. The evaluation reflects such factors as its quality, value, contribution to landscape character and the degree to which the element or characteristic can be replaced or substituted.

GLVIA 3 at paragraph 5.39 states that "*landscape receptors need to be assessed firstly in terms of their sensitivity, combining judgments of their susceptibility to the type of change or development proposed and the value attached to the landscape*".

Susceptibility is defined by GLVIA 3 at paragraph 5.40 as: "*the ability of the landscape receptor (whether it be the overall character or quality/ condition of a particular landscape type or area, or an individual element and/ or feature, or a particular aesthetic and perceptual aspect) to accommodate the Proposed Development without due consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies*".

The value of a landscape receptor is determined with reference to the presence of relevant landscape designations, such as Areas of Outstanding Natural Beauty (AONB) and their level of importance. For the purpose of this assessment, landscape value is categorised as:

- Very High: Areas of landscape acknowledged through designation such as AONB or other landscape based sensitive areas. These are of landscape significance within the wider region or nationally;
- High: Areas that have a very strong positive character with valued and consistent distinctive features that gives the landscape unity, richness, and harmony. These are of landscape significance within the district;
- Medium: Areas that exhibit positive character, but which may have evidence of alteration/degradation or erosion of features resulting in a less distinctive landscape. These may be of some local landscape significance with some positive recognisable structure; and
- Low: Areas that are generally negative in character, degraded and in poor condition. No distinctive positive characteristics and with little or no structure. Scope for positive enhancement.

As previously discussed, landscape sensitivity is influenced by several factors including susceptibility to change, value and condition. To assist with bringing these factors together judgements regarding susceptibility and value have been used which define the landscape resource as being either, negligible, low, medium, high or very high. Table 20-2 defines the criteria that have guided the judgement as to the overall sensitivity of the Landscape Resource.

Assessments of susceptibility and value of a particular landscape resource may be different, and professional judgement will always be used to conclude on the judgement of sensitivity. For example, value may be high, and susceptibility may be low, and a professional judgement will be made to determine whether sensitivity is high, low or in between, supported by narrative explanation.

Table 20-2 Landscape Sensitivity

Definition		Sensitivity
Landscape resource susceptibility	**Landscape resource value**	
Exceptional landscape quality, no or limited potential for substitution. Key elements / features well known to the wider public. Little or no tolerance to change	Nationally / internationally designated/ valued landscape, or key elements or features of national/ internationally designated landscapes. Little or no tolerance to change	Very High
Strong/ distinctive landscape character; absence of landscape detractors. Low tolerance to change.	Regionally/ nationally designated/ valued countryside and landscape features. Low tolerance to change.	High

Some distinctive landscape characteristics; few landscape detractors. Medium tolerance to change.	Locally' regionally designated/ valued countryside and landscape features. Medium tolerance to change.	Medium
Absence of distinctive landscape characteristics; presence of landscape detractors. High tolerance to change	Undesignated countryside and landscape features. High tolerance to change	Low
Absence of positive landscape characteristics. Significant presence of landscape detractors. High tolerance to change	Undesignated countryside and landscape features. High tolerance to change	Negligible

20.6.15 Magnitude of Landscape Impact

The magnitude of impact or change affecting landscape receptors depends on the size or scale, geographical extent of the area influenced and its duration and reversibility. These factors are described below:

- Size or scale: "*The extent of the existing landscape elements that will be lost, the proportion of the total extent that this represents and the contribution of that element to the character of the landscape…; the degree to which aesthetic or perceptual aspects of the landscape are altered either by removal of existing components of the landscape or by addition of new ones…*" and, "*whether the effect* [impact] *changes the key characteristics of the landscape, which are critical to its distinctive character*" (GLVIA, para 5.49).
- Geographical extent: Distinct from scale or size, this factor considers the geographical area over which the landscape impacts will be felt, it might, for example, be a moderate loss of landscape receptors or character over a large area, or a large loss of receptors or character over a very localised area. At para 5.50 GLVIA3 notes that "*in general effects* [impacts] *may have an influence at the following scales, although this will vary according to the nature of the project and not all may be relevant on every occasion: at the site level within the development site itself; at the level of the immediate setting of the site; at the scale of the landscape type or character area within which the proposal lies; and, on a larger scale, influencing several landscape types or character areas.*" For the purposes of this LVIA, the assessment considers the impact of the Proposed Development on the published landscape character areas, at local level, i.e. the fourth landscape scales.

Duration and reversibility: Duration is categorised as short, medium or long-term. GLVIA explains that as there are no standard lengths of time within these categories, the appraisal must state what these are and why these have been chosen (GLVIA, para 5.51). Reversibility is described as "*a judgement about the prospects and practicality of the particular effect being reversed in, for example, a generation*" (GLVIA, para 5.52). Projects can be permanent (irreversible), partially reversible or fully reversible.

For the purposes of this SLVIA assessment, duration is; temporary (less than 1 year), short term (1 to 7 years), medium term (7 to 15 years), long term (15 – 60 years) and permanent (effects lasting over 60 years). The photomontages in support of this chapter (refer to Volume III Figure 20.6 to Figure 20.13 inclusive) have been provided to illustrate the existing view available from each location along with illustrative imagery depicting a completed scheme scenario.

The magnitude of landscape impact has been classified on a five-point scale (Large, Medium, Small, Negligible and No Change). The definitions of terms relating to the magnitude of landscape impact are set out in Table 20-3 below.

Table 20-3 Magnitude of Landscape Impact

Definition	Magnitude of Impact
Total loss or addition or/ very substantial loss or addition of key elements / features / patterns of the baseline, i.e., pre-development landscape and/ or introduction of dominant, uncharacteristic elements with the attributes of the receiving landscape	Large
Partial loss or addition of or moderate alteration to one or more key elements / features / patterns of the baseline, i.e., pre-development landscape and / or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic with the attributes of the receiving landscape.	Medium
Minor loss or addition of or alteration to one or more key elements / features / patterns of the baseline, i.e., pre-development landscape and or introduction of elements that may not be uncharacteristic with the surrounding landscape.	Small
Very minor loss or addition of or alteration to one or more key elements / features / patterns of the baseline, i.e., pre-development landscape and/or introduction of elements that are not uncharacteristic with the surrounding landscape approximating to a 'no-change' situation.	Negligible
No loss, alteration or addition to the receiving landscape resource	No change

20.6.16 Visual Impact Assessment

As outlined in GLVIA 3 (Paragraph 6.1) '*An assessment of visual effects deals with the effects of change and development on the views available to people and their visual amenity*'. The assessment of effects on views is an assessment of how the introduction of a proposed development will affect views within the study area. The Assessment of visual effects therefore needs to consider:

- Direct impacts of a proposed development upon views of the landscape through intrusion or obstruction;
- The reaction of viewers who may be affected, e. g. residents, walkers, road users; and
- The overall impact on visual amenity.

20.6.17 Sensitivity of Visual Receptors

The sensitivity of visual receptors (the particular person or group of people likely to be affected at a specific viewpoint) "*should be assessed in terms of both their susceptibility to change and in views and visual amenity and also the value attached to particular views*" (GLVIA, para 6.31). For the purpose of this assessment, susceptibility and value of visual receptors are defined as follows:

- Visual susceptibility: "*The susceptibility of different visual receptors to changes in views and visual amenity is mainly a function of: The occupation or activity of people experiencing views at the particular locations; and, the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations*" (GLVIA, para 6.32).
- Value of views: Judgements made about the value of views should take account of: "*recognition of the value attached to particular views, for example in relation to heritage assets, or through planning designations; and, indicators of value attached to views by visitors, for example through appearances in guidebooks or on tourist maps, provision of facilities for their enjoyment (such as parking places, sign boards or interpretive material) and references to them in literature or art…*" (GLVIA, para 6.37).

Sensitivity is not readily graded in bands and GLVIA notes, with regards to visual sensitivity, that the division of who may or may not be sensitive to a particular change "*is not black and white and in reality, there will be a gradation in susceptibility to change*" (GLVIA, para 6.35).

In order to provide both consistency and transparency to the assessment process, however, Table 20-4 below defines the criteria which have guided the judgement as to the intrinsic susceptibility and value of the resource/receptor and subsequent sensitivity to the Proposed Development.

Table 20-4 Visual Resource Sensitivity

Definition		Sensitivity
Visual resource Susceptibility	**Visual resource value**	
Views of remarkable scenic quality, of and within internationally designated landscapes or key features or elements of nationally designated landscapes that are well known to the wider public. Little or no tolerance to change.	Observers, drawn to a particular view, including those who have travelled to experience the views. Little or no tolerance to change	Very High
Views from residential property. Public rights of way, National Trails, Long distance walking routes and nationally designated countryside/ landscape features with public access. Low tolerance to change.	Observers enjoying the countryside from their homes or pursuing quiet outdoor recreation are more sensitive to visual change. Little tolerance to change	High
Views from local roads and routes crossing designated countryside / landscape features and 'access land' as well as promoted paths. Medium Tolerance to change.	Observers enjoying the countryside from vehicles on quiet/ promoted routes are moderately sensitive to visual change. Medium tolerance to change	Medium
Views from workplaces, main roads and undesignated countryside / landscape features. High tolerance to change.	Observers in vehicles or people involved in frequent or infrequent repeated activities are less sensitive to visual change. High tolerance to change	Low
Views from within and of undesignated landscapes with significant presence of landscape detractors. High tolerance to change.	Observers in vehicles or people involved in frequent or frequently repeated activities are less sensitive to visual change. High tolerance to change	Negligible

20.6.18 Magnitude of Impact on Visual Receptors

As with the magnitude of landscape impacts, the magnitude of impact or change affecting visual receptors depends on the size or scale, geographical extent of the area influenced and its duration and reversibility. These factors are described below:

- Size or scale: Judgements need to take account of: "*the scale of the change [impact] in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the proposed development; the degree of contrast or integration of any new features or changes in the landscape with existing or remaining landscape elements and characteristics in terms of form, scale and mass, line, height, colour and texture; and, the nature of the view of the proposed development, in terms of the relative amount of time over which it will be experienced and whether views will be full, partial or glimpses*" (GLVIA, para 6.39).
- Geographical extent: This will vary from viewpoint to viewpoint and will reflect: "*the angle* [orientation] *of view in relation to the main activity of the receptor; the distance of the viewpoint from the proposed development; and, the extent of the area over which the changes* [impacts] *would be visible*" (GLVIA, para 6.40).

Duration and reversibility of visual effects: As with landscape impacts, duration should be categorised as short, medium or long-term and projects considered to be permanent (irreversible), partially reversible or fully reversible (GLVIA, para 6.41).

For the purposes of this appraisal the impacts on views of the Proposed Development are considered to be temporary and fully reversible. The magnitude of visual impact has been classified on a five-point scale (Large, Medium, Small, Negligible and No Change). The definitions of terms relating to the magnitude of landscape impact are set out in Table 20-5 below.

Table 20-5 Magnitude of Visual Impact

Definition	Magnitude
Complete or very substantial change in view dominant involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, e.g., through removal of key elements	Large
Moderate change in view: which may involve partial obstruction of existing view or partial change in character and composition of baseline, i.e., pre-development view through the introduction of new elements or removal of existing elements. Change may be prominent but would not substantially alter scale and character of the surroundings and the wider setting. Composition of the view would alter. View character may be partially changed through the introduction of features which, though uncharacteristic, may not necessarily be visually discordant	Medium
Minor change in baseline, i.e., pre-development view - change would be distinguishable from the surroundings whilst composition and character would be similar to the pre change circumstances.	Small
Very slight change in baseline, i.e., pre-development view - change barely distinguishable from the surroundings. Composition and character of view substantially unaltered.	Negligible
No alteration to the existing view	No change

20.6.19 Significance of Effects

The purpose of this SLVIA is to determine, in a transparent way, the likely significant landscape and visual effects of the Proposed Development. It is accepted that, due to the nature and scale of development, the Proposed Development could potentially give rise to some notable landscape and visual effects.

GLVIA3 identifies that: "*… a final judgment is made about whether or not each effect is likely to be significant. There are no hard and fast rules about what effects should be deemed 'significant' but LVIAs should always distinguish clearly between what are considered to be significant and non-significant effects*".

Significance can only be defined in relation to each particular development and its specific location. The relationship between receptors and effects is not typically a linear one. It is for each LVIA to determine how judgements about receptors and effects should be combined to derive significance and to explain how this conclusion has been arrived at.

The identification of significant effects would not necessarily mean that the effect is unacceptable in planning terms. What is important is that the likely effects on the landscape and visibility are transparently assessed and understood in order that the determining authority can bring a balanced, well-informed judgement to bear when making the planning decision.

The significance of effects on landscape, views and visual amenity have been judged according to a six-point scale: Substantial, Major, Moderate, Minor, Negligible or None as presented in Table 20-6, which contains a description of the Significance of Effect Criteria.

Table 20-6 Significance of Effect Criteria

Significance of Effect	Landscape Resource	Visual Resource
None	Where the project would not alter the landscape character of the area.	Where the project would retain existing views.
Negligible	Where proposed changes would have an indiscernible effect on the character of an area.	Where proposed changes would have a barely noticeable effect on views/visual amenity.
Minor	Where proposed changes would be at slight variance with the character of an area.	Where proposed changes to views, although discernible, would only be at slight variance with the existing view.
Moderate	Where proposed changes would be noticeably out of scale or at odds with the character of an area.	Where proposed changes to views would be noticeably out of scale or at odds with the existing view.
Major	Where proposed changes would be uncharacteristic and/or would significantly alter a valued aspect of (or a high quality) landscape.	Where proposed changes would be uncharacteristic and/or would significantly alter a valued view or a view of high scenic quality.
Substantial	Where proposed changes would be uncharacteristic and/or would significantly alter a landscape of exceptional landscape quality (e.g., internationally designated landscapes), or key elements known to the wider public of nationally designated landscapes (where there is no or limited potential for substitution nationally).	Where proposed changes would be uncharacteristic and/or would significantly alter a view of remarkable scenic quality, within internationally designated landscapes or key features or elements of nationally designated landscapes that are well known to the wider public.

For the purposes of this assessment those effects indicated, in Table 20-7 below, as being Substantial or Major to Substantial are regarded as being significant. Effects of ‘Minor to Moderate’ and lesser significance have been identified within the assessment, though are not considered significant.

For those effects indicated as being of ‘Moderate’ or ‘Moderate to Major’ the assessor has exercise professional judgement in determining if the effect is considered to be significant, taking account of site specific or location specific variables which are given different weighting in each instance according to location.

Table 20-7 Significance of Effect Matrix

Magnitude of Impact	Sensitivity				
	Negligible	Low	Medium	High	Very High
No Change	No Change	No Change	No Change	No Change	No Change
Negligible	Negligible	Negligible to Minor	Negligible to Minor	Minor	Minor
Small	Negligible to Minor	Negligible to Minor	Minor	Minor to Moderate	Moderate to Major
Medium	Negligible to Minor	Minor	Moderate	Moderate to Major	Major to Substantial
Large	Minor	Minor to Moderate	Moderate to Major	Major to Substantial	Substantial

A conclusion that an effect is 'significant' should not be taken to imply that the Proposed Development is unacceptable. Significance of effect needs to be considered regarding the scale over which it is experienced and whether it is beneficial or adverse.

20.3 Baseline Conditions

20.3.1 General Overview

The site for the Proposed Development lies wholly within the existing infrastructure associated with Fishguard Harbour, Fishguard Bay, in north Pembrokeshire. The Proposed Development is located on the western side of the inner Harbour area (refer Volume III; Figure 20.1) at the location of an existing linkspan and associated infrastructure used by ferries operated by Stena Ltd. Ferries are observed frequently coming and going from the Harbour.

Fishguard Harbour is defined to the west by rising topography and steep cliffs. To the south lies the settlement of Goodwick and the A40 that follows the shoreline in lower-lying flat land and promenade area with car parking to the rear. The watersports centre and visitor/information centre (Ocean Lab) are located in this area adjacent to the A40. The settlement of Goodwick is largely located on steep wooded cliffs with houses set out across the hillside overlooking Fishguard Bay. Fishguard Bay Hotel is a Grade II listed building set within a Grade II registered park/garden located immediately west of the ferry terminal area. The central and northern part of Goodwick is designated as a Conservation Area. Sitting above the existing ferry terminal on the cliff tops to the north is Harbour Village that consists of small cottages overlooking the Bay.

The existing ferry terminal lies at the western side of the Harbour and consists of extensive tarmac area used by traffic queuing for ferries. High mast lights are very noticeable. Buildings and infrastructure associated with the ferry terminal are also very noticeable in views along and across the Harbour area.

To the east of the Harbour lies rocky cliffs that are not as steep as those on the western side and the small settlement of Fishguard with small bungalows hugging the rocky cliffs at Penyraber. Fishguard is closely associated with Goodwick but is separated from Goodwick by a small green area of woodland and fields.

Further east lies the rocky promontory of Fishguard Fort with direct views across Fishguard Harbour and Bay and towards the existing ferry terminal area. This section of the coast is crossed by the Pembrokeshire Coastal Path.

20.4 Landscape and Visual Baseline

20.4.1 Landscape Character Baseline

20.4.1.1 Published Landscape and Seascape Character Assessments

Landscape and Seascape character can be defined at a variety of scales and a substantial amount of existing published information is available at national and county / regional levels.

20.4.1.2 National Landscape Character Areas and Marine Character Areas

There are 48 National Landscape Character Areas (NLCA), each with their own descriptive profile, setting out the unique combination of natural, cultural, and perceptual characteristics. Meanwhile, marine character assessments at national and local scale highlight the key natural, cultural and perceptual influences affecting marine and coastal areas.

A review of the NLCAs indicates the that Proposed Development lies within one NLCA; NLCA 43 - West & North Pembrokeshire Coast (refer Volume III; Figure 20.2). Additionally, the Proposed Development lies within one Marine Character Area (MCA); MCA 16 – Cardigan Bay (South) (refer Volume III; Figure 20.2).

20.4.1.2.1 NLCA 43 – West & North Pembrokeshire Coast

The key characteristics identified from the NCLA description are as follows:

- Coastal features - varied and rugged, exposed, highly indented coastline, with rocky coastal cliffs, punctuated by sandy bays and sheltered inlets, some larger bays, a number of remote islands and islets, and a number of raised beaches.

- Varied geology - the coastline cuts across the geology, informing coastal geometry and the range of coastal features. Old Red Sandstone rocks in the south meet the western extent of the South Wales Coalfield at St Brides Bay. Further north around St David’s, hard Cambrian rocks and igneous intrusions form craggy outcrops. Ordovician shales stretch across the north coast, interrupted by volcanic rock in places.
- Dissected plateau landscape – comparatively gentle, settled, farmed land, compared to the coastline.
- Coastal heath - although the rugged and windswept coastal heaths are common grazed, inland areas are enclosed: with larger mixed arable land in the south and smaller fields in parts of the north, some of these bounded hedgebanks with proven origins in the prehistoric period.
- Inland larger mixed arable fields – with hedgerows and fences and smaller fields in rougher ground - with hedgebanks and walls.
- Coastal wildlife - The coastal landscape is nationally and internationally important for marine habitats and species, including species-rich maritime grasslands. The islands off the coast are the home of internationally important sea bird colonies.
- Rural villages and scattered farms – nucleated villages, often around a church, and with historic character in places. Often quiet, settled, well established, agricultural, away from the coast, but busier with tourism and marine activity focus on the coast.
- Ferry port and road/rail transport terminal – major feature by Fishguard, together with nearby development and periodic busyness as ferries arrive.
- Tourist related ‘honeypots’ - of activity and busyness along the coast. The area’s rugged coastline and high scenic qualities make the area a popular tourist destination. Rural roads can become busy with traffic in the peak season.

NLCA 43 is described as having the following character: *“The area represents the western and northern extents of the Pembrokeshire coastline and hinterland. Much of the area is within the Pembrokeshire Coast National Park. The gently undulating, productive, agricultural landscape is edged by some of the most spectacular and rugged coastline in southern Britain. The landscape dramatically terminates with steep cliffs, and includes a number of remote islands, being remnants of peninsulas. The coastal areas also include a number of distinctively shaped rocky hills, that together with coastal slopes, include areas of heather and heath, stone walls or hedgebanks, and a far more remote feeling than many of the nearby inland landscapes.”*

20.4.1.2.2 MCA 16 – Cardigan Bay (South)

The key characteristics identified from the MCA description are as follows:

- Diverse coastline of exposed rugged cliffs and rocky headlands punctuated by small coves, sheltered sandy bays and a few sinuous estuaries fringed by mudflats.
- Gently shelving seabed reaching a maximum of 30 metres, with Holocene-derived sediments providing some evidence for the legendary lost kingdom of Cantref y Gwaelod.
- Overfalls and strong tidal streams associated with exposed rocky headlands, with islets and shallow reefs in the west creating further hazards.
- Highly designated stretch of coastline and surrounding waters, with valued sandbanks, reefs and sea caves supporting species such as the bottlenose dolphins.
- Rich historic seascape with evidence for occupation and defence since prehistory. These include promontory forts on headlands and Norman castles.
- Hubs of activity at Aberystwyth and Fishguard, including commercial fishing and leisure craft. Ferries travelling to and from Fishguard link Swansea and Ireland.
- Much coastal and marine recreation, including leisure sailing, beach angling, sea kayaking and use of Celtic longboats, swimming and beach-based activities, as well as dolphin spotting trips.
- The Coast Path provides access for walkers along the cliff tops and headlands, affording expansive views out to sea across Cardigan Bay to Snowdonia National Park, Llŷn AONB and Bardsey Island.

- Coastal landmarks visible in landward views include Cemaes and Dinas Heads, fronting a backcloth of coastal hills including Mynydd Carningli.

20.4.1.2.3 Pembrokeshire County Landscape Character Assessment 2022

This Landscape Character Assessment (LCA) is for areas of Pembrokeshire which lie outside of the Pembrokeshire Coast National Park (PCNP). The primary source of desk-based information is LANDMAP information covering Pembrokeshire. LANDMAP stands for Landscape Assessment and Decision Making Process and is the formally adopted approach to baseline landscape assessment throughout Wales developed by Natural Resources Wales and advocated by the Welsh Government.

There are 29 LCAs within the Pembrokeshire County Landscape Character Assessment, which are unique individual geographical areas primarily based on the Quality Assured LANDMAP Visual and Sensory aspect areas refined by consideration of other aspect layers, site assessment and local stakeholder input.

A review of Pembrokeshire County Landscape Character Assessment indicates that the Proposed Development lies in one LCA; LCA 3 – Fishguard Coastal (refer Volume III; Figure 20.2).

20.4.1.2.4 LCA 3 – Fishguard Coastal

The key characteristics identified from the LCA description are as follows:

- *An undulating chalky boulder clay plateau is dissected by numerous river valleys, giving a topography of gentle slopes in the lower, wider valleys and steeper slopes in the narrower upper parts.*
- *The headland to the north above Goodwick rises to 141mAOD at Pen-rhiw whilst Fishguard rises to around 100m AOD to the south from 50m high coastal cliffs and just above sea level at the Lower Town and Goodwick Moor.*
- *The steep headland and cliffs are formed mostly of resistant Ordovician volcanic gabbros striking east–west while mudstones and sandstones dominate in the harbour areas. To the west, glacial boulder clay / till sits within the river flood plain system. To the south of Fishguard, sedimentary Ordovician slate dominates.*
- *Fishguard town is set on top of exposed north facing rocky cliffs with semi-natural vegetation including rough grasses, bracken and scrub and forming part of Fishguard Cliffs SSSI which lies either side of the old harbour.*
- *Fishguard has medieval origins, but development is generally 18th and 19th century, with most building having taken place once the town was connected to the railway network. Nineteenth century terraced housing lies further out, and 20th century housing estates have been developed at the edge of the town.*
- *There is a distinct difference between upper town and lower town although both lie within Fishguard Conservation Area. In Upper Town listed buildings are concentrated along High Street, Main Street and West Street such as the fine Town Hall. In the Lower Town, the focus is on the picturesque intimate harbour with its moored boats, stone harbour walls, listed cottages along Quay Street and Newport Road.*

LCA 3 is described as having the following character: *“The settlements of Fishguard, Fishguard Lower Town and Goodwick, with their respective old and new harbours and cliffs are separated by a beach backed by the flat wetland of Goodwick Moor. Goodwick and Fishguard Harbour are an active ferry port with infrastructure and a major breakwater. The area includes part of the setting of the built-up area with steep slopes of pastoral land and moorland extending to the National Park boundary to the north beyond Goodwick and to the south of Goodwick Moor. The enclosed Gwaun valley and its slopes provides the landscape setting to the east. Both settlements have strong historic maritime character with Conservation Areas and listed buildings, particularly Fishguard.”*

20.4.1.2.5 Pembrokeshire Coast National Park Seascape Character Assessment 2023

Pembrokeshire Coast National Park Authority has undertaken separate seascape character assessments which describe the variations in character between the different seascape types within the National Park area. The assessment process has identified 44 seascape character areas, and each distinct area has been mapped and includes a description of the seascape character, key characteristics, physical influences and historical and cultural influences and an evaluation of the condition and robustness of the landscape character area. Guidelines in relation to strategy for managing change is also included within each of the assessments.

A review of the landscape character area assessments has identified that the Proposed Development is wholly located within the Fishguard and Goodwick including Fishguard Harbour and the Quayside at Lower Town (SCA 7) seascape character area defined by Pembrokeshire Coast National Park Authority (refer Volume III; Figure 20.2).

20.4.1.2.6 SCA 7 - Fishguard and Goodwick including Fishguard Harbour and the Quayside at Lower Town

The Pembrokeshire Coast National Park Seascape Character Assessment (December 2013) identifies that the proposed site is located within Seascape Character Area (SCA) 7 Fishguard and Goodwick Harbours. The SCA states that Fishguard Harbour including the ferry port and the old harbour, located on the north Pembrokeshire coast, is one of most intensively used areas along the coast, with significant settlement, commercial and recreational use. It is an area of contrasts between the more open and commercial Goodwick area and the contained and picturesque Lower Town harbour, with wooded valleys and sea edge to Fishguard. The SCA identifies the key features as;

- A sheltered bay with substantial breakwaters enclosing a modern harbour and ferry terminal to the east and an old harbour with quay to the west;
- 50m high cliffs and steeply sided, wooded sea edges;
- Narrow and steep sided valleys at Lower Town and broad, flat valley and wetland at Goodwick;
- A busy seascape with regular ferries including catamaran and traditional ferries linking to Rosslare and recreational boating and fishing [mainly from the old harbour] with two slipways including rowing and sailing and bases for diving charters;
- Traditional village and harbour at Lower Town, elevated town of Fishguard, and mixed commercial and residential areas with modern landscaped seafront and facilities at Goodwick; and
- Long breakwaters, boat moorings and boats drying.

Factors contributing to the SCA sensitivity include;

- Historic character of settlements and old harbour.
- Focal point for visitor activity.
- Open views in main area of bay and number of urban receptors.
- Initial impressions of Wales for Irish visitors on ferry.
- Pembrokeshire Coast Path as a sensitive receptor.

20.5 Landscape Designations

This section reviews relevant landscape designations and their proximity to the Proposed Development (refer Volume III; Figure 20.3). A brief explanation of these has been given below:

20.5.1 National Parks

The Proposed Development site lies between two sections of the Pembrokeshire Coast National Park, with the nearest part of the boundary approx. 850m to the east and approx.875m to the west.

The Pembrokeshire Coast National Park Local Development Plan 2010 identifies the special qualities of the National Park as:

- Coastal splendour;
- Diverse geology;
- Diversity of landscape;
- Distinctive settlement character;
- Rich historic environment;
- Cultural heritage;
- Richness of habitats and biodiversity;
- Islands;
- Accessibility;
- Space to breathe;
- Remoteness, tranquillity and wildness;
- The diversity of experiences and combination of individual qualities.

Policy 15: Conservation of the Pembrokeshire Coast National Park states that development will not be permitted where this would adversely affect the qualities and special character of the Pembrokeshire Coast National Park by:

a) causing significant visual intrusion; and/or,

b) being insensitively and unsympathetically sited within the landscape; and/or

c) introducing or intensifying a use which is incompatible with its location; and/or

d) failing to harmonise with, or enhance the landform and landscape character of the National Park; and/or

e) losing or failing to incorporate important traditional features.

20.5.2 Historic Landscapes

The Register of Landscapes of Historic Interest in Wales states that all landscape areas identified on the Register are of national importance in the Welsh context and identifies the nearest historic landscape to the proposed development site as (ref:43) Pen Gaer: Garn Fawr and Strumble Head located approx. 340m north. This area is located on the higher ground northwest of the Proposed Development. The historic interest for this landscape relates to the distinctive settlement forms, early ecclesiastical monuments, Neolithic burial chambers and to Iron Age hillforts and field systems found across this landscape.

20.5.3 Heritage Coasts

Heritage Coasts occupy about a third of the Welsh coastline and were established up to protect coastlines from insensitive developments. Most are defined simply by the coastline between two named points; however, some have clearly defined inland boundaries. Their status carries no legal protection, but planning authorities must take the designation into account when making decisions on development.

The Proposed Development site lies between two Heritage Coasts, namely the St David's Peninsula, which extends along the coast north and west of the North Breakwater and Dinas Head, which covers the coast east of Fishguard within Pembrokeshire Coast National Park.

20.5.4 Registered Parks and Gardens

The site for the Proposed Development is located in proximity to PGW (Dy) 63 (PEM) Fishguard Bay Hotel that is registered as a Grade II listed building and park/garden.

The description provided within the register identifies that '*the Fishguard Bay Hotel (formerly known as 'Wyndcliffe') is situated on a levelled shelf on the steep, rocky slope above the west side of Fishguard Harbour, with panoramic views across the bay towards Dinas Head. Its gardens lie mainly on the steep slope above the hotel, to its west, with smaller areas on the same level, to its south-east and north-east. The gardens were mainly developed, with the hotel, between 1900 and 1910 though the earlier house had ornamental gardens in the mid-nineteenth century.*

The report provides further detail in relation the grounds surrounding the hotel, describing them as '*largely wooded, both above and below the hotel, and to its north the steep slope becomes a cliff. The main area of the gardens lies on the steep slope to the north, west and south-west of the hotel, bounded by a high stone wall and occupying the slope up to the lane to Harbour Village which bounds its west side. This area is entered through an iron gate on the west side of the forecourt, and up steps to a zig-zag path which climbs the steep slope. The ground is densely wooded, with some fine specimen coniferous and deciduous trees in the lower part and a deciduous canopy in the upper part. Laurel and rhododendron form an extensive understorey but their unrestricted growth has made parts of the gardens inaccessible. The lower part of the gardens is divided into two main areas: the northern half, which was purely ornamental and the southern half, which originally contained the utilitarian gardens and a tennis court. Above is deciduous woodland*.

20.5.5 Listed Buildings / Conservation Areas

The Proposed Development site is located in proximity to Fishguard Bay Hotel (Grade II) that is located in Goodwick Conservation Area as designated by Pembrokeshire County Council. The Conservation Area extends along the western boundary of the Proposed Development site and covers most of the settlement of Goodwick.

A further Conservation Area is located at the settlement of Fishguard.

20.5.6 Long Distance Footpaths & Cycle Routes

National Cycle Route 4 runs above the A40 to the south of the proposed development site. Clear views are available looking northwards towards the site and the wider Bay area. At the foot of the embankment to the north, the Route follows the Pembrokeshire Coast National Trail before terminating at the edge of Goodwick.

The National Trail continues north-westwards and crosses the existing ferry terminal area via a footbridge. Clear views into the site are available from this area. The Trail then passes through the heavily wooded area immediately south of the Fishguard Hotel and then follows the minor road through Harbour Village.

20.6 Key Components of Proposed Development

The project involves several key activities aimed at enhancing the infrastructure and operational capabilities of the harbour. These include the following:

- Demolition of
  - Disused RNLI slipway structure
  - Buffer Dolphin
  - Suspended deck structure
  - 3 No. small disused kiosks
- Removal of
  - Linkspan bridge, equipment and cabin
  - Jack up barge
- Dredging with disposal at sea
- Reclamation
- Scour protection to the berth and dredged slope to the rear of the berth.
- Piled Reinforced Concrete Bankseat
- Tubular Steel Guide Pile
- Floating pontoon linkspan installation
- Terminal reconfiguration
- Temporary Works

The schematic diagram shown in Figure 20-2 below identifies the main components of the Proposed Development which will constitute the replacement linkspan.

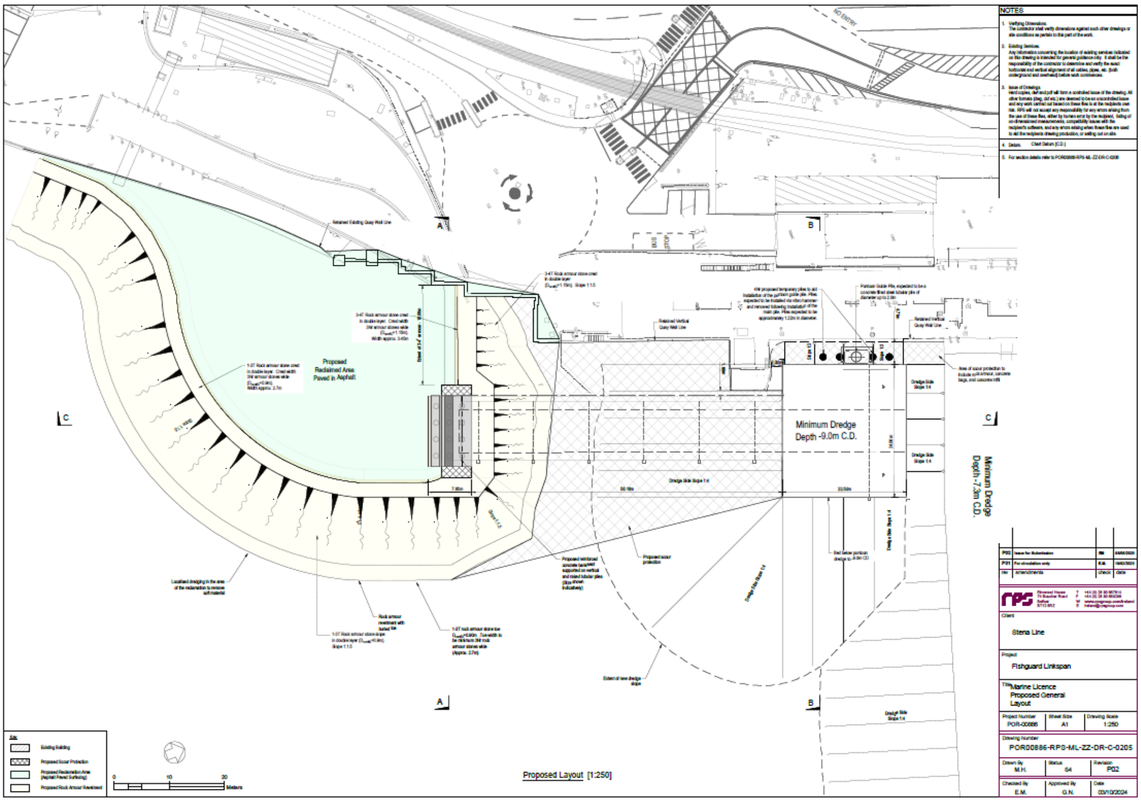

Figure 20-2 Layout of proposed reclamation works, linkspan and dredging overlaid with existing arrangement

20.7 Impact Assessment

20.7.1 Assessment of Landscape Effects

The assessment of landscape effects follows the methodology previously described in Section 20.6 and considers those effects which are predicted to occur during the construction and operational phases of the Proposed Development.

To avoid repetition, an assessment of construction phase impacts and predicted operational phase impacts is included within the following landscape assessments.

20.7.1 Description of the Sources of Impact

The assessment of landscape effects follows the methodology previously described in Section 20.6.13 and considers those effects which are predicted to occur during the construction and operational phases of the Proposed Development.

The assessment of the construction phase effects relates to the following identified activities:

- Construction works associated with the formation of the Proposed Development and associated infrastructure development;
- Delivery of materials to working areas; and
- Localised site clearance and reinstatement.

The construction phase of the Proposed Development will result in additional built elements being introduced into the existing baseline seascape/ landscape resource. The operational phase of the Proposed Development will result in new built elements being visible within the surrounding seascape/ landscape resource, though new built form will be integrated into the existing baseline resource.

An assessment of the predicted landscape impacts during both construction and operation is provided in Table 20-8 and has been based upon the susceptibility and sensitivity of the landscape character as described within the Pembrokeshire Council Landscape Character Assessment 2022 and the Pembrokeshire Coast National Park Seascape Character Assessment 2023.

Table 20-8 NLCA 43 - West & North Pembrokeshire Coast; Predicted Impacts

NLCA 43 – West & North Pembrokeshire Coast	
Sensitivity	The Proposed Development is located within the existing coastal area adjacent to this NLCA. Key characteristics which, together with field work, have informed an understanding of the susceptibility of this landscape within proximity of the Proposed Development site and the type of development proposed include; - Coastal features - varied and rugged, exposed, highly indented coastline, with rocky coastal cliffs, punctuated by sandy bays and sheltered inlets, some larger bays, several remote islands and islets, and several raised beaches. - Coastal area associated with the Proposed Development defined by existing port development, including jetties, breakwater sections and port development. - Varied geology - the coastline cuts across the geology, informing coastal geometry and the range of coastal features. Old Red Sandstone rocks in the south meet the western extent of the South Wales Coalfield at St Brides Bay. Further north around St David's, hard Cambrian rocks and igneous intrusions form craggy outcrops. Ordovician shales stretch across the north coast, interrupted by volcanic rock in places. - Dissected plateau landscape – comparatively gentle, settled, farmed land, compared to the coastline. - Coastal heath - although the rugged and windswept coastal heaths are common grazed, inland areas are enclosed: with larger mixed arable land in the south and smaller fields in parts of the north, some of these bounded hedge banks with proven origins in the prehistoric period.

NLCA 43 – West & North Pembrokeshire Coast	
	- Inland larger mixed arable fields – with hedgerows and fences and smaller fields in rougher ground - with hedge banks and walls. - Rural villages and scattered farms – nucleated villages, often around a church, and with historic character in places. Often quiet, settled, well established, agricultural, away from the coast, but busier with tourism and marine activity focus on the coast. - Ferry port and road/rail transport terminal – major feature of Fishguard, together with nearby development and periodic water based and land based movements associated with ferry traffic arrival/ departure and vehicular arrival / departure. - Tourist related 'honeypots' - of activity and busyness along the coast. The area's rugged coastline and high scenic qualities make the area a popular tourist destination. Rural roads can become busy with traffic in the peak season. Susceptibility of this NLCA to the type of development proposed is judged to be **medium**. This NLCA places value in the sense of place and biodiversity, however the NLCA notes no important landscape features in proximity to the Proposed Development. The value of the NLCA is judged to be **medium**. Overall, considering the susceptibility and value attached to the NLCA, the overall sensitivity of this NCA is judged to be **medium**.
Magnitude of Change – Construction Phase	Direct impacts on this NLCA will arise from the physical construction of the Proposed Development, resulting in the introduction of manmade elements into the existing coastal landscape, although this will primarily replacement of existing elements of the harbour. New built form and associated ancillary features will require construction equipment and activities that will be locally conspicuous during the construction phase of the Proposed Development. It is considered that construction activities will have a localised, temporary effect. Localised portions of the NLCA adjacent to, but beyond the site boundary of the Proposed Development are predicted to experience indirect effects only because of the formation of the new features, though the predicted effects will be minimal due to the new features being like the existing elements of the harbour. The predicted magnitude of change associated with the construction stage of the Proposed Development is localised and **small**, restricted to land contained within the site boundary.
Magnitude of Change – Operational Phase	During the operational phase, new features of the harbour will be perceived as a minor alteration locally, though generally not obvious within the wider context due to its low development form and similarity existing harbour features. The predicted magnitude of change in the landscape resource during the operational phase is judged to be localised and **negligible** during the operational phase.
Significance of Landscape Effect during Construction Phase	**Minor**, localised, temporary, short-term duration assessed as not significant effects are predicted to be experienced during the construction phase of the Proposed Development and limited to lands contained within the site boundary. Remaining portions of the NLCA outside of the Proposed Development boundary are predicted to experience no significant, indirect effects.
Significance of Landscape Effect during Operational Phase.	**Negligible** to **minor** localised landscape effects assessed as not significant are predicted to be experienced during the operational phase of the Proposed Development. Predicted effects during the operational phase are limited in extent by the Proposed Development being similar in style and colour to the existing elements of Fishguard Harbour. Additional built form will easily integrate into the existing landscape and will not be perceived as a noticeable alteration.

Table 20-9 MCA 16 - Cardigan Bay (South); Predicted Impacts

MCA 16 – Cardigan Bay (South)	
Sensitivity	The Proposed Development is located entirely within the Cardigan Bay (South) MCA. Key characteristics which, together with field work, have informed an understanding of the susceptibility of this seascape within proximity of the Proposed Development site and the type of development proposed include; - Diverse coastline of exposed rugged cliffs and rocky headlands punctuated by small coves, sheltered sandy bays and a few sinuous estuaries fringed by mudflats. - Highly designated stretches of coastline and surrounding waters, with valued sandbanks, reefs and sea caves. - Rich historic seascape with evidence for occupation and defence since prehistory, including forts on headlands and Norman castles. - Hubs of activity at Aberystwyth and Fishguard, including commercial fishing and leisure craft. Ferries travelling to and from Fishguard linking further afield. - Coastal and marine recreation, including leisure sailing, beach angling, sea kayaking and use of Celtic longboats, swimming and beach-based activities, as well as dolphin spotting trips. - The Coast Path provides access for walkers along the cliff tops and headlands, affording expansive views out to sea across Cardigan Bay to Snowdonia National Park, Llŷn AONB and Bardsey Island. - Coastal landmarks visible in landward views include Cemaes and Dinas Heads, fronting a backcloth of coastal hills including Mynydd Carningli. Susceptibility of this MCA to the type of development proposed is judged to be **medium**. The assessment undertaken by the LPA identifies that this MCA is a *"highly designated stretch of coastline and surrounding waters, with valued sandbanks, reefs and sea caves."* The value of the MCA is judged to be **medium**. Overall, considering the susceptibility and value attached to the MCA, the overall sensitivity of this MCA is judged to be **medium**, as whilst there are some distinctive characteristics present, there are also many manmade structures in the seascape associated with, and directly adjacent to the Proposed Development site.
Magnitude of Change – Construction Phase	Direct impacts on this MCA will arise from the physical construction of the Proposed Development, resulting in the introduction of manmade elements into the existing seascape, although this will primarily replacement of existing elements of the harbour. New built form and associated ancillary features will require construction equipment and activities that will be locally conspicuous during the construction phase of the Proposed Development. It is considered that construction activities will have a localised, temporary effect. Localised portions of the MCA adjacent to, but beyond the site boundary of the Proposed Development are predicted to experience indirect effects only because of the formation of the new features, though the predicted effects will be minimal due to the new features being like the existing elements of the harbour. The predicted magnitude of change associated with the construction stage of the Proposed Development is localised and **small**, restricted to land contained within the site boundary.
Magnitude of Change – Operational Phase	During the operational phase, new features associated with the Proposed Development will be perceived as a minor alteration locally particularly when visible in southern views from the A507, though generally not obvious within the wider context due to its low development form and similarity to the existing harbour. The predicted magnitude of change in the landscape resource during the operational phase is judged to be localised and **negligible** during the operational phase.
Significance of Landscape Effect during Construction Phase	**Minor**, localised, temporary, short-term duration assessed as not significant effects are predicted to be experienced during the construction phase of the Proposed Development and limited to lands contained within the site boundary. Remaining portions of the MCA outside of the Proposed Development boundary are predicted to experience no significant, indirect effects.
Significance of Landscape Effect during Operational Phase.	**Negligible** to **minor** localised landscape effects assessed as not significant are predicted to be experienced during the operational phase of the Proposed Development.

MCA 16 – Cardigan Bay (South)	
	Predicted effects during the operational phase are limited in extent by the Proposed Development being similar in style and colour to the existing elements of Fishguard Harbour. Additional built form will easily integrate into the existing landscape and will not be perceived as a noticeable alteration.

Table 20-10 LCA 3 - Fishguard Coastal; Predicted Impacts

LCA 3 – Fishguard Coastal	
Sensitivity	The Proposed Development is located entirely within the Fishguard Coastal LCA. Key characteristics which, together with field work, have informed an understanding of the susceptibility of this landscape within proximity of the Proposed Development site and the type of development proposed include; - An undulating chalky boulder clay plateau is dissected by numerous river valleys, giving a topography of gentle slopes in the lower, wider valleys and steeper slopes in the narrower upper parts. - Fishguard town is set on top of exposed north facing rocky cliffs with semi-natural vegetation including rough grasses, bracken and scrub and forming part of Fishguard Cliffs SSSI which lies either side of the old harbour. - Fishguard has medieval origins, but development is generally 18th and 19th century, with most building having taken place once the town was connected to the railway network. Nineteenth century terraced housing lies further out, and 20th century housing estates have been developed at the edge of the town. - There is a distinct difference between upper town and lower town although both lie within Fishguard Conservation Area. In Upper Town listed buildings are concentrated along High Street, Main Street and West Street such as the fine Town Hall. In the Lower Town, the focus is on the picturesque intimate harbour with its moored boats, stone harbour walls, listed cottages along Quay Street and Newport Road. Susceptibility of this LCA to the type of development proposed is judged to be **medium**. The value of the LCA is judged to be **medium**. Overall, considering the susceptibility and value attached to the LCA, the overall sensitivity of this LCA is judged to be **medium**, as whilst there are some distinctive landscape characteristics present, there are also many manmade structures in the landscape as well.
Magnitude of Change – Construction Phase	Direct impacts on this LCA will arise from the physical construction of the Proposed Development, resulting in the introduction of new manmade elements into the existing landscape, although this will be replacing existing manmade elements of the harbour. New built form and associated ancillary features will require construction equipment and activities that will be locally conspicuous during the construction phase of the Proposed Development. It is considered that construction activities will have a localised, temporary effect. Localised portions of the LCA adjacent to, but beyond the site boundary of the Proposed Development are predicted to experience indirect effects only because of the formation of the new features, though the predicted effects will be minimal due to the new features being similar to the existing elements of the harbour. The predicted magnitude of change associated with the construction stage of the Proposed Development is localised and **small**, restricted to land contained within the site boundary.
Magnitude of Change – Operational Phase	During the operational phase, new features of the harbour will be perceived as a minor alteration locally, though generally not obvious within the wider context due to its low development form and similarity to the existing harbour. The predicted magnitude of change in the landscape resource during the operational phase is judged to be localised and **negligible** during the operational phase.
Significance of Landscape Effect during Construction Phase	**Minor**, localised, temporary, short-term duration assessed as not significant effects are predicted to be experienced during the construction phase of the Proposed Development and limited to lands contained within the site boundary. Remaining portions of the LCA outside of the Proposed Development boundary are predicted to experience no significant, indirect effects.

LCA 3 – Fishguard Coastal	
Significance of Landscape Effect during Operational Phase.	**Negligible** to **minor** localised, assessed as not significant effects are predicted to be experienced during the operational phase of the Proposed Development. Predicted effects during the operational phase are limited in extent by the Proposed Development being similar in style and colour to the existing elements of Fishguard Harbour. Additional built form will easily integrate into the existing landscape and will not be perceived as a noticeable alteration.

Table 20-11 SCA 7 - Fishguard and Goodwick including Fishguard Harbour and the Quayside at Lower Town; Predicted Impacts

SCA 7 - Fishguard and Goodwick including Fishguard Harbour and the Quayside at Lower Town	
Sensitivity	The Proposed Development is located entirely within the Fishguard and Goodwick Seascape Character Area, which includes the existing Fishguard Harbour and the Quayside at Lower Town. Key characteristics which, together with field work, have informed an understanding of the susceptibility of this landscape within proximity of the Proposed Development site and the type of development proposed include; - A sheltered bay with substantial breakwaters enclosing a modern harbour and ferry terminal to the east and an old harbour with quay to the west. - 50m high cliffs and steeply sided, wooded sea edges. - Narrow and steep sided valleys at Lower Town and broad, flat valley and wetland at Goodwick. - A busy seascape with regular ferries including catamaran and traditional ferries linking to Rosslare and recreational boating and fishing [mainly from the old harbour] with two slipways including rowing and sailing and bases for diving charters. - Traditional village and harbour at Lower Town, elevated town of Fishguard, and mixed commercial and residential areas with modern landscaped seafront and facilities at Goodwick. - Long breakwaters, boat moorings and boats drying. Susceptibility of this sCA to the type of development proposed is judged to be **low**. The assessment undertaken by the LPA identifies that this SCA is "*one of most intensively used areas along the coast, with significant settlement, commercial and recreational use."* The value of the SCA is judged to be **medium**. Overall, considering the susceptibility and value attached to the SCA, the overall sensitivity of this SCA is judged to be **low,** as whilst there are some distinctive landscape characteristics present, there are also many manmade structures in the landscape as well.
Magnitude of Change – Construction Phase	Direct impacts on this SCA will arise from the physical construction of the Proposed Development, resulting in the introduction of new manmade elements into the existing landscape, although this will be replacing existing manmade elements of the harbour. New built form and associated ancillary features will require construction equipment and activities that will be locally conspicuous during the construction phase of the Proposed Development. It is considered that construction activities will have a localised, temporary effect. Localised portions of the SCA adjacent to, but beyond the site boundary of the Proposed Development are predicted to experience indirect effects only because of the formation of the new features, though such features are not considered to alter the existing character as new features will be like existing elements of the harbour. The predicted magnitude of change associated with the construction stage of the Proposed Development is localised and **small**, restricted to land contained within the site boundary.
Magnitude of Change – Operational Phase	During the operational phase, new features of the harbour will be perceived as a minor alteration locally, though generally not obvious within the wider context due to its low development form and similarity to the existing harbour. The predicted magnitude of change in the landscape resource during the operational phase is judged to be localised and **negligible** during the operational phase.

SCA 7 - Fishguard and Goodwick including Fishguard Harbour and the Quayside at Lower Town	
Significance of Landscape Effect during Construction Phase	**Negligible to Minor**, localised temporary, short-term duration assessed as not significant effects are predicted to be experienced during the construction phase of the Proposed Development and limited to lands contained within the site boundary. Remaining portions of the SCA outside of the Proposed Development boundary are predicted to experience no significant, indirect effects.
Significance of Landscape Effect during Operational Phase.	**Negligible** to **minor** localised effects, assessed as not significant are predicted to be experienced during the operational phase of the Proposed Development. Predicted effects during the operational phase are limited in extent by the Proposed Development being similar in style and colour to the existing elements of Fishguard Harbour. Additional built form will easily integrate into the existing landscape and will not be perceived as a noticeable alteration.

20.7.2 Landscape Designation Impacts

20.7.2.1 National Parks

As stated in Section 20.5.1 previously, the Proposed Development site is located between 2 sections of the Pembrokeshire Coast National Park (refer Volume III; Figure 20.3).

The Proposed Development is located within the existing ferry terminal area, and harmonises with its setting and context, and consequently is not considered to adversely affect the qualities and special character of the Pembrokeshire Coast National Park.

The Proposed Development is screened from the western area of National Park by a combination of existing vegetation cover and topographical changes, with the Proposed Development sited at the base of the existing coastal fringe, at a lower elevation when compared with western portions of the National Park.

While views from the exposed coastal area within the National Park to the east of Fishguard will be available the Proposed Development will blend with the existing ferry terminal features and replaces an existing facility so that it will be very difficult to discern any changes.

It is therefore considered that none of the special qualities of the National Park would be affected by the Proposed Development.

20.7.2.2 Historic Landscapes

As stated in Section 20.5.2 previously, the Proposed Development site is located approximately 340m south of the Pen Gaer: Garn Fawr and Strumble Head historic landscape.

The identified historic landscape area is located on higher ground to the north-west of the Proposed Development, and following a review of the ZTV (refer Volume III: Figure 20.1) it is considered that the Historic Landscape will not experience visibility of the Proposed Development as the location of the Proposed Development at the base of the coastline means that the Proposed Development will not be visible.

It is therefore considered that this Historic Landscape will not be affected by the Proposed Development.

20.7.2.3 Heritage Coasts

As stated in Section 20.5.3 previously, the Proposed Development site lies between two Heritage Coasts, namely the St David's Peninsula, which extends along the coast north and west of the North Breakwater and Dinas Head, which covers the coast east of Fishguard within Pembrokeshire Coast National Park.

Following a review of the ZTV (refer Volume III: Figure 20.1) it is considered that the Heritage Coast section identified as St David's Peninsula will not experience any impact because of the Proposed Development due to screening provided by intervening topographical changes.

The Dinas Head section of the Heritage Coast is predicted to experience indirect effects because of the Proposed Development, however as stated previously the change in visual context is so limited as to be un-noticeable and the Proposed Development will blend with the existing ferry terminal facilities in western views with no change predicted for the Dinas Head Heritage Coast.

20.7.2.4 Registered Parks and Gardens

As stated previously in Section 20.5.4, the Proposed Development is located in proximity to the PGW (Dy) 63 (PEM) Fishguard Bay Hotel that is registered as a Grade II listed building and park/garden.

As illustrated by Viewpoint 7 (refer Volume III: Figure 20.12a to Figure 20.12c inclusive), Fishguard Bay Hotel and its associated grounds are located on elevated lands above the Proposed Development site and are physically and visually separated by the railway line and ferry terminal infrastructure which occupy lands at a lower elevation.

In addition there are existing woodlands with mature trees located on the steep slopes from the Hotel down to the railway line. The views from the Hotel and grounds across the wider Harbour will remain unaffected by the Proposed Development. The Proposed Development is well screened by a combination of intervening topographical changes and vegetation cover, and where visible will be difficult to discern from the existing ferry terminal infrastructure.

It is therefore considered that this Registered Park and Garden will not be affected by the Proposed Development.

20.7.2.5 Listed Buildings/ Conservation Areas

As stated above the Proposed Development site is in proximity to Fishguard Bay Hotel (Grade II) which is located within Goodwick Conservation Area. Goodwick Conservation Area extends along a portion of the western boundary associated with the Proposed Development site and covers most of the settlement of Goodwick as illustrated in Volume III Figure 20.3.
As illustrated in Viewpoint 7 (refer Volume III: Figure 20.12a to Figure 20.12c inclusive), that is the nearest point of this Conservation Area to the Proposed Development, the Proposed Development is well screened in views and available panoramic views across the Harbour will remain unaffected. The remainder of the Conservation Area is set further back than the Hotel and views of the Proposed Development are restricted and screened by intervening built form and existing vegetation.

No significant landscape or visual effects are predicted for the Goodwick Conservation Area.

A further Conservation Area is located south-east of the Proposed Development site within the settlement of Fishguard but this area is well visually and physically separated from the Proposed Development by the headland at Penyraber and built development and no alteration to views will occur.

No significant landscape or visual effects are predicted for the Fishguard Conservation Area.

20.7.2.6 Long Distance Footpaths & Cycle Routes

National Cycle Route 4 runs above the A40 to the south of the Proposed Development site.

Open views from this identified route are available northwards towards the site and the wider Bay area (refer Volume III; Figure 20.9a to 20.9c inclusive).

The National Trail continues north-west and crosses the existing ferry terminal area via a footbridge (refer Volume III; Figure 20.7a to 20.8c inclusive).

In views from the National Cycle Route the Proposed Development will not noticeably alter the visual context of the existing view due to the limited nature of the proposals and their location at the site of the existing ferry terminal infrastructure.

No significant landscape or visual effects are predicted for Long Distance Footpaths and Cycle Routes.

Table 20-12 below summaries the predicted significance of landscape effect for each of the previously assessed landscape character types and designations.

Table 20-12 Summary of Predicted Landscape Effects

Landscape Character / Designation	Predicted Construction Phase Landscape Effects	Predicted Operational Phase Landscape Effects
NLCA 43 – West & North Pembrokeshire Coast	**Minor**, localised, temporary, short-term duration assessed as not significant.	Localised **negligible** to **minor**, long-term effects assessed as not significant.
MCA 16 – Cardigan Bay (South)	**Minor**, localised, temporary, short-term duration assessed as not significant.	Localised **negligible** to **minor**, long-term effects assessed as not significant.
LCA 3 – Fishguard Coastal	**Minor**, localised, temporary, short-term duration assessed as not significant.	Localised **negligible** to **minor**, long-term effects assessed as not significant.
SCA 7 - Fishguard and Goodwick including Fishguard Harbour and the Quayside at Lower Town	**Negligible to Minor,** localised, temporary, short-term duration assessed as not significant.	Localised **negligible** to **minor**, long-term effects assessed as not significant.
National Parks	No Change	No Change
Historic Landscapes	No Change	No Change
Heritage Coasts	No Change	No Change
Long Distance Footpaths & Cycle Routes	No Change	No Change
Registered Parks and Gardens	No Change	No Change
Listed Buildings / Conservation Areas	No Change	No Change

20.8 Visual Effects

A series of 8 representative viewpoints have been selected to illustrate the visual context of the Proposed Development and as an aid to the visual assessment. All the viewpoints have been located on publicly accessible roads, footways and verges within the study area associated with the Proposed Development, from locations where it is theoretically possible to view the Proposed Development (refer to Volume III Figure 20.4).

Visual effects from the representative viewpoints considered in the SLVIA are described in Table 20-13 to Table 20-20 below and are supported by visualisations (refer Volume III; Figure 20.6a to Figure 20.13c inclusive) from each of the viewpoint locations (refer Volume III; Figure 20.4).

To avoid repetition, an assessment of construction phase impacts and predicted operational phase impacts is included within the following viewpoint assessment tables.

Table 20-13: Viewpoint 1 – Station Hill

Viewpoint 1 – Station Hill			
Grid Ref	194552; 238232	**Viewpoint Location**	Volume III; Figure 20.6a
Direction of View	North-east	**Approx Distance to Proposed Development**	750m from southern boundary

Description of existing view and potential receptors	This viewpoint is located on the public footpath forming the northen edge of Station Road, at an elevated location (bridge) over the existing railway on Station Hill, approximately 750m south of the Proposed Development. The view is considered to be representative of views experienced primarily by receptors on the footpath as thparapet walling associated with the bridge blocks views from passing cars. The existing view available (refer Volume III; Figure 20.6a) from this location is generally panoramic in nature, though views to the left are partially restricted in nature due to dense vegetation on more elevated land. This view is slightly elevated in location and is primarily comprised of existing built form asscoiated with the harbour and Fishguard harbour.The foreground and middle ground consists of a railway line, a local road travelling towards Fishguard Harbour, the road and the existing infrastructure associated with ferry terminal and Fishguard Harbour. Views of more distant coastlines form a prominant feature on the horizon from this veiwpoint. Streetlights and timber poles carrying overhead lines are visible throughout the view adding verticality.
Sensitivity	Transient receptors on the road at this location are judged to be of a low susceptibility to change in their views, though pedestrians on the footpath are judged to be on a high susceptibility to change in their views. The viewpoint does not represent a recognised stopping place and does not form part of a recognised tourist route, and the overall value of the view available is judged to be medium. Overall, taking into account the receptor susceptibility and the value of the view the sensitivity is judged to be **medium**.
Magnitude of Change – Construction Phase	During the construction phase the main source of impact on the view will be the visibility of machinery and activities associated with the Proposed Development, which are predicted to be visible at distance within a minor portion of the available view from this location. Construction phase operations will be viewed well below existing horizons, and perceived against a similarly developed backdrop which aids integration. The magnitude of visual impact during the construction phase of the Proposed Scheme is judged to be localised and **small** as such operations will be perceived within a minor portion of the view, at distance and below perceived horizons.
Magnitude of Change – Operational Phase	During the operational phase, elements of the Proposed Development will be partially visible, at distance within a minor portion of the overall view available from this location (refer Volume III; Figure 20.6c). Viewed at distance, the Proposed Development, will be perceived as a minor addition to the view, perceived well below existing horizons, with the character of the landscape remaining unaltered. Existing elements of the view, including the large scale man-made structures will retain visual prominance, with, middle distance and long-distance views remaining unaffected. Overall, the magnitude of visual impact during the operational phase is judged to be **negligible**.

Viewpoint 1 – Station Hill	
Significance of Visual Effect during Construction Phase	Localised **minor**, short-term, assessed as not significant effects are predicted to be experienced during the construction phase of the Proposed Development.
Significance of Visual Effect during Operational Phase	Localised **negligible to minor**, long-term assessed as not significant effects are predicted to occur during the operational phase of the Proposed Development. Whilst portions of the Proposed Development will be perceived within the view, they will be viewed as a minor alteration to the existing character and composition of the view and will be easily absorbed into the view.

Table 20-14: Viewpoint 2 – Ferry Port Entrance

Viewpoint 2 – Ferry Port Entrance			
Grid Ref	194657; 238164	**Existing Viewpoint Location**	Volume III; Figure 20.7a
Direction of View	North-east	**Approx Distance to Proposed Development**	750m from southwestern boundary

Description of existing view and potential receptors	This viewpoint is located approximately 750m to the south-west of the Proposed Development site on the footpath, adjacent to Fishguard Pier Car Park, off the roundabout between Station Hill, the A40 and Wern Road. The view is representative of views experienced by transient road users and pedestrian receptors traveling along Fishguard Pier towards Fishguard Ferry terminal. The existing view available from this location (refer Volume III; Figure 20.7a) is generally open and panoramic in nature, though views north are constrained by existing, elevated coastline. The foreground of the view is Fishguard Bay with vegetation and rock armour visible to the left as is the road leading to the Fishguard Ferry and Fishguard Harbour. Fishguard Pier and Fishguard Bay are the main visual draws to the viewpoint while streetlights along the road to the ferry provide verticality to the view.
Sensitivity	Transient receptors on the road at this location are judged to be of a medium susceptibility to change in their views, as the main focus of these receptors will be on the direction of travel and the view represented is predominantly experienced peripheral to the direction of travel. However, pedestrian receptors at this location are considered to be of a high susceptibility to change as the main focus would be the view of and across the bay. The viewpoint does not represent a recognised stopping place and does not form part of a recognised tourist route, and the overall value of the view available is judged to be medium. Overall, taking into account the receptor susceptibility and the value of the view the sensitivity is judged to be **medium**.
Magnitude of Change – Construction Phase	During the construction phase the main source of impact on the view will be the visibility of machinery and activities associated with the formation of the Proposed Development, which is predicted to be visible at distance within a minor portion of the available view from this location. Construction phase operations will be viewed well below existing horizons, and perceived against a similarly developed backdrop which aids integration. The magnitude of visual impact during the construction phase of the Proposed Scheme is judged to be localised and **small** as such operations will be perceived within a minor portion of the view, at distance and below perceived horizons.
Magnitude of Change – Operational Phase	During the operational phase, elements of the Proposed Development will be partially visible, at distance within a minor portion of the overall view available from this location (refer Volume III; Figure 20.7c). Viewed at distance, the Proposed Development, will be perceived as a minor addition to the view, perceived well below existing horizons, with the character of the landscape remaining unaltered. Existing elements of the view, including the large scale man-made structures will retain visual prominance, with, middle distance and long-distance views remaining unaffected. Overall, the magnitude of visual impact during the operational phase is judged to be **negligible**.
Significance of Visual Effect during Construction Phase	Localised **minor**, short-term, reversible assessed as not significant effects are predicted to be experienced during the construction phase of the Proposed Development.

Viewpoint 2 – Ferry Port Entrance	
Significance of Visual Effect during Operational Phase	Localised **negligible to minor**, long-term assessed as not significant effects are predicted to occur during the operational phase of the Proposed Development. Whilst portions of the Proposed Development will be perceived within the view, they will be viewed as a minor alteration to the existing character and composition of the view and will be easily absorbed into the view.

Table 20-15: Viewpoint 3 – View from Ocean Lab

Viewpoint 3 – Ocean Lab			
Grid Ref	194657; 238164	**Existing Viewpoint Location**	Volume III: Figure 20.8a
Direction of View	North-east	**Approx Distance to Proposed Development**	830m from southern boundary

Description of existing view and potential receptors	This viewpoint is located at the entrance to Ocean Lab aquarium, adjacent to Fishguard Pier car park, approximately 830m south of the Proposed Development. The view is representative of views experienced by transient and recreational receptors traveling along Fishguard Pier and towards Fishguard Ferry as well as those visiting Ocean Lab. The existing view (refer Volume III; Figure 20.8a) available from this location is partially restricted in nature to the left of the view due to elevated coastline with dense vegetation. However, more panoramic views are available centrally and to the right of the view. The immediate foreground of the view is formed by the car park with street furniture, while Fishguard Bay is visible in the middle distance with vegetation and rock armour visible to the left as is the road leading to the Fishguard Ferry and Fishguard Harbour. Fishguard Pier and Fishguard Bay are the main visual draws to the viewpoint while streetlights along the road to the ferry provide verticality to the view. Fishguard Bay Hotel is partially visible at lower elevation on the steep cliffs to the rear of the ferry terminal.
Sensitivity	Transient receptors on the road at this location are judged to be of a low susceptibility to change in their views at this location, however recreational receptors are considered to be of a high susceptibility to change as the main focus would be the view of the bay. The viewpoint does represent views from a recognised stopping place and the overall value of the view available is judged to be medium. Overall, taking into account the receptor susceptibility and the value of the view the sensitivity is judged to be **medium**.
Magnitude of Change – Construction Phase	During the construction phase the main source of impact on the view will be the visibility of machinery and activities associated with the Proposed Development, which are predicted to be visible at distance within a minor portion of the available view from this location. Construction phase operations will be viewed well below existing horizons, and perceived against a similarly developed backdrop which aids integration. The magnitude of visual impact during the construction phase of the Proposed Scheme is judged to be localised and **small** as such operations will be perceived within a minor portion of the view, at distance and below perceived horizons.
Magnitude of Change – Operational Phase	During the operational phase, elements of the Proposed Development will be partially visible, at distance within a minor portion of the overall view available from this location. Viewed at distance, the Proposed Development (refer Volume III; Figure 20.8c), will be perceived as a minor addition to the view, visible well below existing horizons, with the character and composition of the view remaining largely unaltered. Existing elements of the view, including the large scale man-made structures will retain visual prominance, with, middle distance and long-distance views remaining unaffected. Overall, the magnitude of visual impact during the operational phase is judged to be **negligible**.
Significance of Visual Effect during Construction Phase	Localised **minor**, short-term, reversible assessed as not significant effects are predicted to be experienced during the construction phase of the Proposed Development.
Significance of Visual Effect during Operational Phase	Localised **negligible to minor**, long-term assessed as not significant effects are predicted to occur during the operational phase of the Proposed Development. Whilst portions of the Proposed Development will be perceived within the view, they will be viewed as a

Viewpoint 3 – Ocean Lab	
	minor alteration to the existing character and composition of the view and will be easily absorbed into the view.

Table 20-16: Viewpoint 4 – View from St. Theresa's Convent

Viewpoint 4 – St. Theresa's Convent			
Grid Ref	195150; 237641	**Existing Viewpoint Location**	Volume III; Figure 20.9a
Direction of View	North	**Approx Distance to Proposed Development**	1100m to southern boundary

Description of existing view and potential receptors	This viewpoint is located on a footpath at St. Theresa's Convent, accessed from Windyhill Road. The slightly elevated viewpoint is located approximately 1100m south of the Proposed Development. The view is considered to be representative of views available to recreational and residential receptors in the immediate vicinity as well as those receptors who sit at St Theresa's Convent. This viewpoint is on elevated land and the existing view available from this location (refer Volume III; Figure 20.9a) is generally open and panoramic in nature, though partially constrained in nature by topographical changes which hide views of the horizon to the left. The immediate foreground of the view contains views of Fishguard Bay, with Goodwick sea wall forming a prominent feature of the view. The existing Fishguard Harbour is visible, as is Fishguard Pier to the centre right of the viewpoint. Residential properties are visible on more elevated land forming the well vegetated backdrop to the view. Street lighting and existing infrastructure associated with Fishguard Harbour are visible are lower elevation across the whole of the view at mid-distance. Fishguard Bay Hotel is visible at lower elevation on the steep cliffs to the rear of the ferry terminal.
Sensitivity	Recreational and residential receptors at this location are judged to be of a high susceptibility to change in their views at this location. The viewpoint does represent a stopping place and does form part of a recognised route (Marine Walk), and the overall value of the view available is judged to be medium. Overall, taking into account the receptor susceptibility and the value of the view the sensitivity is judged to be **medium**.
Magnitude of Change – Construction Phase	During the construction phase the main source of impact on the view will be the visibility of machinery and activities associated with the Proposed Development, which are predicted to be visible at distance within a minor portion of the available view from this location. Construction phase operations will be viewed well below existing horizons, and perceived against a similarly developed backdrop which aids integration. The magnitude of visual impact during the construction phase of the Proposed Scheme is judged to be localised and **small** as such operations will be perceived within a minor portion of the view, at distance and below perceived horizons.
Magnitude of Change – Operational Phase	During the operational phase, elements of the Proposed Development will be perceived, at distance within a minor central portion of the overall view available from this location. Viewed at distance, the Proposed Development (refer Volume III; Figure 20.9c), will be viewed as a minor addition to the view, perceived well below existing horizons, with the character and composition of the view remaining unaltered. Existing elements of the view, including evelated coastal lands and harbour walling will retain visual prominance, with middle distance and long-distance views remaining unaffected. Overall, the magnitude of visual impact during the operational phase is judged to be **negligible**.
Significance of Visual Effect during Construction Phase	Localised **minor**, short-term, assessed as not significant effects predicted to be experienced during the construction phase of the Proposed Development.
Significance of Visual Effect during Operational Phase	Localised **negligible to minor**, long-term assessed as not significant effects are predicted to occur during the operational phase of the Proposed Development. Whilst portions of the Proposed Development will be perceived within the view, they will be viewed as a minor alteration to the existing character and composition of the view and will be easily absorbed into the view.

Table 20-17: Viewpoint 5 – View from Pantycelyn Road

Viewpoint 5 – Pantycelyn Road			
Grid Ref	195514; 237737	**Existing Viewpoint Location**	Volume III; Figure 20.10a
Direction of View	North	**Approx Distance to Proposed Development**	1050m from southern boundary

Description of existing view and potential receptors	This viewpoint is located on the Pantycelyn, which can be access via the Windyhill Road. This viewpoint is approximately 1050m south of the Proposed Development. The view is considered to be representative of views available to both transient receptors utilising the local road network and recreational and residential receptors in the immediate vicinity. This viewpoint is located on elevated land, to the south of the Proposed Development, which forms the southern edge to Fishguard Bay and the existing view (refer Volume III; Figure 20.10a) available from this location is generally open and panoramic in nature. Existing elevated land forming the northern edge to Fishguard Bay forms the horizon and backdrop to Fishguard Bay and the existing harbour development. The immediate foreground of the view is Fishguard Bay, with Goodwick sea wall forming a prominent visual feature. The existing Fishguard Harbour is visible, as is Fishguard Pier to the centre right of the view, with rock armour and built form associated with the harbour forming a distinctive element of the view. Fishguard Bay Hotel is visible within the central portion of the view, at lower elevation on the steep cliffs to the rear of the ferry terminal. Residential properties are visible to the left of the view, extending across the central portion of the view, though generally visible at distance. Existing built form on more elevated land forming the backdrop of the view form a distinct visual draw due to their contrasting colour.
Sensitivity	Transient receptors on the road at this location are judged to be of a medium susceptibility to change in their views, as the main focus of these receptors will be on the direction of travel and the view represented is predominantly experienced peripheral to the direction of travel. However, pedestrian and recreational receptors at this location are judged to have a high susceptibility to change in their views.. The viewpoint does represent a stopping place and does form part of a recognised route (Marine Walk), and the overall value of the view available is judged to be medium. Overall, taking into account the receptor susceptibility and the value of the view the sensitivity is judged to be **medium**.
Magnitude of Change – Construction Phase	During the construction phase the main source of impact on the view will be the visibility of machinery and activities associated with the Proposed Development, which are predicted to be visible at distance within a minor portion of the available view from this location. Construction phase operations will be viewed well below existing horizons, and perceived against a similarly developed backdrop which aids integration. The magnitude of visual impact during the construction phase of the Proposed Scheme is judged to be localised and **small** as such operations will be perceived within a minor portion of the view, at distance and below perceived horizons.
Magnitude of Change – Operational Phase	During the operational phase, elements of the Proposed Development will be partially visible, at distance within a minor portion of the overall view available from this location. Viewed at distance, the Proposed Development, will be perceived as a minor addition to the view, with the character and composition of the view remaining largely unaltered. Existing elements of the view, including the large scale man-made structures will retain visual prominance, with middle distance and long-distance views remaining unaffected. Overall, the magnitude of visual impact during the operational phase is judged to be **negligible**.
Significance of Visual Effect during Construction Phase	Localised **minor**, short-term, assessed as not significant effects predicted to be experienced during the construction phase of the Proposed Development.
Significance of Visual Effect during Operational Phase	Localised **negligible to minor**, long-term assessed as not significant effects are predicted to occur during the operational phase of the Proposed Development. Whilst portions of the Proposed Development will be perceived within the view, they will be viewed as a minor alteration to the existing character and composition of the view and will be easily absorbed into the view.

Table 20-18: Viewpoint 6 – View from Fishguard Fort

Viewpoint 6 – View from Fishguard Fort			
Grid Ref	196212; 237815	**Existing Viewpoint Location**	Volume III; Figure 20.11a
Direction of View	North-west	**Approx Distance to Proposed Development**	1.4 km from southern boundary

Description of existing view and potential receptors	This viewpoint is located within Fishguard Fort (Castle Point Old Fort) approximately 1.4km south-east of the Proposed Development. The view, from this location are considered to be representative of views available to recreational receptors visiting this location or utilising the long distance walking route (Pembrokeshire Coast Path National Trail). Views available from this elevated location (refer Volume III; Figure 20.11a) are generally open and panoramic in nature across Fishguard Bay with Goodwick sea wall forming a distinct visual element at mid distance across the central portion of the view. Elevated coastlines to the immediate north of Fishguard Bay form the horizon, with existing built form and vegetation cover perceived to locally elevate horizons. Fishguard Bay Hotel is visible within the central portion of the view, at lower elevation on the steep cliffs to the rear of the ferry terminal. Rock armour and built form associated with the harbour is perceived at lower elevation forming a defined edge to the bay and extends across the whole of the central portion of the view, though perceived at distance.
Sensitivity	Recreational receptors at this location are judged to be of a high susceptibility to change in their views, as the focus of the view from this location is across the bay towards Goodwick. The viewpoint does represent a stopping place and does form part of a recognised route (Pembrokeshire Coast Path National Trail), and the overall value of the view available is judged to be high. Overall, taking into account the receptor susceptibility and the value of the view the sensitivity is judged to be **high**.
Magnitude of Change – Construction Phase	During the construction phase the main source of impact on the view will be the visibility of machinery and activities associated with the Proposed Development, which are predicted to be visible at distance within a minor portion of the available view from this location. Construction phase operations will be viewed well below existing horizons, and perceived against a similarly developed backdrop which aids integration. The magnitude of visual impact during the construction phase of the Proposed Scheme is judged to be localised and **negligible** as such operations will be perceived within a minor portion of the view, at distance and below perceived horizons.
Magnitude of Change – Operational Phase	During the operational phase, elements of the Proposed Development will be visible, at distance within a minor portion of the overall view available from this location. Viewed at distance, the Proposed Development will be difficult to discern, with the character of the landscape remaining unaltered. Existing elements of the view, including the large scale man-made structures will retain visual prominance with middle distance and long-distance views remaining unaffected. Overall, the magnitude of visual impact during the operational phase is judged to be **negligible**.
Significance of Visual Effect during Construction Phase	Localised **Minor**, short-term, assessed as not significant effects predicted to be experienced during the construction phase of the Proposed Development.
Significance of Visual Effect during Operational Phase	Localised **Minor**, long-term assessed as not significant effects are predicted to occur during the operational phase of the Proposed Development. Whilst portions of the Proposed Development will be perceived, they will be difficult to differentiate as the new facilities will blend with the existing ferry terminal infrastructure

Table 20-19: Viewpoint 7 – View from Fishguard Bay Hotel

Viewpoint 7 – View from Fishguard Bay Hotel			
Grid Ref	194877; 238663	**Existing Viewpoint Location**	Volume III; Figure 20.12a
Direction of View	East	**Approx Distance to Proposed Development**	220m from western boundary

Description of existing view and potential receptors	This viewpoint is located at within the grounds Fishguard Bay Hotel, located off the Quay Road, approximately 220m from the western boundary of the Proposed Development site. The view is considered to be representative of views available to recreational receptors and patrons using Fishguard Bay Hotel. The existing view available from this location (refer Volume III; Figure 20.12a) is constrained and screened by existing vegetation to the immediate north, east and west of the hotel. Distant horizons, formed by more elevated lands to the south, associated with the Pembrokeshire Coast National Park, are partially visible beyond intervening vegetation. Existing infrastructure associated with the ferry terminal and the wider harbour area is screened within the view by existing vegetation cover.
Sensitivity	Receptors at the Fishguard Bay Hotel are judged to be of a high susceptibility to change in their views. The viewpoint does represent views from a recognised location and from within a designated landscape area (Registered Historic Park and Garden) and the value of the view is judged to be high. Overall the sensitivity of the view is judged to be **high**.
Magnitude of Change – Construction Phase	During the construction phase, operations and machinery movements associated with the Proposed Development will not be visible in views availabe from this location due to screening effects of vegetation associated with Fishguard Bay Hotel. Overall, the magnitude of change during the construction phase of the Proposed Development is judged to be **No Change**.
Magnitude of Change – Operational Phase	The Proposed Development and associated infrastructure will be screened in views from this location due to screening effects of vegetation (refer Volume III; Figure 20.12c). Overall, the magnitude of visual impact during the operational phase is judged to be **No Change**.
Significance of Visual Effect during Construction Phase	**No Change**
Significance of Visual Effect during Operational Phase	**No Change**

Table 20-20: Viewpoint 8 – View from Quay Road Footbridge

Viewpoint 8 – View from Quay Road Footbridge			
Grid Ref	194877; 238663	**Existing Viewpoint Location**	Volume III; Figure 20.13a
Direction of View	North-east	**Approx Distance to Proposed Development**	370m from western boundary

Description of existing view and potential receptors	This viewpoint is located on the pedestrian footbridge connecting Quay Road with pedestrain access / footpath adjacent to the main ferry terminal access. This elevated viewpoint is located approximately 370m south-west of the Proposed Development and is considered to be representative of views experienced by recreational receptors utilising the bridge link. The existing view available from this location (refer Volume III: Figure 20.13a) is open and panoramic in nature, though views to the left are restricted due to elevated land with dense vegetation. The view available from this slightly elevated location is comprised primarily of existing ferry terminal infrastructure, though breakwater and jettys are visible across

Viewpoint 8 – View from Quay Road Footbridge	
	central portions of the view at varying distances. To the right of the view, elevated lands associated with the Pembrokeshire Coastline form a distinctive horizon.
Sensitivity	Recreational receptors at this location are judged to be of a high susceptibility to change in their views at this location. The viewpoint does not represent a recognised stopping place and does not form part of a recognised tourist route, and the overall value of the view available is judged to be medium as the view contains existing built form associated with the ferry terminal facility, visible at close distance. Overall, taking into account the receptor susceptibility and the value of the view the sensitivity is judged to be **medium**.
Magnitude of Change – Construction Phase	During the construction phase the main source of impact on the view will be the visibility of machinery and activities associated with the Proposed Development, which are predicted to be visible within a minor portion of the available view from this location. Construction phase operations will be viewed well below existing horizons, and perceived against a similarly developed backdrop which aids integration. The magnitude of visual impact during the construction phase of the Proposed Scheme is judged to be localised and **small** as such operations will be perceived within a minor portion of the view, at distance and below perceived horizons.
Magnitude of Change – Operational Phase	During the operational phase, elements of the Proposed Development will be partially visible, within a minor portion of the overall view available from this location. Viewed at mid-distance, the Proposed Development, will be perceived as a minor addition to the view, with the character and composition of the view remaining largely unaltered. Existing elements of the view, including the large scale man-made structures will retain visual prominance with middle distance and long-distance views remaining unaffected. Overall, the magnitude of visual impact during the operational phase is judged to be **negligible**.
Significance of Visual Effect during Construction Phase	Localised **minor**, short-term, assessed as not significant effects predicted to be experienced during the construction phase of the Proposed Development.
Significance of Visual Effect during Operational Phase	Localised **negligible to minor**, long-term assessed as not significant effects are predicted to occur during the operational phase of the Proposed Development. Whilst portions of the Proposed Development will be perceived within the view, they will be viewed as a minor alteration to the existing character and composition of the view and will be easily absorbed into the view.

Table 20-21 below summarises the predicted significance of visual effect for each of the previously assessed viewpoints.

Table 20-21: Summary of Predicted Visual Effects

Viewpoint		Predicted Construction Phase Visual Impacts	Predicted Operational Phase Visual Impacts
1	View south from Station Hill	Localised **minor**, short-term, assessed as not significant effects.	Localised **negligible to minor**, long-term assessed as not significant effects.
2	View southeast from Ferry Port Entrance	Localised **minor**, short-term, assessed as not significant effects.	Localised **negligible to minor**, long-term assessed as not significant effects.
3	View southwest from Ocean Lab	Localised **minor**, short-term, assessed as not significant effects.	Localised **negligible to minor**, long-term assessed as not significant effects.
4	View south from St. Theresa's Convent	Localised **minor**, short-term, assessed as not significant effects.	Localised **negligible to minor**, long-term assessed as not significant effects.
5	View north from Pantycelyn Road	Localised **minor**, short-term, assessed as not significant effects.	Localised **negligible to minor**, long-term assessed as not significant effects.
6	View from Fishguard Fort	Localised **minor**, short-term, assessed as not significant effects.	Localised **negligible to minor**, long-term assessed as not significant effects.
7	View from Fishguard Bay Hotel	**No Change**	**No Change**

Viewpoint		Predicted Construction Phase Visual Impacts	Predicted Operational Phase Visual Impacts
8	View from Quay Road Footbridge	Localised **minor**, short-term, assessed as not significant effects.	Localised **negligible to minor**, long-term assessed as not significant effects.

20.9 Conclusion

The Proposed Development is located within a single National Landscape Character Area identified as West & North Pembrokeshire Coast NLCA 43. The identified NLCA has been assessed for both construction and operational phase effects associated with the Proposed Development. The NLCA has been predicted to experience localised, minor short-term effects assessed as not significant during the construction phase, restricted to areas contained within the Proposed Development site boundary only, with remaining portions of NLCA 43 predicted to experience no significant indirect effects. During the operational phase of the Proposed Development, negligible to minor, assessed as not significant effects are predicted as the Proposed Development easily integrate into the existing landscape and will not be perceived as a noticeable alteration.

Additionally, the Proposed Development is located within the Cardigan Bay (South) MCA, the Fishguard Coastal LCA as well as the Fishguard and Goodwick including Fishguard Harbour and the Quayside at Lower Town SCA. Like the NLCA mentioned above, the identified areas have been assessed for both construction and operational phase effects associated with the Proposed Development. These identified areas are predicted to experience localised, minor short-term effects assessed as not significant during the construction phase, restricted to areas contained within the Proposed Development site only, with surrounding areas predicted to experience no significant indirect effects. During the operational phase of the Proposed Development, negligible to minor assessed as not significant effects are predicted as the Proposed Development easily integrate into the existing landscape and will not be perceived as a noticeable alteration.

The Proposed Development has been assessed as not giving rise to any significant direct or indirect effects on any of the landscape designations including; National Parks, Historic Landscapes, Registered Parks & Gardens; Listed Buildings or Conservation Areas.

A total of 8 viewpoints have been assessed, for both construction and operational phases associated with the Proposed Development. None of the viewpoint’s assessment are considered to experience significant effects during either the construction phase or operational phase of the Proposed Development, as whilst portions of the Proposed Development are predicted to be visible, visible elements of the Proposed Development will be difficult to discern and perceived as a minor alteration to the existing character and composition of the view. The Proposed Development is easily absorbed within views as the development type and form is of a similar nature to existing infrastructure elements visible in views.

It is noted that the Proposed Development is located within a robust harbour setting and is considered that the wider landscape and visual resources surrounding the Proposed Development site have the capacity to accommodate a development of this type and scale.

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 21 Waste Management

794-NI-POR-00886R
May 2025

21 WASTE MANAGEMENT

21.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as “the Proposed Development”) by wastes produced from the Proposed Development. This chapter considers the potential impacts from wastes that are generated from offshore and onshore activities during the construction and operational phases of the Proposed Development.

Waste is defined as ‘*any substance or object the holder discards, intends to discard or is required to discard*’ under the Waste Framework Directive (European Directive 2006/12/EC as amended by Directive 2008/98/EC). Once a substance has become waste it will remain waste until it has been fully recovered and no longer poses a potential risk to the environment or human health.

Directive 2011/92/EU included waste as a criteria for assessment in EIA requiring an estimate of the quantities and types of waste produced during the construction and operation phases of projects.

The main objectives of this assessment are to:

- Undertake a desktop study to identify the main sources of non-hazardous and hazardous wastes that are expected to be generated from the Proposed Development;
- Assess the potential impact from the construction and operational phases of the Proposed Development from generated wastes; and
- Recommend mitigation measures in relation to the proposed construction and operational and phases, if necessary, and predict residual impacts.

The assessment presented is informed by the following key chapters of the ES:

- Chapter 2: Project Description.

Other aspects relevant to waste management are addressed in the specific chapters of the ES, namely:

- Chapter 15: Air Quality and Climate – particulate matter/dust impacts from demolition and loading of wastes.
- Chapter 19: Traffic and Transport – impacts of any vehicle movements associated with hauling or removing wastes.

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

21.2 Purpose of this Chapter

The primary purpose of the ES chapter is to provide an assessment of the likely effects of the Proposed Development from the solid wastes generated from construction works and operational phase. In particular, this ES chapter:

- Presents the existing environmental baseline established from desk studies, relevant datasets and consultation;
- Identifies any limitations encountered in compiling the environmental information (**Section 21.13**);
- Presents an assessment of the potential likely significant effects from the management of wastes arising from the Proposed Development (Section 21.9) based on the information gathered and the analysis and assessments undertaken.
- Highlights any required management measures.

21.3 Study Area

The study area for wastes generated from the Proposed Development is the red line boundary. The assessment will consider solid waste arisings from the construction site and dredged sediment at the nearshore, any wastewater generated from project activities will be considered in Chapter 11 Water Quality.

The study area for the treatment and disposal of wastes not reused on the site will be Mid and South-West Wales as a sub-region of Wales.

21.4 Waste Legislation and Policy Context

A legislative review has been undertaken as part of this assessment that includes identifying relevant waste and environmental European Directives, National Regulations, National Policies and Strategies. The European Revised Waste Framework Directive (2008/98/EC) was amended in May 2018 and sets the framework for UK Waste Policy. The Waste (Circular Economy) (Amendment) Regulations 2020 made changes to UK legislation to transpose the revised Waste Framework Directive into English and Welsh legislation.

The UK legislative framework for the management of construction wastes comprises the following:

- Environmental Protection Act 1990;
- Environment Act 1995;
- Hazardous Waste (England and Wales) Regulations 2005 (as amended);
- Waste Management (England and Wales) Regulations 2006;
- Waste (Wales) Measure 2010;
- Waste (England and Wales) Regulations 2011 (as amended);
- Environmental Permitting (England and Wales) Regulations 2016 (as amended);
- Environment (Wales) Act 2016; and
- Waste (Circular Economy) (Amendment) Regulations 2020.

The Waste (England and Wales) Regulations 2011 place a duty on waste producers and all handlers of waste to manage waste in accordance with a hierarchy of options where this achieves the best overall environmental outcome (Defra, 2018a). The contractors involved in the Proposed Development will be required to demonstrate that they are applying the waste hierarchy.

The following waste strategy details the Welsh Governments current long-term framework for resource efficiency and managing wastes in Wales:

- Towards Zero Waste. One Wales: One Planet. The Overarching Waste Strategy Documents for Wales (Welsh Assembly Government, 2010).

The construction and demolition sector plan supporting the Towards Zero Waste Strategy covers the waste produced during construction, civil engineering and demolition projects. It aims are to prevent waste and reduce waste and increase recycling from businesses in this sector. Additional waste planning guidance for Wales is set out in Technical Advice Note 21 (WAG, 2014).

The guidance document supported by the National Assembly for Wales on the classification and assessment of waste, Technical Guidance WM3 (Environment Agency, 2021) sets out how wastes are classified as non-hazardous and hazardous in line with the various hazard criteria.

All wastes generated from the Proposed Development will be classified in line with regulatory requirements and management plans will document how the different waste streams will be handled, stored and managed. The management plans will include the responsibilities of staff and the site-specific procedures and tracking procedures to enable full traceability of wastes to treatment or disposal locations.

21.5 Consultation

No issues relevant to waste management were raised during consultation activities undertaken to date, including comments received on the Scoping Report. NRW note in the screening opinion that adequate disposal of sediment arisings will be required, including for offshore disposal identifying the disposal site and status. Information on the proposed disposal site is included in Table 21-8.

Chapter 5: Scoping and Consultation provides details of the types of consultation activities undertaken for the Project up to the end of January 2025 and the consultees that were contacted.

21.6 Methodology to Inform the Baseline

21.6.1 Desktop study

Information on wastes generated from the Proposed Development within the Waste Management Study Area was collected through a desktop review of existing studies and datasets, including:

- Demolition Layout, drawing number Figure 21.A Demolition Layout (RPS, 2025).
- Indicative waste arisings data provided to the EIA team.

These sources provide the most up to date information and data for this assessment, although updated estimates on the expected volumes of wastes from the demolition of the existing infrastructure will be developed in due course.

21.6.2 Site-specific surveys

No site-specific baseline surveys were undertaken as part of the assessment for waste management. The baseline data presented in this section is derived from Project information and expert judgement based on waste arisings from similar projects.

21.7 Assessment Methodology

The methodology and associated impact assessment had regard to the general guidance regarding the undertaking of an EIA, as presented in Chapter 4: Environmental Impact Assessment Process and Methodology and the following waste management specific guidance as follows:

- *Guide to Materials and Waste in Environmental Impact Assessment: Guidance for a Proportionate Approach* (IEMA, 2020).

The method to be adopted in the assessment was detailed in the Scoping Report. The methodology for assessing the significance of effects associated with the generation of waste is based upon an assessment of the quantity and types of waste that are likely to be produced during construction and operation of the replacement linkspan.

21.7.1 Impact assessment criteria

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity for waste management are based on those set out in the IEMA guidance (IEMA, 2020).

The criteria for defining impact magnitude in this chapter are outlined in below.

Table 21-1 Waste management: Magnitude of an impact definition

Assessment of Magnitude				
Inert and Non-Hazardous Waste Landfill Void Capacity				
No change	**Negligible**	**Minor**	**Moderate**	**Major**

Zero waste generation and disposal from the development	Waste generated by the development will reduce regional landfill void capacity baseline by <1%	Waste generated by development will reduce regional landfill void capacity baseline by 1-5%	Waste generated by the development will reduce regional landfill void capacity baseline by 6-10%.	Waste generated by the development will reduce landfill void capacity baseline by >10%.
Hazardous Waste Landfill Void Capacity				
No change	**Negligible**	**Minor**	**Moderate**	**Major**
Zero waste generation and disposal from the development	Waste generated by the development will reduce national landfill void capacity baseline by <0.1%	Waste generated by development will reduce national landfill void capacity baseline by <0.1-0.5%	Waste generated by the development will reduce national landfill void capacity baseline by >0.5-1%	Waste generated by the development will reduce national landfill void capacity baseline by >1%.

Source: IEMA, 2020

The criteria for defining receptor sensitivity in this chapter are outlined in below.

Table 21-2 Waste management sensitivity matrix definitions

Importance / Sensitivity of Resource or Receptor				
Across construction and or/operation phases, the baseline/future baseline (i.e., without development) or regional inert and non-hazardous landfill void capacity is expected to…				
Negligible	**Low**	**Medium**	**High**	**Very High**
Remain unchanged or is expected to increase through a committed change in capacity.	Reduce minimally: by <1% as a result of wastes forecast.	Reduce noticeable: by 1-5% as a result of wastes forecast.	Reduce considerably: by 6-10% as a result of wastes forecast.	Reduce very considerably (by >10%); end during construction or operations; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand.

Source: IEMA, 2020

The significance of the effect upon waste arisings is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this assessment is presented in **Table 21-3**. Where a range of significance of effect is presented in **Table 21-3**, the final assessment for each effect is based on calculated assessment and professional judgement.

Table 21-3 Waste: Matrix used for the assessment of the significance of the effect

		Magnitude of Impacts				
Sensitivity (or value) of receptor		**No Change**	**Negligible**	**Minor**	**Moderate**	**Major**
	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Source: IEMA, 2020

Once the effect threshold has been determined, **Table 21-4** provides how the Waste Topic Lead may determine whether environmental effects are potentially significant, or not. Where a threshold is 'slight or moderate', i.e., transcends the significant – or not - effect boundary, professional judgement has been used to determine a final outcome.

Table 21-4 Waste: Determination of overall significance of effect

Effect	Waste
Neutral	Not significant
Slight	
Moderate	Significant
Large	
Very Large	

Source: IEMA, 2020

21.8 Baseline Environment

Fishguard port provides the basic services for the operation of the Fishguard to Rosslare ferry service operated by Stena Line. The current waste arisings at the port are from the administrative buildings and the vessel-generated wastes routinely backloaded at the port from the ferry. These typically comprise municipal type wastes from the bins, separated recyclables and catering wastes including food. Currently the following non-hazardous wastes are segregated for recycling:

- Cardboard and paper
- Glass
- Cans and metal
- Plastics

Some hazardous wastes are also separated, including fluorescent tubes, oil filters, and oily rags and absorbents and stored separately. The existing operational wastes are managed in line with approach set out in the current Port Waste Management Plan for the Fishguard Port (Stena Line, 2024) that complies with requirements for businesses in Wales to segregate recyclables.

A detailed description of the Proposed Development and construction sequence is provided in Chapter 2 Project Description. The key project elements that will generate wastes will be the works removing existing infrastructure, construction activities, and operation of the new infrastructure.

Construction phase works comprise:

- Demolition of the following.
  - Disused RNLI slipway
  - Buffer dolphin
  - Suspended deck structure
- Dredging of soft material at the nearshore.
- Land reclamation and rock armour revetment construction – using imported material.
- Bankseat
- Guide pile
- Installation of replacement linkspan.
- Placement of scour protection at the vessel berth.
- Terminal reconfiguration – to align traffic and pedestrian routes.

Operational phase activities will be:

- Continuation of ferry services operated by Stena.
- Future offshore dredging to maintain access, where required.

The types of wastes that will be produced from the Proposed Development, their classification and indicative estimates of waste arisings are detailed in the next section.

21.8.1 Waste Arisings from Construction

The wastes that will be generated from these works can be classified as either non-hazardous or hazardous, depending on the properties of the waste types.

Non-hazardous Wastes

- Concrete and rubble – from demolition works.
- Dredgings – mixtures of sand, gravel and clays from nearshore works.
- Food waste – from welfare facilities.
- General waste – mixed residual waste that cannot be recycled.
- Paper and cardboard – cardboard boxes from packaging and paper that can be recycled when not wet or contaminated.
- Plastic – various types of plastics that can be segregated and recycled (e.g. PET and HDPE).
- Reinforced concrete - assumed to be concrete and rebar.
- Scrap metal –metals that can be recycled
- Wood - pallets and packing board

Hazardous Wastes

- Batteries, lead acid – vehicle type batteries containing acid.
- Chemicals (liquids) – off-spec and out of date chemicals.
- Oil filters (used) – spent oil filters containing oils from plant and machinery maintenance.
- Oily rags – oil contaminated rags or soak-up materials.
- Used oil – from plant or machinery maintenance.

The initial site preparation will include the clearance of all legacy infrastructures before removal of the pontoon, linkspan ramps and concrete approach structure. The demolition stage of the project will generate Construction Demolition and Excavation (CD&E) waste materials. Demolition will be required to remove the concrete slab approach and support structures, including the open piled deck, bankseat and buffer dolphins.

Typical CD&E materials will consist of the existing concrete approach, deck slab, supporting towers and columns and metal from the associated mechanical infrastructure and existing linkspan ramps.

Indicative quantities of wastes that will be generated from the Proposed Development are:

- Reinforced Concrete – 1,800 m^3
- Steel – 300 m^3
- Inert – 40 m^3

Further information and management options for these indicative wastes are provided in **Table 21-8.**

Dredgings

It is estimated that dredging will generate around 78,000 m^3 of silty sands and gravels. Sediment sampling previously undertaken confirmed that the sediment did not contain any hazardous substances so is classified as non-hazardous waste (RPS, 2018). A further campaign of sediment sampling was undertaken in March 2025 confirming that no hazardous chemicals were present in locations that will be targeted for dredging and the results will feed into the development of the management strategy. Higher levels of contaminants were identified at one sampling location (VC-003) but this was confirmed as being at depth beyond proposed works. An interpretation report and chemical analysis results are included in Appendix 17C of the ES.

The proposed management strategy for the dredgings is offshore disposal at an existing licenced location at Milford Haven (as detailed in Chapter 2 Project Description). No dredged material will be disposed of onshore.

21.8.2 Waste Arisings from Operation

The new Linkspan will provide for the two dockings per day for the ferry service running between Fishguard and Rosslare and the quantity of wastes backloaded from the routine ferry services and small number of other vessels using the port is expected to remain consistent in the medium-term.

Vessels using the new Linkspan during the operational phase will continue to backload ship-generated waste at the port in line with the Port Waste Management Plan for the Fishguard Port (Stena Line, 2024) that implements MARPOL requirements and UK Regulations. The plan includes provisions for the management of International Catering Waste and various waste streams that are segregated for recycling to minimise the quantity of residual waste requiring disposal.

The Port Waste Management Plan is periodically reviewed and updated to ensure any new requirements for the management of wastes are incorporated and the plan accurately details the required procedures and information on the specific companies responsible for collection and onwards management of the various wastes.

Periodic dredging within the port area and access channels may be required during the operational phase. No estimates of the quantities of dredged materials generated from future works have been considered as part of this assessment and it is assumed that where this is required separate permits will be applied for from the NRW based on the volume and offshore disposal locations available at that time.

21.8.3 Waste Capacity Baseline

To inform the assessment, the availability and capacity of local / regional waste infrastructure within the Study Area has been reviewed for the Mid and South-Wales region to reflect that the transportation of waste should be minimised as far as practically possible. The most up-to-date information on the waste management permitted sites within the region was identified from data published by Natural Resources Wales (NRW, 2025) and Pembrokeshire Coast National Park Authority.

There are numerous waste treatment sites in the vicinity of the Proposed Development, including a number of Material Recycling Facilities (MRFs) and scrap metal recycling sites. The NRW locator indicates the following treatment sites within the vicinity of Fishguard:

- Metal recycling site – 4 sites within 75 km
- Construction and demolition waste MRF – 3 sites within 100km
- Industrial and commercial waste MRF – 3 sites within 50 km

These waste sites will facilitate diverting materials from landfill and provide opportunities to reuse and recycle materials from the Proposed Development. In addition to these sites, the inert waste landfills in the wider study area that could take those inert wastes from the Proposed Development are listed in **Table 21-5**. The NRW permit number and nearest town is also provided.

Table 21-5 Inert Waste Landfills in Mid and South-West Wales

Permit No.	Site Name	Town	Local Authority Area
CP3398FR	Pope Hill 2	Haverfordwest	Pembrokeshire
HP3598FM	Pope Hill 3	Pope Hill	Pembrokeshire
SP3998FQ	Pope Hill 1	Haverfordwest	Pembrokeshire
BP3598FJ	Glogue Quarry Landfill	Hermon	Pembrokeshire
LP3998FV	Blaencilgoed Farm	Narberth	Pembrokeshire
UP3098FG	Slade Cross	Cosheton	Pembrokeshire
KP3198FQ	Wogaston	Pembroke	Pembrokeshire
PP3798FV	Waunlwyd Farm	Cynwyl Elfed	Carmarthenshire

Permit No.	Site Name	Town	Local Authority Area
LP3298FS	Penrhos Depot Landfill	Llandysul	Ceredigion
MP3498FG	Pibwrlwyd Inert Landfill	Carmarthen	Carmarthenshire
BP3398FA	Penycoed Landfill	Carmarthen	Carmarthenshire
RP3799FD	Bwlch Y Wern Landfill	Builth Wells	Powys
PP3195CR	J A Bowen & Co, Landfill	Welshpool	Powys
PP3695CU	Kingswood Farm Landfill	Welshpool	Powys

Source: NRW (2025)

The non-hazardous landfills that can take general waste and various other mixed waste streams are detailed in **Table 21-6**. The closest to the Proposed Development is in the vicinity of St Davids.

Table 21-6 Non-hazardous Waste Landfills in Mid and South-West Wales

Permit No.	Site Name	Town	Local Authority Area
TP3698FA	St Davids Landfill	St Davids	Pembrokeshire
AP3991SM	Land Off Trostre Link Road	Llanelli	Carmarthenshire
YP3895FY	Timet Landfill	Waunarlwydd	Swansea
PP3898FA	Penplas Farm	Swansea	Swansea
BP3898FM	Cwmrhydyceirw Quarry	Swansea	Swansea
CP3299FR	Cwrt Y Plyffin Landfill	Brecon	Powys

Source: NRW (2025)

The hazardous waste landfills currently permitted by Natural Resources Wales for the whole of Wales are included in **Table 21-7**. Capacity data for the remining landfill void space is not available from NRW.

Table 21-7 Hazardous Waste Landfills in Wales

Permit No.	Site Name	Town	Local Authority Area
SP3298FT	Giants Grave Landfill	Neath	Neath Port Talbot
YP3199FE	Coedely Reclamation & Development Scheme	Tonyrefail	Rhondda Cynon Taff
GP3392EH	Trehir Quarry Landfill	Caerphilly	Caerphilly
BP3795FD	Ferry Road Landfill	Cardiff	Cardiff
CP3694FW	Penhesgyn Gors Landfill (area 2)	Menai Bridge	Isle of Anglesey
BP3394FH	W D A - Formerly Erie Electronic 1	Wrexham	Wrexham
BP3994FJ	W D A - Formerly Erie Electronic 2	Wrexham	Wrexham
BP3390VA	Standard Landfill Site	Buckley	Flintshire

Source: NRW (2025)

The latest predicted remaining landfill capacity for the Mid and South-West Wales Waste Planning region is 6.1 years (Pembrokeshire Coast National Park Authority, 2024) and in July 2022, the latest data available, the capacity available was around 155,000 tonnes for non-hazardous landfills (Mid & South-West Wales, 2023). Landfill is considered the worst-case scenario and would be the least desirable disposal option for wastes arising from the Proposed Development and reuse and recycling will be considered before this disposal option, as detailed in **Section 21.9.2**.

21.9 Impact Assessment

21.9.1 Do Nothing Scenario

If the Proposed Development did not go ahead, there would be no non-hazardous or hazardous wastes generated and so no impact on the local and regional waste management capacity. The do-nothing scenario has therefore not been considered further in the assessment.

21.9.2 Assessment of Construction Effects

There is the potential for quantities of materials to be deposited in landfill sites rather than being reused or recycled unless the SWMP is implemented and adhered to. The use of non-permitted waste contractors or unlicensed facilities could give rise to inappropriate management of waste and result in pollution incidents or contamination of land. Therefore, it is essential that all waste materials are dealt with in accordance with regional policies, national legislation, and that site management procedures are in place to ensure the appropriate procedures for waste segregation, storage, handling, and off-site transportation to approved waste facilities are implemented.

A number of different waste types are expected to be generated on site and the proposed management methods and indicative quantities are detailed in **Table 21-8**.

Table 21-8 Waste Streams Generated and Proposed Management Options

Project Activity	Waste Type	Classification	Management Option(s)	Management Strategy
Dredging	Sediment from dredging (silty sands and gravel)	Non-hazardous	Disposal at licenced offshore site	Dredged material (~78,000 m^3) will be extracted onto barges and transferred for disposal at a licenced offshore deposit site. This is currently planned to be Milford Haven existing disposal site (L169) Licence DML1646 issued in 2017. Previous sediment sampling has confirmed target material as being non-hazardous in nature based on laboratory chemical analyses results. A further sediment sampling campaign was undertaken in 2025 and verified that additional sampling points associated with sediment removal do not contain contaminants and are able to be disposed of offshore as non-hazardous materials. Results of the March 2025 sampling campaign will be communicated to the MMO.
Demolition and Construction	Soils and subsoil	Inert	Reuse	All excavated soils and subsoils will be stockpiled onsite and reused within the design.
	Concrete / reinforced concrete	Inert or non-hazardous	Re-use or recycle. Disposal at landfill (inert or non-hazardous)	It is currently estimated that ~1,800m^3 of concrete wastes will be produced from the demolition of the RNLI slipway and offshore structures. This material will be bulked and removed from the construction area. Depending on the nature of the waste, it may be possible to crush and recycle some of the material into aggregate. Where this is not possible the Principal Contractor will assess other options before disposing of the material to landfill.
	Metals	Non-hazardous	Recycle	All metals shall be segregated for off-site recycling. Separately segregate ferrous and non-ferrous metals if sufficient quantity expected to be generated. Current estimate of 300 m^3 of scrap metal from construction works (including demolition). The Principal Contractor will identify an approved scrap metal site for transfer of these materials.
	Plastics	Non-hazardous	Recycle	Plastics shall be segregated for off-site recycling. Separate bins should be deployed in welfare areas and a separate skip provided for hard plastics and film.
	Paper and cardboard	Non-hazardous	Recycle	Paper and cardboard shall be segregated for off-site recycling. Small quantities of paper and card are expected to be produced from the project.
	Wood	Non-hazardous	Reuse packing material, Recycle or send for energy recovery.	Pallets shall be returned to suppliers for reuse where possible. Wood waste will be segregated into a separate container so that off-site recycling can occur. Oily or chemical contaminated wood must be segregated and treated as a hazardous waste.
	Glass	Non-hazardous	Recycle	Glass will be segregated to facilitate recycling. Small quantities expected from welfare areas.

General waste (mixed)	Non-hazardous	Materials Recovery Facility, energy recovery or landfill	Residual waste must be placed into a skip labelled mixed waste. Investigations shall be undertaken to identify potential recovery options for all waste.
Sewage waste	Non-hazardous	Transfer to wastewater treatment plant	From temporary toilets at the construction compound. Toilets for construction workforce to be periodically emptied by vacuum truck or discharged into the mains sewerage system where possible.
Chemicals (liquid)	Hazardous / non-hazardous (depending on properties)	Treated based on properties by specialist waste contractors	Small qualities of spent chemicals or out of date chemicals may arise during the construction works. These should be stored in the hazardous waste area where the MSDS indicates hazardous properties.
Contaminated soils	Hazardous	Remediated and reused or landfilled	All contaminated soils or soak-up materials contaminated with chemicals will be stored preventing leakage of liquids. Only small quantities expected. Store with hazardous wastes.
Oil filters	Hazardous	Drained of oils and metals recycled	Any oil filters from plant maintenance or transferred to shore from vessels must be stored in leak-proof containers to collect oil residues. Drained filters can be recycled.
Used oils	Hazardous	Recycle	Used oil be collected and stored in the hazardous waste area and removed for re-processing by waste contractors.
Batteries, lead-acid	Hazardous	Recycle	Must be segregated and stored in leak proof boxes and recycled by specialist contractors.
Oily rags	Hazardous	Energy recovery	Segregated with other hazardous wastes.

In terms of the overall impact of the construction phase of the Proposed Development, there is the potential for non-hazardous waste management to have a **Slight** effect, due to the increase in waste being generated and the potential for this waste to be sent to landfill for disposal. This would be a worst-case scenario as the intention of the Proposed Development will be to achieve a higher rate of diversion from landfill through reuse, recycling and recovery throughout the construction phase as set out in the SWMP included as part of the draft CEMP.

For hazardous waste, the quantity of wastes requiring management is very small, so the Proposed Development has the potential to have a **Neutral or slight** effect. Hazardous wastes generated from the Proposed Development are unsuited to be landfilled so will be recycled or incinerated via approved waste contractors.

21.9.3 Assessment of Operational Effects

The port operations will return to the baseline situation once works are complete and it is anticipated that due to recycling and reuse policies and procedures and the implementation of the Sustainability Strategy there will be no discernible effects to waste management once the replacement linkspan is operational. Therefore, the effect of the operational phase in relation to waste management has not been included in the impact assessment.

21.10 Mitigation

21.10.1 Construction Phase Mitigation Measures

Details of all waste types that will be produced from the Construction Phase of the Proposed Development will be documented in the Site Waste Management Plan (SWMP) that will form part of the Construction Environmental Management Plan (CEMP). An outline version of the CEMP, including an initial SWMP is provided in Appendix 2A of the ES.

All construction waste will be managed as part of the SWMP, which will be implemented by the Principal Contractor for the duration of the construction works. The SWMP will contain procedures for the management of waste and related pollution control measures and will be a live document subject to revision throughout the course of the construction works.

Specific waste management requirements will include the following:

- Strict adherence to waste regulatory requirements for the storage and handling on-site.
- No wastes shall be deposited outside the Proposed Developments red line boundary, unless it is at a facility that holds a valid environmental permit or suitable authorised exemption.
- Allocate space on site for the storage of waste materials and ensure that storage areas and containers are clearly labelled (appropriate signage) so site workers know which wastes should be put there.
- Hazardous waste must be stored separately from non-hazardous wastes to avoid contamination.
- Segregate wastes into specific categories and provide separate containers for dry recyclables, such as paper and cardboard, plastic, glass, wood, and metal at welfare facilities within temporary works areas.
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site. The waste storage area(s) will be assigned and all construction staff provided with training regarding the waste management procedures on commencement of the project.
- Identify proposed waste treatment and disposal methods for each of the waste streams and make a commitment to reuse and recycle specific percentages of the overall quantity generated to minimise wastes disposed of to landfill.
- Ensure that all Waste Contractors that remove waste from site have the appropriate authorisation (i.e. are registered waste carriers).
- Monitor the actual quantities of wastes produced during construction and update SWMP to allow comparison with waste arisings estimated prior to construction. Record the proposed waste management option for each waste produced.

- All wastes that are removed off-site must 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.
- The Principal Contractor will designate 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.

The implementation of the SWMP will promote sustainable waste management practices by maximising waste prevention, re-use, recycling, and recovery opportunities for material destined for off-site waste management and will ensure all regulatory requirements are in compliance.

21.10.2 Operational Phase Mitigation Measures

No mitigation is proposed for the operational phase. The arrangements for the management of routine wastes from vessels and port activities will be detailed in the Port Waste Management Plan, which will be periodically reviewed and updated to ensure the information is up to date and all regulatory requirements for the management of vessel-generated wastes and the onshore management of these wastes are compliant.

21.11 Assessment of Residual Effects

The residual effects of the Proposed Development considering the mitigation measures are determined to be **Not Significant** for both non-hazardous and hazardous wastes. These are summarised in **Table 21-9**.

21.12 Cumulative Effects

The longlist of projects being considered as part of the cumulative effects assessment identifies two onshore projects within Pembrokeshire (application references NP/24/0164/OBS and NP/22/0133/OBS. These projects are a shellfish farm expansion and jetty birth maintenance project and are not expected to generate large quantities of waste that would requirement management in the vicinity of the Proposed Development.

The waste arising from the Proposed Development will be required to fully comply with the current legislation and there is sufficient capacity in the regional licenced waste facilities to conclude that the cumulative effect of Proposed Development and other projects on waste management are considered to be Negligible.

21.13 Limitations of the Assessment

There are no known limitations to the assessment presented in this chapter of the ES. Pre-demolition surveys will improve estimates of waste arisings from these works and the development of a detailed SWMP covering all wastes expected to be generated from the Proposed Development activities will allow all wastes to be managed in the most sustainable way and minimise wastes being disposed of to landfill.

21.14 Summary of Effects and Conclusion

By implementing the mitigation measures and by managing wastes in accordance with the waste hierarchy as required, wastes generated during the construction phase of the works associated with the upgrade of the linkspan will have no adverse effect on waste management in the area.

It is concluded that the replacement linkspan, which includes development and implementation of a detailed SWMP will have a slight or neutral effect on the environment in relation to waste management.

The residual effects of the Proposed Development considering the mitigation measures are determined to be **Not Significant** and are presented in **Table 21-9**.

Table 21-9 Residual Effects of the Proposed Development on Waste Management

Description of impact	Phase C	Phase O	Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Reduction in inert or non-hazardous landfill capacity	✓	✗	Manage waste in line with the waste hierarchy, maximising reuse and recycling to minimise landfill disposal	C: Minor	C: Medium	C: Slight	None	Not significant	Implementation of the final SWMP
Reduction hazardous landfill capacity	✓	✗	None	C: Negligible	C: Low	C: Neutral or slight	None	Not significant	Implementation of the final SWMP

21.15 References

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FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 22 Climate Change

794-NI-POR-00886R
May 2025

22 CLIMATE CHANGE

22.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as “the Proposed Development”) on climate and the vulnerability of the Proposed Development to climatic factors. This chapter considers the potential impacts to climate from the Project during the construction and operational phases of the Proposed Development.

Climate relates to emissions of greenhouse gases (GHGs). Climate change will continue to cause impacts on the environment. In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions) and their vulnerability to climate change.

As all GHG emissions are contributing to a global accumulation, the global climate is the ultimate receptor and the impacts of climate change will impact all aspects of the Environmental Impact Assessment (EIA) directive. Although GHG emissions to the atmosphere are localised, the impacts are transboundary, meaning no matter where the emissions are released, the social, economic and environmental impacts will be felt on a global scale. Potential effects to climate may arise during the construction phase, such as from emissions from traffic and NRMM[1]. Each of these potential sources has been identified and emissions have been evaluated using standard procedures.

Annex IV to the 2014 EIA Directive includes direct reference to climate and climate change with the emphasis placed on two distinct aspects of the climate change issue:

- Climate change mitigation: this considers the impact the Proposed Development will have on climate change, through greenhouse gas emissions primarily; and,
- Climate change adaptation: this considers the vulnerability of the Proposed Development to future changes in the climate, and its capacity to adapt to the impacts of climate change, which may be uncertain.

The main objectives of this assessment are to:

- Undertake a desktop study of the existing climate trends to assess current environmental baseline conditions locally and nationally;
- Assess the potential impact of the proposed construction and operation phases of the Proposed Development on climate; and
- Recommend mitigation measures in relation to the proposed construction and operational phases, if necessary, and there is also a prediction made of residual impacts.

The assessment presented is informed by the following key chapters of the ES

- Chapter 2: Project Description

Other aspects relevant to climate are addressed in the specific chapters of the ES, namely:

- Chapter 12: Flood Risk; and,
- Chapter 19: Traffic and Transport.

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

22.2 Purpose of this chapter

The primary purpose of the ES chapter is to provide an assessment of the likely direct and indirect significant effects of the Project on climate. In particular, this ES chapter:

[1] Non-road mobile machinery is defined as any mobile machine, transportable equipment or vehicle that is not intended for carrying passengers or goods on the road. In this context it refers to machinery used for demolition and construction activities. Examples include, but are not limited to, excavators, telehandlers, cranes, piling rigs and power generators.

- Presents the existing environmental baseline established from desk studies, relevant datasets and consultation (section 22.8);
- Identifies any limitations encountered in compiling the environmental information (section 22.13);
- Presents an assessment of the potential likely significant effects on climate arising from the Proposed Development (section 22.7.3.2) based on the information gathered and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in section 22.12; and,
- Highlights any necessary monitoring (section 22.10.3) and/or measures (see section 22.10.1 and section 22.10.2) to prevent, minimise, reduce or offset the likely significant environmental effects identified in the assessment (section 22.9).

22.3 Study Area

The study area for climate includes the national environment (Wales), where the receptor is the climate and the global atmosphere. Effects arising from the potential impacts on climate are considered to impact on a national level. National, regional and local data has been considered where relevant and available. Carbon dioxide (CO_2) emissions have a global climate warming effect. This is regardless of their rate of release, location, or the weather when released into the atmosphere. This is unlike pollutants that affect local air quality where the rate of release, location, and prevailing weather, as well as the amount of pollutant, determines the local concentrations and the impact.

Local ambient concentrations of CO_2 are not relevant and there are no limits or thresholds that can be applied to particular sources of carbon emissions. Any amount of CO_2 released into the atmosphere will contribute to climate warming, the extent of which is determined by the magnitude of the release. Although CO_2 emissions are typically expressed as kilograms or tonnes per year, there is a cumulative effect of these emissions because CO_2 emissions have a warming effect which lasts for 100 years or more.

22.4 Policy Context

22.4.1 National legislation and policy

22.4.1.1 Legislative Framework

The applicable legislative framework for both GHG and Climate vulnerability is summarised in the following subsections.

22.4.1.1.1 United Nations Framework Convention on Climate Change

The UK is a member of the United Nations Framework Convention on Climate Change (UNFCCC) which drives international action on climate change. The UK has pledged to reduce emissions under the Paris Agreement, as a part of a joint pledge by members of the European Union (EU). This provides an overarching commitment by the UK.

Commitments include:

- Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
- take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases; and
- reach global peaking of greenhouse gas emissions as soon as possible.

Under Article 7 of the Paris Agreement, the UK has agreed to *"hereby establish the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal referred to in Article 2*". Section 9 of Article 7 also states that "*each Party shall, as appropriate, engage in adaptation planning processes and the implementation of actions…".*

More recently (2018) the Intergovernmental Panel on Climate Change (IPCC) has released a special report which compared the likely climate impacts between a 1.5 degree and 2 degree warming scenario, and found that "*Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C".*

22.4.1.1.2 The Climate Change Act 2008 (2050 Target Amendment)

As required by the UK Climate Change Act 2008, the Welsh government developed a Climate Change Adaptation Programme which focuses on key priority areas identified as requiring urgent adaptation over the next five years.

The 2019 amendment to the Climate Change Act 2008 established a legal requirement for reaching net zero GHG emissions in the UK economy by 2050, which is reflected in the UK Net Zero Strategy. The 2008 Act also created the Committee on Climate Change, with a responsibility for:

- Setting five-year carbon budgets;
- Advising and scrutinising the UK Government's associated climate change adaptation programmes; and
- Producing a national adaptation plan for the UK Government to implement.

22.4.1.1.3 Glasgow Climate Pact (2021)

The UK attended COP26 in 2021, from which one of the outcomes was the Glasgow Climate Pact (2021), the pact highlighted the impacts of human activities on the climate, and "stresses the urgency of enhancing ambition and action in relation to mitigation, adaptation and finance in this critical decade". The report also states that to keep global warming within 1.5 °C above pre-industrial levels there will need to be "rapid, deep and sustained reductions in global greenhouse gas emissions", including a phasedown of coal use.

22.4.1.1.4 The Environment (Wales) Act 2016 (Amendment of 2050 Emissions Target) Regulations 2021

The Environment (Wales) Act sets out the approach for the sustainable management of natural resources in Wales, which will help to mitigate for and adapt to the impacts of climate change. This includes strengthening the health of our natural resources to reduce the impacts of climate change on them, considering the services that natural resources provide and identifying opportunities to provide green growth. This new approach also enables resilience of ecosystems to be considered as part of the decision-making process for activities from the outset.

The purpose of Part 2 of the Environment (Wales) Act 2016 ("the Act") is to require the Welsh Ministers to meet targets for reducing emissions of greenhouse gases from Wales. Section 29 requires that the Welsh Ministers ensure that the net Welsh emissions account for the year 2050 is at a specified percentage lower than the baseline. These Regulations amend section 29 of the Act by altering the percentage amount in subsection (1). Section 29(1) imposes a duty on the Welsh Ministers as to the level of the "net Welsh emissions account" (the amount of Welsh emissions of greenhouse gases for a period adjusted by the amount of Welsh removals of those gases for that period) for the year 2050. The duty is to ensure that the net Welsh emissions account is lower than the "the baseline" (the baseline of net Welsh emissions of greenhouse gases against which the percentage amount in section 29(1) is applied) by a minimum percentage amount.

The amendment in these Regulations has the effect that the minimum percentage by which the net Welsh emissions account for the year 2050 must be lower than the baseline is increased from 80% to 100%.

22.4.1.1.5 The Climate Change (Interim Emissions Targets) (Wales) (Amendment) Regulations 2021

These Regulations make amendments to the Climate Change (Interim Emissions Targets) (Wales) Regulations 2018, which set the interim emissions targets under Part 2 of the Environment (Wales) Act 2016 ("the Act"). The purpose of Part 2 of the Act is to require the Welsh Ministers to meet targets for reducing emissions of greenhouse gases from Wales. Section 29 requires that the Welsh Ministers ensure that the net Welsh emissions account for the year 2050 is at least 100% lower than the baseline. Section 30 of the Act requires that the Welsh Ministers make regulations to set interim emissions targets for the years 2020, 2030 and 2040. These targets are expressed as a percentage below the baseline. Regulation 2 amends the Climate Change (Interim Emissions Targets) (Wales) Regulations 2018. The 2030 and 2040 targets are increased from "45%" to "63%" and "67%" to "89%", respectively, lower than the baseline. In accordance with section 32(1)(a) of the Act, the Welsh Ministers have satisfied themselves that the interim emissions targets are consistent with meeting the 2050 emissions target.

22.4.1.1.6 The Climate Change (Carbon Budgets) (Wales) (Amendment) Regulations 2021

In March 2021, Senedd Cymru approved a net zero target for 2050. Net zero means balancing the greenhouse gas emissions with the number of gases we're removing from the atmosphere. Wales also has interim targets for 2030 and 2040, and a series of 5-year carbon budgets. The first carbon budget ran from 2016 to 2020. Wales have to set a carbon budget at least five years before the budgetary period begins. The targets and carbon budgets form Wales's statutory framework. They include Wales's share of emissions from international aviation and international shipping. For each carbon budget, they have to set a limit on how many international offsets Wales can use. A zero% (0%) limit means we must achieve the carbon budget by action taken in Wales.

A summary of the targets and carbon budgets approved by Senedd Cymru in March 2021 is detailed below in Table 22-1.

Table 22-1: Targets and Carbon Budgets[2]

Budget/target	Amount
Carbon budget 2 (2021-2025)	Average 37% reduction
Carbon budget 2 offset limit	0%
Carbon budget 3 (2026-2030)	Average 58% reduction
2030 target	63% reduction
2040 target	89% reduction
2050 target	At least 100% reduction (net zero)

22.4.1.1.7 Well-being of Future Generations (Wales) Act 2015

The Well-being of Future Generations Act requires public bodies in Wales to think about the long-term impact of their decisions, to work better with people, communities and each other, and to prevent persistent problems such as poverty, health inequalities and climate change.

The Act sets to provide understanding for the challenges that the world will be facing and have a clear picture of where we are heading. To do this, within the twelve months after a Senedd election, Ministers must publish a 'Future Trends Report' containing:

- Predictions of likely future trends in social, economic, environmental and cultural well-being of Wales; and
- Any related analytical data and information that the Welsh Ministers consider appropriate.

In preparing the report, Ministers must take account of the United Nations' sustainable development goals and the impact of climate change on Wales.

22.4.1.1.8 The Climate Change (International Aviation and International Shipping) (Wales) Regulations 2018

The Climate Change (International Aviation and International Shipping) (Wales) Regulations 2018 establish a framework for addressing greenhouse gas emissions from international aviation and shipping in Wales. These regulations aim to ensure that emissions from these sectors are accounted for in the context of Wales' overall climate change commitments. They require the Welsh Government to report on emissions from international aviation and shipping and to take measures to mitigate their impact. The regulations align with broader UK and international efforts to reduce emissions and promote sustainable practices in the aviation and shipping industries, contributing to Wales' goals for reducing overall greenhouse gas emissions and addressing climate change.

[2] https://www.gov.wales/climate-change-targets-and-carbon-budgets

22.4.1.2 Guidance and Policy

22.4.1.2.1 Infrastructure Carbon Review

In 2013, the UK government published the Infrastructure Carbon Review, aiming to "*release the value of lower carbon solutions and to make carbon reduction part of the DNA of infrastructure in the UK*". Major infrastructure owners, operators and developers were invited to endorse, become signatories and make commitments under the review.

The review provided increased emphasis on 'capital carbon' (GHG emissions associated with raw materials, activities and transport for construction, repairs, replacement, refurbishment and de-construction of infrastructure) while acknowledging that 'operational carbon' (associated with energy consumption for the operation and use of infrastructure) will continue to dominate overall emissions to 2050 and beyond.

The Infrastructure Carbon Review highlighted the importance of assessing GHG emissions early in the lifecycle of an infrastructure scheme when there is the greatest carbon reduction potential. The assessment presented in this chapter provides an assessment of the Proposed Development early in its lifecycle.

22.4.1.2.2 Future Wales The National Plan 2040

Future Wales – the National Plan 2040 is a national development framework, setting the direction for development in Wales to 2040. It is a development plan with a strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of communities.

The challenges of the climate emergency demand urgent action on carbon emissions and the planning system must help Wales lead the way in promoting and delivering a competitive, sustainable decarbonised society. The framework includes the following policies:

- **Policy 9 – Resilient Ecological Networks and Green Infrastructure**

  Identify areas which should be safeguarded and created as ecological networks for their importance for adaptation to climate change, for habitat protection, restoration or creation, to protect species, or which provide key ecosystems services, to ensure they are not unduly compromised by future development.

- **Policy 15 – National Forest**

  An increase in woodland cover is needed to help build the resilience of ecosystems, to secure the delivery of our climate change and decarbonisation aspirations, to provide places for recreation and well-being and to ensure that the productive potential of Welsh woodlands is maintained.

- **Policy 17 – Renewable and Low Carbon Energy and Associated Infrastructure**

  In determining planning applications for renewable and low carbon energy development, decision-makers must give significant weight to the need to meet Wales' international commitments and our target to generate 70% of consumed electricity by renewable means by 2030 in order to combat the climate emergency.

- **Policy 18 – Renewable and Low Carbon Energy Developments of National Significance**

  Proposals for renewable and low carbon energy projects (including repowering) qualifying as Developments of National Significance will be permitted subject to Policy 17.

22.4.1.2.3 Climate Adaptation Strategy for Wales

The Welsh Government published its second national climate adaptation plan in 2019, Prosperity for All: A Climate Conscious Wales. That five-year plan demonstrated commitment to tackling the climate emergency and set out the actions being taken by Welsh Government to prepare for and adapt to the risks and impacts arising from climate change. It was a step in a journey, and the new strategy was published in October 2024. The strategy has been directly informed by:

- The Climate Change Committee's third UK climate risk independent assessment (CCRA3-IA), published in June 2021.

- Our progress report on the Prosperity for All: A Climate Conscious Wales plan in December 2022.
- A specially commissioned independent assessment of progress and future priorities for climate adaptation in Wales in September 2023 from the Climate Change Committee.

The Climate Adaptation Strategy for Wales, outlines a comprehensive framework for enhancing the resilience of communities, ecosystems, and infrastructure to the impacts of climate change. The strategy emphasizes the need for proactive measures to address risks such as flooding, extreme weather events, and biodiversity loss. It promotes collaboration among government, businesses, and communities to implement adaptive practices, improve resource management, and integrate climate considerations into planning and decision-making processes. The strategy also highlights the importance of monitoring and evaluating progress to ensure effective adaptation efforts, ultimately aiming to create a sustainable and resilient Wales in the face of ongoing climate challenges.

Climate change is already happening. In 2023-24 Wales experienced the wettest winter since records began. In July 2022, a new maximum daily temperature was recorded in Wales of 37.1°C in Hawarden Airport, Flintshire. Even if we were able to reach net zero greenhouse gas emissions tomorrow, we would continue to see further global warming and changes to our climate at least until the 2050s. Winter rainfall is expected to increase by approximately 6% by the 2050s compared to the average in the period 1981-2000, while summer rainfall is expected to decrease by approximately 15% by the 2050s and by between 18% to 26% by the 2080s. Even under low to moderate global warming scenarios sea level for Cardiff is expected to rise by approximately 22-28 cm by the 2050s and by approximately 43-76 cm by the 2080s.

22.4.1.2.3.1 Climate-related risks

In summer 2021 the UK Climate Change Committee (CCC) published their latest report on Climate Risks and Impacts. This summary concluded that the climate change risks associated with Wales are:

- Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards
- Risks to soil health from increased flooding and drought
- Risks to natural carbon stores and sequestration from multiple hazards, leading to increased emissions
- Risks to crops, livestock and commercial trees from multiple climate hazards
- Risks to supply of food, goods and vital services due to climate-related collapse of supply chains and distribution networks
- Risks to people and the economy from climate related failure of the power system
- Risks to human health, well-being and productivity from increased exposure to heat in homes and other buildings
- Multiple risks to the UK from climate change impacts overseas.

22.4.1.2.3.2 Purpose and principles of this strategy

This strategy represents a new approach to considering the interrelated actions needed for addressing climate adaptation and resilience in Wales. In developing the approach to this strategy, The Welsh Government have sought to apply the following principles:

- A focus on delivery of climate adaptation outcomes
- A systems-based approach, addressing interdependencies between different sectors and stakeholders
- A wider perspective of collective action across Wales, recognising the needs and roles of different stakeholders in delivering climate adaptation
- Integration with other societal goals, such as decarbonisation, social justice and nature recovery.

Figure 22.1 illustrates the different elements of the strategy, including the action plans and the crosscutting issues they are aiming to address.

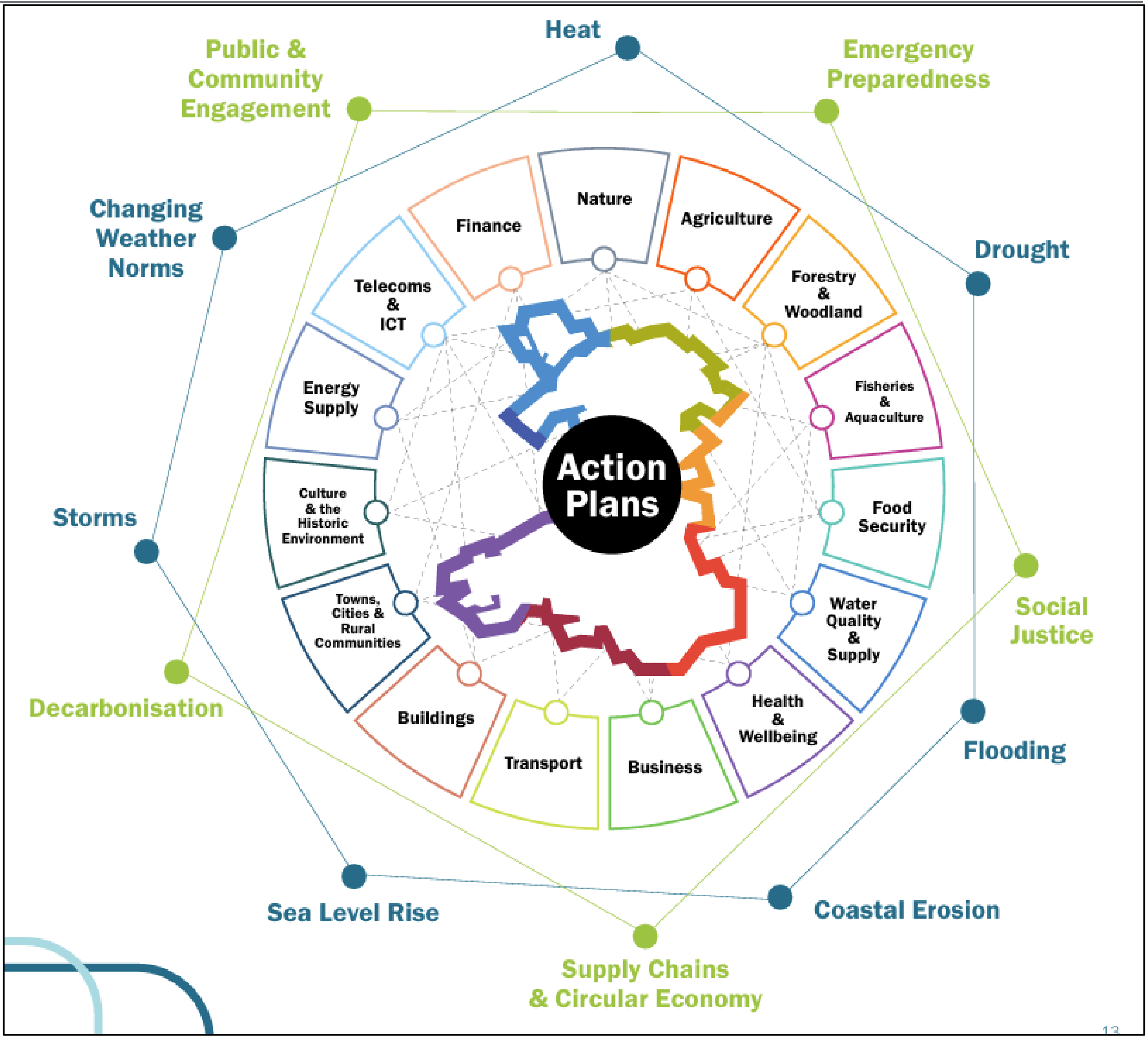

Figure 22.1: Climate Adaptation Strategy for Wales

22.4.1.2.4 Pembrokeshire County Council Local Development Plan

On the 28th February 2013, the Council adopted a Local Development Plan (LDP) for Pembrokeshire (excluding the area of the Pembrokeshire Coast National Park). Pembrokeshire County Council commenced review of its LDP on the 5th May 2017, however a new submission to the Welsh Government is not set until June 2025.

The Plan establishes a Vision based development strategy and policies to guide the development and use of land in Pembrokeshire from adoption. It provides the policy context for directing development to appropriate locations, conserving the natural, built and historic environment and providing a basis for rational and consistent decision-making on planning applications. The base date for the Plan's land use allocations is 2011.

Pembrokeshire is a predominantly rural County, with a strong maritime influence and has a history of development based on agriculture, tourism, defence, energy and port activities centred on the Milford Haven Waterway. The area is characterised by a series of distinct, yet interdependent settlements. The unique environment and strong sense of community is attractive to both residents and visitors and provides a distinctive sense of place. The Pembrokeshire ports and the Haven Waterway are international assets, critical to the future energy security of the UK.

Just under half the total Pembrokeshire population of 117,100 (2010) live in the five main towns of **Fishguard**, Haverfordwest, Milford Haven, Pembroke and Pembroke Dock.

This LPL is broken down into General Policies (GN), with the following related to climate:

- **GN.2 Sustainable Design**

  It incorporates a resource efficient and climate responsive design through location, orientation, density, layout, land use, materials, water conservation and the use of sustainable drainage systems and waste management solutions; and,

- **GN.4 Resource Efficiency and Renewable and Low-carbon Energy Proposals**

  Development proposals should seek to minimise resource demand, improve resource efficiency and seek power generated from renewable resources, where appropriate. They will be expected to be well designed in terms of energy use.

22.5 Consultation

No specific comments regarding climate have been received during consultation activities undertaken to date, together with how these issues have been considered in the preparation of this ES chapter. Chapter 5: Scoping and Consultation provides details on the types of consultation activities undertaken for the Project.

22.6 Methodology to inform the baseline

22.6.1 Desktop study

Information on climate within the study area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 22-2. These sources provide the most up to date data for this assessment.

Table 22-2 Summary of key desktop reports.

Title	Source	Year
Wales’ Greenhouse Gas Emissions 2021	Welsh Government	2022
The Devolved Administrations (DA) GHG inventory	The UK National Atmospheric Emissions Inventory	2024
UK Climate Change Risk Assessment (CCRA3) Summary for Wales	UK Climate Risk	2021
Met Office UK Climate Averages	Met Office	1991 - 2020

22.6.2 Site-specific surveys

No site-specific baseline surveys were undertaken as part of the assessment for climate. The baseline data presented in this section is derived from Welsh inventories, UKCP18 projections, and Met Office monitoring network, and may be taken as representative of the background conditions.

22.7 Assessment Methodology

22.7.1 Guidance

The methodology and associated impact assessment had regard to the general guidance regarding the undertaking of an EIA, as presented in Chapter 4: Environmental Impact Assessment Process and Methodology and the following climate specific guidance as follows:

- Design Manual for Roads and Bridges (DMRB) (June 2021) LA 114 – Climate;
- Institute of Environmental Management and Assessment (IEMA) (2022) Guidance on 'Assessing Greenhouse Gas Emissions and Evaluating their Significance', 2nd Edition; and,
- IEMA (2020) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation.

22.7.1.1 Design Manual for Roads and Bridges (DMRB)

DMRB guidance on climate change was published on June 2021 under the heading LA 114 – Climate. Although specifically related to highway schemes it can be referenced in this assessment with regard to emissions and also is aligned with guidance as presented in the Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Assessing Greenhouse Gas (GHG) Emissions and Evaluating their Significance.

The LA 114 document was created to set out the requirements for assessing and reporting the effects of climate on highways (climate change resilience and adaptation), and the effect on climate of greenhouse gas from construction, operation and maintenance of road/highway[3] projects.

LA 114 advises to report on the likely additional and avoided GHG emissions at each life cycle stage of the project, in comparison with current and future baseline GHG emissions. The nature and scale of GHG emissions (positive, neutral or negative) and the likelihood of significant effects should be reported in accordance with the LA 114 guidance document.

Two main questions are posed in order to gain an understanding of the need to undertake further assessment, those are:

- are construction GHG emissions (or GHG-emitting activity), compared to the baseline scenario (i.e. when compared to GHG emissions and energy use associated with existing maintenance activities), increasing by >1%; and,
- during operation, will roads meet or exceed any of the following criteria:
  a. change of more than 10% in AADT;
  b. change of more than 10% to the number of heavy duty vehicles; and,
  c. change in daily average speed of more than 20 km/hr.

If the answer is 'yes' to either of these questions, then further assessment is recommended. In terms of the Proposed Development the answer is 'yes' to the construction GHG emissions increases but 'no' to the operational criteria. Therefore, the operational phase DMRB road assessment can be screened out as impacts are not deemed to be significant – although the approach to assessment is still set out and confirmation of screening out the operational phase assessment is detailed as required in this assessment.

The key anticipated GHG emissions sources during construction of the Proposed Development are presented in Table 22-3.

Table 22-3: Anticipated GHG Emission Sources – Construction (DMRB)

Lifecycle stage	Activity	Primary emission sources
Product Stage	Raw material extraction and manufacturing of products/	Embodied GHG emissions

[3] Although specific to road schemes, the criteria for assessment is a useful gauge in determining whether an assessment is required for construction and operational phases of Proposed Developments.

Lifecycle stage	Activity	Primary emission sources
	materials Transport of products/ materials to site	Emissions from fuel used for the transportation of products/materials to site
Construction Process Stage	On-site construction activity Transport of construction workers Disposal of construction waste	GHG emissions from fuel consumption by vehicles, plant and equipment for construction of the Proposed Development Emissions from fuel used for worker commuting GHG emissions from fuel used for the transport and disposal of waste

22.7.1.1.1 Key Anticipated GHG Emission Sources – Operation

The key anticipated GHG emissions sources during the operational, maintenance and use phases of the Proposed Development are presented in Table 22-4.

Table 22-4: Key Anticipated GHG Emission Sources – Operation (DMRB)

Lifecycle stage	Activity	Primary emission sources
Operational stage	Vehicle journeys	GHG emissions from fuel consumption by vehicles

The operational phase does not meet criteria regarding emissions from vehicles and may be screened out.

22.7.1.2 Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance

IEMA published this guidance to assist practitioners with addressing greenhouse gas (GHG) emissions assessment and mitigation. The guidance indicates that a ‘good practice’ approach is advocated where GHG emissions are always considered and reported but at varying degrees of detail depending on the project.

The guidance sets out there are a number of different assessment methods available for measuring and quantifying the GHG emissions associated with the built environment, ranging from general guidance to form standards. The Guidance recognising that:

‘Qualitative assessments are acceptable, for example: where data is unavailable or where mitigation measures are agreed early on in the design phase with design and engineering teams.’

The assessment in this chapter presents a qualitative assessments and discussion in terms of GHG emissions.

22.7.1.3 Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation, June 2020

The Guide to Climate Change Resilience and Adaptation (June 2020) provides an updated framework for the effective consideration of climate change resilience and adaption in the assessment process). This document is a revision of the 2015 IEMA guidance on Climate Change Resilience and Adaption in assessment and reflects lessons learnt from emerging practice.

A step-by-step method presented within this guidance is set out below and has been given due cognizant within this chapter:

- **Step 0** – Building climate resilience into the project by considering incorporating resilience during the designs stage and by identifying appropriate mitigation measures;

- **Step 1** – Scoping for the Project; e.g. identify the climate change projections for use in the assessment and identify key climatic variables relevant to the project;
- **Step 2** – Defining the future (climate) baseline; define future conditions using selected climate change projections (i.e. increase in rainfall, increase in mean summer temperature and wind strength). **Step 3** – Identifying and determining sensitivity of receptors;
- **Step 4** – Reviewing and determining magnitude of the effect; consider probability and consequence to determine the magnitude of the effect;
- **Step 5** – Determination of significance;
- **Step 6** – Developing additional adaptation / mitigation measures;
- **Step 7** (Development permitted) – Monitoring and adaptive management by implementing mitigation measures.

Climate assessments produced in line with this guidance are to be proportionate in their approach and not include superfluous assessment that does not address likely material issues.

In lieu of a prescribed methodology, IEMA guidance on Climate Change Resilience and Adaptation (2020) has been prepared to assist practitioners with the effective consideration *"of both climate change resilience and adaptation in the assessment process"*.

The guidance stresses that climate change should be an integrated consideration within the assessment, by undertaking an assessment that is *"proportional to the evidence base available to support any assessment"* and focusses on impacts *"specific to project".*

22.7.2 Assessment Criteria and Assignment of Significance

22.7.2.1 Assessment of GHG Emissions

The significance of GHG impacts has been assessed in line with the DMRB LA114 with consideration as to how the GHG emissions arising from the Proposed Development contribute towards the respective Welsh carbon budgets, which have been set by the Welsh Government covering 2021 - 2050.

In March 2021, the Senedd passed a suite of regulations to increase Wales's decadal emissions targets from those set in 2018 and to set Carbon Budgets 2 and 3 in line with them. The targets and budgets set in law followed the CCC's recommendations:

- Carbon Budget 2 (2021 – 2025): 37% average reduction with a 0% offset limit.
- Carbon Budget 3 (2026 – 2030): 58% average reduction.
- 2030: 63% reduction.
- 2040: 89% reduction.
- 2050: at least 100% reduction (net zero).

The budgets are expressed in percentages. As such the magnitude of emissions, in conjunction with guidance from IEMA's Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance and knowledge of similar developments have been used to inform the professional judgement of significance.

The main emissions sources of the Proposed Development that have been considered are:

- As with the majority of large engineering projects potential emissions to air are inevitable during the construction phase, arising from construction activities, transport of materials and the use of plant and equipment.
- other inputs, primarily electricity and heat load; and,
- The decommissioning of the Proposed Development. The decommissioning phase is not considered due to the long design life of the assets and given that emissions with the end of the life of this type of asset are relatively small and therefore unlikely to be significant.

22.7.2.2 Assessment of Climate Risks

The assessment assumes the development will be fully operational from 2027. In considering future climate change scenarios, managing climate change resilience and adaption, the IEMA guidance (2020) recommends the use of the UK Climate Projections (UKCP) Website (Met Office, 2018). The latest UKCP is UKCP18 which provides updated observations and climate change projections out to 2100 in the UK. Therefore, this assessment assumes projections for the 2100 as the most far-reaching projection and is considered to be appropriate for the design life of the development.

In order to consider the impact of the changing future climate upon the Proposed Development, probabilistic projections of change in climatic variables over time under several potential future global emissions scenarios published by the Met Office have been used. These projections have informed a high-level assessment of risks to the Proposed Development from climate change in the course of its lifetime, and potential design responses to adapt or increase resilience.

22.7.2.3 Sensitive Receptors

Following identification of the future climate scenarios, the project receptors within the study area which are vulnerable to climate change may be identified as below:

- the construction process (e.g. workforce, plant, machinery etc);
- the assets and their operation, maintenance and refurbishment (e.g. structures, plant & equipment, etc); and,
- end-users (e.g. members of public, commercial operators etc).

22.7.3 Significance of Effects

22.7.3.1 General Approach

‘Climate’ is generally understood to mean the weather conditions prevailing over a long period of time and climate change refers to changes in recorded long term climate trends. Guidance is evolving and there is no prescribed way in which climate change should be incorporated into a project, however, some guidance has been prepared by IEMA, discussed further below, which sets out the two main approaches that can be taken to determine a project’s climate change impact.

These involve identifying:

- The vulnerability of the development to climate change; and,
- The direct and indirect influence on the development on climate change.

The vulnerability of the development to climate change considers effects on the development as a receptor (this is referred to in IEMA Guidance as Climate Change Resilience and Adaptation). A high-level climate change risk and resilience assessment has been undertaken to identify the potential risks of climate change on the development and to high design measures to increase its resilience and adaptation to climate hazards, such as extreme hot and cold weather, intense rainfall, high winds and storm events.

Direct and indirect effects consider effects on environmental receptors as a result of the Proposed Development. Direct and indirect emissions can be defined as follows:

- Direct GHG emissions are emissions from sources that are owned or controlled by the operator. Examples include vehicular emissions, plant use (such as generators) and independent onsite energy generation (oil, gas and diesel);
- Indirect GHG emissions are emissions that are a consequence of the construction of operational activities of the development but are a result of procurement and / or activities controlled by another entity. Examples include energy generation and the manufacture of materials (known as ‘embodied’ carbon).

22.7.3.2 Significance of Effect

In the absence of any significance criteria or a defined threshold, it might be considered that all carbon emissions are significant and beneficial effects only arise if there is a net loss in carbon and emissions. As per the IEMA Guidelines, when evaluating significance, all new GHG emissions contribute to a significant negative environmental effect.

The significance of a project's emissions should be based on its net impact, which may be positive or negative, an assessment should ensure an assessment addresses the occurrence of GHGs by taking mitigating action. Whilst there is no single preferred method to evaluate significance of effects given this topic is emerging, the approach to determining the significance of effects has applied available guidance, standard industry practice and profession judgement.

There is currently no industry–wide agreed threshold of carbon emissions which, if exceeded, can be defined as significant or potentially significant. The 2017 IEMA Guidance acknowledges that all emissions could lead to cumulatively significant effects. The IEMA Guidance (2017) notes that the cumulative impact of carbon emissions arising from global human activity is considered major however, the contribution from individual developments, such as the Proposed Development in this project, could be considered negligible / low in the context of the UK's emissions since, in isolation, the quantity of carbon emissions from an individual development is likely to have limited potential to significantly increase atmospheric carbon emissions towards global environmental targets.

22.7.3.3 Climate Change Resilience

The identification and assessment of climate change resilience is an area of emerging practice. There is no single prescribed format for undertaking such assessments; therefore, the approach adopted to undertaking and reporting the assessment has drawn on good practice from other similar developments and studies.

The types of receptors considered vulnerable to climate change are:

- construction phase receptors (i.e. workforce, plant and machinery);
- the development's assets and their operation, maintenance and refurbishment (i.e. hardstand, structures, earthworks and drainage, etc.); and,
- end-users (i.e. members of public and commercial operators etc.).

Table 22-5 shows typical climate change impacts affecting a development. Relative humidity and solar radiation for this assessment will be considered under temperature.

Table 22-5: Climate Variables and Potential Impacts

Climate Variable	Potential Impacts
Change in average (air) temperature (annual, seasonal, monthly). Relative humidity Solar radiation	Prolonged warm periods, drought, change in growing season, soil moisture deficit, erosion, storm surge/tide Reduction in ice and snow Fog Increased UV radiation, deterioration, fading, brittleness
Extreme (air) temperature (frequency and magnitude)	Heatwaves, water availability / drought, fire risk
Change in average precipitation (annual, seasonal, monthly)	Water availability / drought, flooding (pluvial and fluvial), soil moisture deficit, erosion, snow, ice and hail
Extreme rainfall (frequency and magnitude)	Flooding (fluvial and pluvial), subsidence and reduced ground stability, erosion.
Sea level rise	Influence on tidal waters
Average wind speed change (annual, seasonal, monthly)	Increased wind loading resulting in damage, erosion

Climate Variable	Potential Impacts
Gales and extreme winds (frequency and magnitude)	Storms, lightning strike

Criteria used to determine the likelihood of an event occurring, based on its probability and frequency of occurrence, are detailed in Table 22-6.

Table 22-6: Measure of Likelihood for Climate Change Resilience Assessment (Source: DMRB)

Likelihood Category	Description (probability and frequency of occurrence)
Very High	The event occurs multiple times during the lifetime of the project e.g. approximately annually, typically 60 events.
High	The event occurs several times during the lifetime of the project e.g. approximately once every five years, typically 12 events.
Medium	The event occurs limited times during the lifetime of the project e.g. approximately once every 15 years, typically 4 events.
Low	The event occurs during the lifetime of the project.
Very low	The event may occur once during the lifetime of the project.

** The event is defined as the climate event (such as heatwave) and the hazard (such as overheated electrical equipment) occurring in combination.*

The consequence of an impact has been measured using the criteria detailed in Table 22-7 Measure of Consequence for Climate Change Resilience Assessment.

Table 22-7: Measure of Consequence for Climate Change Resilience Assessment (Source: DMRB)

Consequence of Impact	Description
Very Large Adverse	National level disruption lasting more than 1 week.
Large Adverse	National level disruption lasting more than one day but less than 1 week.
Moderate Adverse	Regional level disruption lasting more than one day but less than 1 week.
Minor Adverse	National level disruption lasting less than 1 day.
Negligible	Isolated disruption lasting less than 1 day.

The identification of likely significant effects on receptors has been undertaken using professional judgement by combining the measure of likelihood with the predicted consequence of impact, as shown in Table **22-8** ‘Significance Criteria for Climate Change Resilience Assessment.’

Table 22-8: Significance Criteria for Climate Change Resilience Assessment

Consequence of Impact	Measure of Likelihood				
	Very Low	Low	Medium	High	Very High
Negligible	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
Minor	Not Significant	Not Significant	Not Significant	Significant	Significant
Moderate	Not Significant	Not Significant	Significant	Significant	Significant
Large	Not Significant	Significant	Significant	Significant	Significant
Very Large	Not Significant	Significant	Significant	Significant	Significant

The assessment of potential impacts and the Proposed Developments vulnerability takes into account the mitigation measures that have been designed into the Proposed Development, as discussed in the Mitigation section of this chapter.

The assessment also identifies and accounts for existing climate change resilience measures either already in place or in development for infrastructure and assets, for example, mitigation measures for potential flooding impacts on the Proposed Development.

22.8 Baseline Environment

22.8.1 Greenhouse Gases Existing Baseline

In the baseline (Do Minimum) scenario, GHG emissions occur constantly and widely as a result of human and natural activity including energy consumption (fuel, power), industrial processes, land use and land use change. The GHG assessment will only consider instances in which the Proposed Development results in additional or avoided emissions in comparison to the baseline scenario and its assumed evolution. The baseline conditions therefore focus on those emissions sources subject to change between the baseline scenario and the Proposed Development.

22.8.1.1 Wales' Greenhouse Gas Emissions 2021

The Welsh Government is committed to working with the UK Government, the other devolved administrations, the statutory, voluntary sector and business partners in Wales, and the community to tackle the threat of climate change. The Welsh Government Climate Change Strategy for Wales builds upon the targets and approach outlined in previous documents. It contains a number of specific proposals to enable Wales and the UK to meet targets set out by the Kyoto Protocol and Climate Change Act 2008. These proposals focus on helping people to make climate-friendly choices, leading by example by building climate change into Welsh Government decisions, and improving energy efficiency in the following areas:

- Transport
- Business
- Residential
- Waste
- Public
- Agriculture and land management

The overall aim of the strategy is to reduce the direct emissions of all greenhouse gases by 3% each year (including electricity consumption but excluding emissions from heavy industry and energy generation). However, many of the actions identified by the Climate Change Commission for Wales and laid out in the strategy documents will have wider benefits for Welsh communities. The creation of a low carbon economy will present business opportunities and create jobs across the country, and there are clear health and monetary savings to be made by individuals and organisations changing their behaviour.

On 7th December 2022 the Welsh Government published a Greenhouse gas emissions: infographic[4], which details information about greenhouse gas emissions in 2021. The volume of emissions is reported for seven greenhouse gases:

- **carbon dioxide (CO_2);**
- **methane (CH_4);**
- **nitrous oxide (N_2O);**
- **hydrofluorocarbons (HFCs);**
- **perfluorocarbons (PFCs);**
- **sulphur hexafluoride (SF_6); and,**
- **nitrogen trifluoride (NF_3).**

In 2021, Wales GHG emissions were estimated to be 36.2 million tonnes of carbon dioxide equivalent. This was an increase of 7% compared to 2020. The longer term trend showed a decrease of 35% compared to the base year (1990). The base year is 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for the fluorinated gases.

[4] https://www.gov.wales/greenhouse-gas-emissions-infographic

Most sectors showed a decreasing trend since the base year. The largest decreases, in terms of tonnes of carbon dioxide equivalent, were in the waste management. public sector buildings, electricity and heat production, industry and business sectors. These were driven by improvements in energy efficiency, fuel switching from coal to natural gas, which only became available in the late 1990s, and the introduction of methane capture and oxidation systems in landfill management.

Between 2020 and 2021, emissions from the waste management sector decreased by 1.7% and accounted for most of the total decrease. All other sectors found an increase in emissions between 2020 and 2021, the largest being electricity and heat production by 20.2%. Industry and business is the largest emitting sector of Wales' 2021 greenhouse gas emissions at 39%.

The Land Use, Land-Use Change and Forestry (LULUCF) sector has remained a net removal of emissions throughout the whole time-series. The emissions sink from LULUCF has reduced in size by 0.24 $MtCO_2e$ between 1990 (2.3 $MtCO_2e$) and 2021, and it has increased in size by 0.10 MtCO2e between 2020 (1.97 $MtCO_2e$) and 2021 (2.07 $MtCO_2e$).

22.8.1.2 Devolved Administration GHG Inventory 1990-2022

The Devolved Administrations (DA) GHG inventory (GHGI) presents emissions on a by source (emissions are allocated to the source sector in which they occur) basis, and figures and percentages within the reports refer to these datasets, unless otherwise stated, and was published by The UK National Atmospheric Emissions Inventory (NAEI) in April 2024.

The DA GHG inventory report also includes emission estimates presented on an End User basis (whereby emissions are allocated to the end users of energy, e.g. emissions from refineries passed on to users of refined oils, power station emissions passed on to electricity users). This has been included in the DA GHGI since 2008.

In addition, the report presents estimates of DA emissions from international aviation and shipping (which are excluded from national inventory data, in accordance with United Nations Framework Convention on Climate Change reporting protocols). The DA GHG inventory dataset also presents analysis of the traded and non-traded emissions share of the inventories for each of England, Scotland, Wales and Northern Ireland, through comparison of the DA inventory totals for all emission sources against reported emissions from sites in the EU Emissions Trading Scheme (ETS) and UK ETS.

The Devolved Administration data by source for Wales has been summarised in Table 22-9 below.

Table 22-9: Wales' GHG Inventory by source (1990-2022)[5]

Sector	Base Year ($ktCO_2e$)	2022 ($ktCO_2e$)	% Change
Agriculture	6064.2	5595.8	*-7.7*
Buildings and product uses	6587.7	4117.4	*-37.5*
Domestic transport	6369.9	5653.1	*-11.3*
Electricity supply	11229.6	6843.7	*-39.1*
Fuel supply	6628.0	3426.1	*-48.3*
Industry	15367.2	9507.5	*-38.1*
International aviation and shipping	613.4	383.8	*-37.4*
LULUCF	-360.4	-854.0	*-137.0*
Waste	3592.9	1014.9	*-71.8*
Grand Total	**56092.4**	**35688.4**	***-36.4***

[5] https://naei.energysecurity.gov.uk/greenhouse-gases/devolved-administration-greenhouse-gas-emissions

22.8.2 Climate Vulnerability and Resilience Existing Baseline

22.8.2.1 Evidence for the third UK Climate Change Risk Assessment (CCRA3) Summary for Wales

The UK Climate Risk Independent Assessment (CCRA3-IA) was developed at a UK-wide scale involving scientists, economists, government departments and stakeholders from across the United Kingdom. To accompany the UK Climate Risk Independent Assessment (CCRA3-IA), a team led by Sustainability West Midlands is preparing a series of summaries for each UK country (England, Northern Ireland, Scotland and Wales). The summary for Wales was published on the 16th June 2021.[6]

The Independent Assessment used to help inform the third UK Climate Change Risk Assessment (CCRA3) assesses 61 risks and opportunities from climate change to Wales, including to business, infrastructure, housing, the natural environment, our health and risks from the impacts of climate change internationally. Risks categorised as "More action needed" and "Further investigation" are more urgent than "Watching brief" and "Sustain current action." Of these 61 risks and opportunities, more action is needed in Wales now to address 32 of them, with sustaining current action only deemed appropriate in five cases. Of the 61, six issues are deemed to be both a risk and opportunity, four of which are associated with the natural environment and each of these require more action or further investigation. There are also eight opportunities that could arise from climate change in Wales, with half of these also related to the natural environment.

In summary, risks in Wales that have a high future magnitude score and where more action is required now to address them, after considering any existing adaptation responses, include the following:

- The impacts of climate change on the natural environment, including terrestrial, freshwater, coastal and marine species, forests and agriculture.
- An increase in the range, quantities and consequences of pests, pathogens and invasive species, negatively affecting terrestrial, freshwater and marine priority habitats species, forestry and agriculture.
- The risk of climate change impacts, especially more frequent flooding and coastal erosion, causing damage to our infrastructure services, including energy, transport, water and Information and Communication Technologies (ICT).
- The impact of extreme temperatures, high winds and lightning on the transport network.
- The impact of increasing high temperatures on people's health and wellbeing.
- Increased severity and frequency of flooding of homes, communities and businesses.
- The impact on coastal businesses due to sea level rise, coastal flooding and erosion.
- Disruption to the delivery of health and social care services due to a greater frequency of extreme weather.
- Damage to our cultural heritage assets as a result of temperature, precipitation, groundwater and landscape changes.
- Impacts internationally that may affect the UK, such as risks to food availability, safety and security, risks to international law and governance from climate change that will affect the UK, international trade routes, public health and the multiplication of risks across systems and geographies.

22.8.2.1.1 How is the Climate in Wales Already Changing?

22.8.2.1.1.1 Temperature

Across Wales, average land temperature in the decade 2010-2019 was 0.9°C warmer than in the period of mid 1970s to mid-2010s, up to 10°C from 9°C. Most notable is the greater incidence of hot summer maximum temperatures in Wales, for example temperatures peaked at 31°C in the 2019 summer heatwave.

[6] https://www.ukclimaterisk.org/publications/summary-for-wales-ccra3-ia/#section-1-about-this-document

22.8.2.1.1.2 Rainfall

There has been a small observed increase in annual mean rainfall in recent decades. Between the period of mid 1970s to mid-2010s and 2010-2019 there was an increase of 2%, from an average of 1,402mm per year to 1,430mm per year.

22.8.2.1.1.3 Sunshine hours

A clear trend is emerging for increasing sunshine hours for all parts of the UK including Wales, where there was a 6.1% increase in average sunshine hours from the period of mid 1970s to mid-2010s to 2010-2019. Spring 2020 was the sunniest on record for all UK countries in a series stretching back to 1929.

22.8.2.1.1.4 Weather extremes

However, the evidence of extreme maximum summer temperatures is becoming clearer, as reflected by how many of the UK's record extreme monthly temperatures have been set in the most recent decade.

22.8.2.1.1.5 Sea level rise

A UK-wide sea level index suggests that sea level has risen by between 1.2 and 1.6mm per year since 1901.

A summary of the observed changes within Wales over the years is detailed in Table 22-10.

Table 22-10: Observed Changes Within Wales

Variable	Observed change in Wales
Average annual temperature	Increase in 0.9°C from mid-1970s to mid-2010s
Annual mean rainfall	Increase in 2.0% from mid-1970s to mid-2010s
Sunshine	Increase in 6.1% from mid-1970s to mid-2010s
Weather extremes	UK-wide increase in extreme heat events Little evidence yet on changes in extreme rainfall
Sea level rise	UK-wide increase of ~1.4mm per year since 1901 (16cm to date)

22.8.2.2 Met Office UK Climate Averages

22.8.2.2.1 Aberporth Synoptic Climate Observing Site

UK weather stations report a mixture of snapshot hourly observations of the weather known as synoptic observations, and daily summaries of the weather known as climate observations. Observations from around 260 UK automatic (synoptic) stations are collected in real time; climate data from these stations also comes in straight after readings are taken. Climate observations from around 140 co-operating observers at manual climate stations are also received in slower time.

The nearest climate station to the proposed development is approximately 31km away and located at Aberporth Observing Site[7], as illustrated in Figure 22.2.

[7] https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages/gckb8585x

Figure 22.2: Aberporth Observing Site

The climate observation averages recorded during the climate period 1991 – 2020 at the Aberporth Observing Site are summarised below in Table 22-11. These observations show that the maximum and minimum temperatures tend to increase between January to July and then decrease from August to December. The months of the year with the highest recorded temperatures are the summer months July (18.28°C) and August (18.26°C). The lowest minimum temperature at this location was observed in January (7.78°C), which also had the highest recorded days with air frost (4.50 days).

Sunshine hours increase from January to their peak in May (222.84 hours), then continue to decrease into December due to the seasonal changes. The month with the typical highest recorded rainfall is indicated to be November (117.15mm), however the highest number of days with rainfall greater than 1mm was seen in December (16.20days). The month with the highest mean wind speed at 10 m was January (16.12knots).

It's important to note that these trends are based on the provided data for the specified climate period, and individual years may show variations.

Table 22-11: Aberporth Climate Period 1991 – 2020 (Met Office 2025)

Month	Maximum temperature (°C)	Minimum temperature (°C)	Days of air frost (days)	Sunshine (hours)	Rainfall (mm)	Days of rainfall ≥1 mm (days)
January	7.78	3.38	4.50	62.39	90.11	15.33
February	7.87	3.25	3.80	82.40	67.44	11.77
March	9.40	4.21	1.77	132.35	57.15	11.30
April	11.63	5.73	0.37	180.91	54.22	11.10
May	14.32	8.16	0.00	222.84	54.70	10.27
June	16.65	10.69	0.00	216.13	60.37	9.63
July	18.28	12.50	0.00	202.23	66.54	10.67
August	18.26	12.66	0.00	179.61	75.37	11.63
September	16.66	11.22	0.00	148.68	70.57	12.07
October	13.61	8.91	0.00	103.85	106.99	14.97
November	10.51	6.16	0.57	61.89	117.15	17.17
December	8.45	4.10	3.50	50.94	106.52	16.20
Annual	**12.81**	**7.60**	**14.51**	**1644.22**	**927.13**	**152.11**

22.8.2.2.2 Wales Characteristics

Wales is a mainly mountainous country with much of the land being over 150 metres. In the north, Snowdon is the highest mountain in England and Wales, at 1085 metres, and in the south the Brecon Beacons rise to 885 metres. The rivers drain radially from the upland areas, the Severn being the longest river in England and Wales. There are a number of hydro-electric schemes and reservoirs that supply water to major towns. The mountainous nature of the landscape means that large areas are only sparsely populated, with most of the settlements on or near the coast and in the southernmost counties, where almost half the population lives.

Wales has a maritime climate dominated by highly unpredictable shifts in Atlantic air masses, which, combined with the diverse range of elevations, often cause local conditions to vary considerably from day to day. However, the shape of the coastline and the central spine of high ground from Snowdonia southwards to the Brecon Beacons introduce localised differences. Whilst some upland areas can experience harsh weather, the coasts enjoy more favourable conditions and areas in east Wales are more sheltered and hence similar to neighbouring English counties.

Temperature shows both a seasonal and a diurnal variation. In winter, temperatures are influenced to a very large extent by those of the surface of the surrounding sea, which reach their lowest values in late February or early March. Around the coasts February is therefore normally the coldest month, but inland there is little to choose between January and February. The January mean daily minimum temperatures vary from just above 0 °C in the higher parts of north and mid-Wales to 3 or 4 °C around the coast. The highest values occur in Pembrokeshire, due to the proximity of air from the relatively warm Atlantic.

Rainfall is caused by the condensation of the water in air that is being li ed and cooled to its dew point. Rainfall tends to be associated with Atlantic depressions or with convection. The Atlantic Lows are more vigorous in autumn and winter and bring most of the rain that falls in these seasons. In summer, convection caused by solar surface heating sometimes forms shower clouds and a large proportion of rainfall is from showers and thunderstorms then. A further factor that greatly affects the rainfall distribution is altitude. Moist air that is forced to ascend hills may be cooled to the dew point, to produce cloud and rain. A map of average annual rainfall therefore looks similar to a topographic map. Rainfall in Wales varies widely, with the highest average annual totals being recorded in the central upland spine from Snowdonia to the Brecon Beacons. Snowdonia is the wettest area with average annual totals exceeding 3000 mm, comparable to those in the English Lake District or the western Highlands of Scotland. In contrast, places along the coast and, particularly, close to the border with England, are drier, receiving less than 1000 mm a year.

The occurrence of snow is linked closely with temperature, with falls rarely occurring if the temperature is higher than 4 °C. The numbers of days with snow falling and snow lying increase with latitude and altitude, so values reflect topography. Snow is comparatively rare near sea level in Wales, but much more frequent over the hills. The average number of days each year when sleet or snow falls varies from 10 or less in south-western coastal areas to over 30 in Snowdonia. Snow rarely lies on the ground at sea level before December or a er March, and the average number of days with snow lying in Wales varies from 5 or less around the coasts to over 20 in Snowdonia. These averages can be compared with parts of the Scottish Highlands, which have about 60 days with snow lying on average and with the coasts of SW England, with less than 3 days per year.

Wales is one of the windier parts of the UK, with the windiest areas being over the highest ground and along the coasts, particularly those facing directions between north-west and south. The strongest winds are associated with the passage of deep areas of low pressure close to or across the UK. The frequency and strength of these depressions is greatest in the winter half of the year, especially from November to February, and this is when mean speeds and gusts (short duration peak values) are strongest.

22.8.2.3 Future Wales The National Plan 2040

The climate is already changing and trends show the UK climate is continuing to warm and sea levels continue to rise. In terms of the future, the latest climate projections for Wales come from the 2018 UK Climate Projections and are detailed in Figure 22.3. State of the art modelling is used to provide detailed projections of climate change up to 2100 (and to 2300 on sea level rise). The projections show an increased chance of milder, wetter winters and hotter, drier summers, rising sea levels and an increase in the frequency and intensity of extreme weather events.

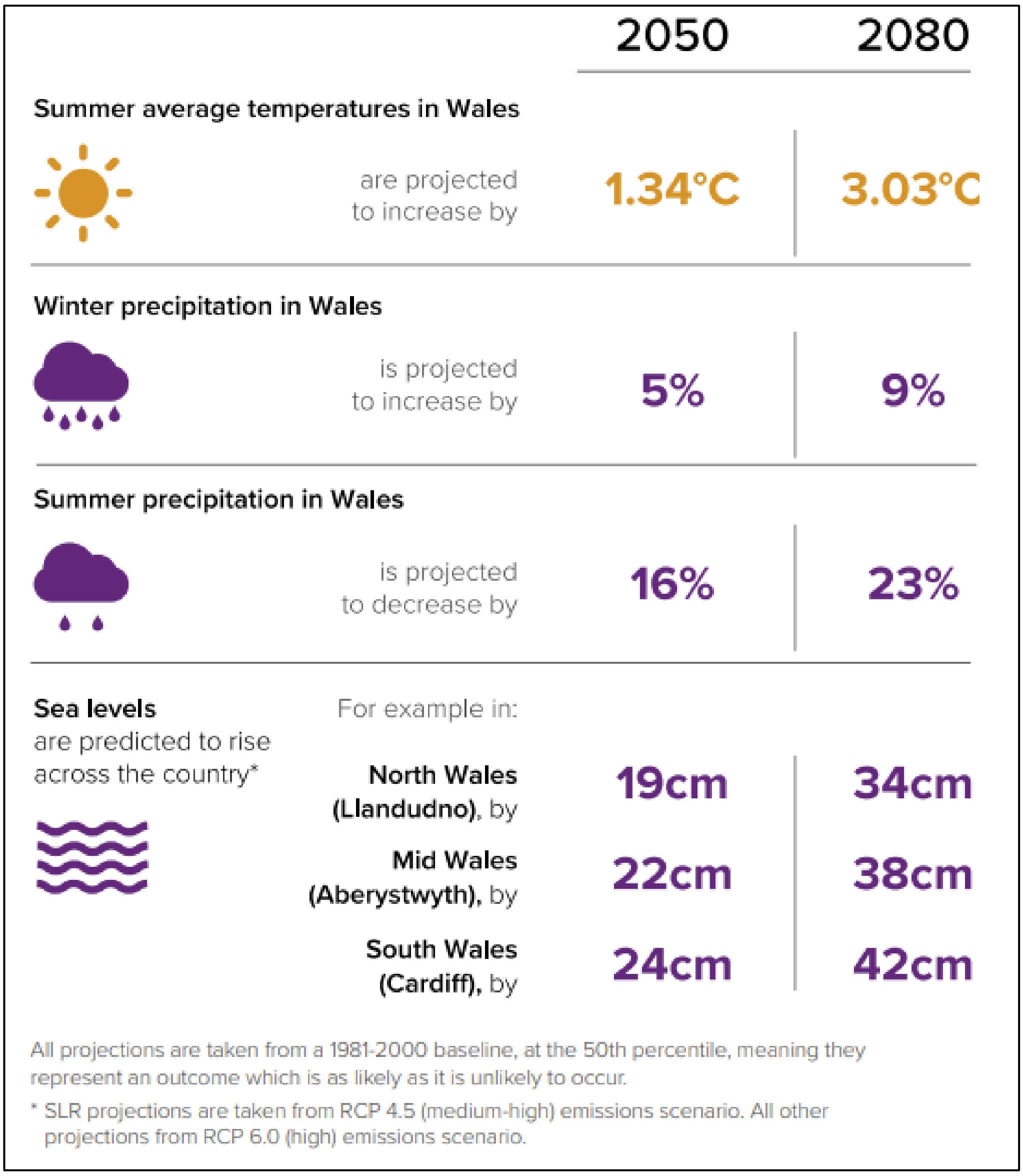

Figure 22.3: Climate change projections for Wales

Changes to our climate and weather patterns will have a significant impact on well-being on both current and future generations. Increasing temperatures and extreme weather events caused by climate change are putting pressure on ecosystems, infrastructure, built environment and our unique landscape and cultural heritage, which all contribute to social, economic and ecological resilience.

Climate change is an equality issue as it will disproportionately affect the most vulnerable communities in Wales and the wider world. This is despite the most vulnerable communities historically contributing the least to the problem of climate changing emissions. Vulnerable communities are more likely to be exposed to the risks and impacts of climate change without the ability to cope with or recover from those impacts.

22.8.2.4 Extreme Weather Events

In 2023, Wales had one of the driest periods on record for the May and June period, followed by the third wettest July in over 100 years. Wales has already experienced changes in its climate, and these are projected to continue and intensify. A summary of some of the extreme weather events within Wales is detailed below[8]:

- **Snow and low temperatures February to March 2018** - Daytime temperatures remained widely below freezing on 28 February to 1 March with a strong east wind and significant accumulations of snow across much of the country; the Met Office issued two Red Warnings for snow. This was the most significant spell of snow and low temperatures for the UK overall since December 2010.
- **Exceptional warmth April 2018** - The panel of daily maximum temperatures below from 17 to 22 April 2018 shows the spatial extent of the warmth through this spell. The warmth also extended to much of northern and western England and Wales from 18th to 21st – examples including 22.6 °C at Porthmadog (Gwynedd) on 18 April, 25.0 °C at Whitby (North Yorkshire) on 19 April, and 24.9 °C at Bude (Cornwall) on 21 April.
- **Storm Hector June 2018 -** The strongest winds were across Northern Ireland, North Wales and parts of northern England where a few locations recorded gusts exceeding 60 Kt (69 mph).
- **Summer 2018 -** Summer 2018 brought plenty of warm, dry, sunny weather with the UK o en under the influence of high pressure, particularly during June and July. This was the UK's warmest summer since 2006, the driest since 2003 and the sunniest since 1995. The hottest day across north-western parts of the UK was 28 June, with 30 °C exceeded across north-west England, Scotland's Central Belt, and parts of the Highlands, Northern Ireland and North Wales.
- **Storms Bronagh 19 to 21 September 2018 -** Storm Bronagh brought further stong winds and very heavy rain acrosss England and Wales overnight 20 to 21 September. The storms tracked rapidly eastward across the UK, driven by a powerful Atlantic jet stream, and continued to deepen as they moved into the North Sea.
- **Storm Callum 11 to 13 October 2018** - Storm Callum was the third named storm of the 2018/19 winter season, bringing strong winds and heavy rain to western areas of the UK on 11 to 12 October 2018. Persistent heavy rain continued to fall across western upland areas into the 13th from a weather front associated with the storm. The wettest area was south Wales, with much of the Brecon Beacons National Park recording 100 to 150mm of rainfall over a 2-day period, and up to 200mm across the higher ground. This was one of the most significant extreme rainfall and flood events to affect south Wales in the last 50 years.
- **Exceptional warmth 21 to 27 February 2019** - The UK experienced some exceptionally high temperatures for the time of year in a spell of fine, settled weather during the second half of February. On 26 February a maximum temperature of 20.8°C was recorded at Porthmadog (Gwynedd).
- **Storm Freya 3 to 4 March 2019** - Storm Freya, the sixth named storm of the 2018/2019 winter, was a rapidly deepening area of low pressure as it crossed the UK, bringing strong winds and heavy rain to England, Wales and southern Scotland.
- **Storm Hannah 26 to 27 April 2019** - Storm Hannah was one of the most significant April storms in the last 50 years, with exposed locations in west Wales recording gusts of over 60 Kt (69 mph).

[8] https://www.metoffice.gov.uk/weather/learn-about/past-uk-weather-events

- **Heavy rainfall June 2019** - The UK experienced a spell of very wet weather in mid-June as a low pressure system and associated fronts brought widespread and slow moving heavy rainfall. There was further wet weather across east Wales, north-east England and eastern Scotland. This wet weather was part of a largely unsettled June, with low pressure often dominating the UK's weather bringing extensive rainfall on many days of the month.
- **Persistent wet weather Late October 2019** - A slow moving front brought persistent heavy rain across parts of England and Wales.
- **Strong winds 2 November 2019** - An area of low pressure brought very strong winds to south Wales and the south coast with a gust of 95 Kt (109 mph) at Needles Old Battery, Isle of Wight.
- **Storms Atiyah and Brendan 8 to 9 December 2019; 13 to 14 January 2020** - Storm Atiyah brought strong winds to Wales and south-west England, while storm Brendan was a deep Atlantic low pressure system bringing strong winds and heavy rain across the UK.
- **Storm Dennis 15 to 16 February 2020 -** Heavy rain from storm Dennis caused widespread flooding. 50 to 100mm of rain fell across western upland parts of the UK and the Met Office issued a Red Warning for parts of south Wales.
- **Storms Ellen and Francis 19 to 21 August; 25 August 2020** - The UK experienced a turbulent spell of weather in late August 2020 with a strong jet stream bringing deep areas of low pressure. Storms Ellen (19th to 21st) and Francis (25th) brought wind gusts of 40 to 50Kt across inland areas and 50 to 60Kt across exposed coastal locations.
- **Storm Alex and heavy rain 2 to 4 October 2020** - Storm Alex marked an emphatic transition to unsettled autumnal weather across the UK. Alex brought stormy conditions with strong winds to the southern half of the UK and the Channel Islands on 2 October 2020, with associated fronts bringing prolonged and widespread heavy rain on 3rd to 4th.
- **Storm Aiden 31 October 2020 -** Storm Aiden brought strong winds and heavy rain to the UK on 31 October 2020. The storm was part of a spell of turbulent, wet and very windy weather from late October to early November as a succession of deep Atlantic low pressure systems, associated with a powerful jet stream, crossed the UK.
- **Storm Bella 26 to 27 December 2020** - Storm Bella was the second named storm of the 2020/2021 season. Bella was a large, deep area of low pressure dominating the North Atlantic, bringing persistent heavy rain across western Scotland on 26 December, with heavy rain and very strong winds sweeping across England and Wales overnight 26 to 27 December. The strongest winds were across Wales, south-west and southern England, where this was one of the most powerful storms of the year.
- **Storm Christoph 18 to 20 January 2021** - Storm Christoph brought some exceptionally wet weather to North Wales and northern England from 18 to 20 January. 100mm of rain or more fell across upland areas, and parts of Cheshire, Greater Manchester and Lancashire received around the January whole-month long-term average rainfall from this event. For north-west England and North Wales this was one of the wettest 3-day periods on record.
- **Severe winter weather and storm Darcy, February 2021** - The UK experienced a week of severe winter weather from 7 to 13 February, with easterly winds drawing a bitterly cold airflow from eastern Europe.
- **Extremes of temperature, March and April 2021** - The UK experienced a brief spell of unusual warmth at the end of March with temperatures across England and Wales widely reaching 20 to 22°C. 24.5°C was recorded at Kew Gardens, Greater London on 30th March, only the third day on record with a UK March temperature exceeding 24°C.
- **Storms Dudley, Eunice and Franklin, February 2022** - Three named storms affected the UK within the space of a week, the first time this has occurred since storm naming was introduced in 2015/2016. Two rare red warnings were issued for storm Eunice, the most severe and damaging storm to affect England and Wales since February 2014.
- **Unprecedented extreme heatwave, July 2022** - The UK experienced a brief but unprecedented extreme heatwave from 16 to 19 July 2022, as hot air moved north from the near-continent, with extreme temperatures recorded on both 18th and 19th. In Wales, on 18th July a new national record of 37.1°C was set at Hawarden Airport, Flintshire.

- **Prolonged spell of low temperatures, December 2022** - The UK experienced a prolonged spell of low temperatures accompanied by snowfalls from 8 to 18 December 2022 as an Arctic Maritime airmass brought hard frosts, with daytime temperatures struggling to rise above freezing and accompanied by widespread lying snow (although generally not deep). Daily minimum temperatures fell widely to between -5°C and -10°C across the UK on several nights – with hard frosts even in cities and coastal areas, and some locations below -10°C.
- **Storm Noa, 12 April 2023** - Storm Noa on 12 April 2023 was the second named storm of the 2022/2023 storm season. The storm was named by Meteo-France and brought widespread gusts of over 50Kt around coastlines of England and Wales. This was an unusually severe storm for the time of year; the most significant April wind storm to affect England and Wales since April 2013.
- **Storm Antoni, 5 August 2023 -** Storm Antoni brought strong winds and heavy rain to parts of England, Wales and Northern Ireland on 5 August 2023. The strongest winds were across South Wales and south-west England, with Berry Head (Devon) recording a gust of 68Kt (78mph).
- **Heatwave, September 2023** - In early September the UK experienced a significant heatwave with daily maximum temperatures exceeding 30°C somewhere in the UK for seven consecutive days from 4th to 10th and reaching 31 to 32°C across south-east England. On 10th, Faversham (Kent) recorded 33.5°C, making this, unusually, the hottest day of the year.
- **Storm Henk, 2 January 2024** - Storm Henk, the eighth storm of the 2023-2024 storm season, brought damaging winds and heavy rain to southern and central parts of England and Wales on 2 January 2024. Winds gusted widely at over 50Kt (58mph), even in inland locations, while Exeter Airport recorded a gust of 70Kt (81mph).
- **Storms Isha and Jocelyn, 21 to 24 January 2024** - Storms Isha and Jocelyn, the ninth and tenth named storms of the 2023-2024 storm season, arrived in quick succession in late January 2024. The storms were influenced by a powerful jet stream which was intensified by a large contrast in temperature across North America caused by a pool of cold air over Canada and the United States sinking south. Storm Isha brought widespread strong winds, particularly across the northern half of the UK, on 21 to 22 January 2024, where winds gusted at 60 to 70Kt (69 to 81mph).
- **Exceptionally wet weather, 21 to 23 May 2024** - From 21 to 23 May, parts of England, southern and eastern Scotland and North Wales experienced exceptionally wet weather from a slow-moving weather front associated with an area of low pressure centred off the east coast of the UK.
- **Storm Lilian, 23 August 2024** - Storm Lilian was the 12th and final named storm of the 2023-2024 storm season, the first time ‘L’ has been reached making this the most named storms in a season since the scheme was introduced in 2015. Lilian was the most significant August windstorm to affect the UK since storms Ellen and Francis in late August 2020, bringing strong winds and heavy rain to northern England and Wales, and parts of Scotland.
- **Storm Bert, 22 to 25 November 2024** - A deep Atlantic low pressure system, named Storm Bert, brought a spell of extremely wet and windy weather in late November. The weekend of Saturday 23rd to Sunday 24th was exceptionally wet across South Wales and south-west England with over 150mm falling in the wettest upland areas.
- **Storm Darragh, 6 to 7 December 2024** - Storm Darragh, the fourth named storm of the 2023/2024 storm season, brought very strong winds to western parts of England and Wales in early December. The Met Office issued a red warning for wind covering West Wales and both coasts of the Bristol Channel, with winds gusting at 60 to 70Kt (69 to 81mph) or higher in these areas.
- **Heavy rain, strong winds and snow, New Year 2024-2025** - The period from late December 2024 to early January 2025 brought some very wet and windy weather, with significant snowfalls across upland areas in the north. On 29 to 31 December, northern Scotland recorded its third-wettest 3-day period on record, while 31 December was the second-wettest day on record for the climate district of North-West England and North Wales.

22.8.2.5 Flood Risk & Climate Change

An increased flood risk, associated with climate change, has the potential to result in considerable impacts on riparian and coastal developments, higher sea levels have already been observed, while wetter winters are anticipated. There are approximately 273,000 properties across Wales at risk of flooding: 1 in every 7. Climate change is increasing the risks and impacts of flooding, with the number of properties at risk set to increase to approximately 350,000 by 2120, an increase of approximately 77,000 properties (approximately 28%). There could also be significant consequences for settlements that are close to lakes and artificial waterbodies (canals and reservoirs). Predicted impacts of climate change include an increase in the frequency and intensity of rainfall, an increase in peak flows in rivers, a rise in sea levels and increased storminess. These climate change effects are likely to increase pluvial, fluvial and coastal flooding and will require that future development be adaptable or resilient to future climatic changes and its associated impacts. Water management infrastructure should be developed with climate change in mind, in order to ensure that it is adaptable to climate change and can be safely exceeded.

The Welsh Government already invests an average of over £54 million per annum in flood and coastal risk management until 2020, but a longer term settlement would help for the strategic planning and adaptation. The Welsh Government has also committed to reviewing policy and putting in place new guidance and tools to increase Wales' capacity to manage coastal flooding and erosion. In September 2019, consultation on the future National Strategy for Flood and Coastal Erosion Risk Management closed and the Welsh Government will publish a new strategy in 2020. The primary goal of the strategy will be to ensure the risks to people and communities from flooding and coastal erosion are effectively managed.

Sea level rise caused by climate change, along with increased incidence of storms, means the risk of erosion and flooding of coastal communities is increasing. There are a number of communities which are already vulnerable to spring tides and coastal surges. With the projected sea level rises in the long term, some of those communities may become unsustainable.

Fishguard, located on the Pembrokeshire coast of Wales, is susceptible to tidal flooding due to its geographical position and the influence of sea level rise. According to the Environment Agency, the area is classified as having a medium to high risk of flooding from tidal sources, particularly during storm surges and high spring tides. Historical data indicates that significant tidal flooding events have occurred, notably in December 2013, when severe weather led to extensive flooding along the coast, affecting properties and infrastructure in Fishguard. The tidal range in Fishguard can reach approximately 5.2 meters, which, combined with adverse weather conditions, can exacerbate flooding risks. In response to these challenges, local authorities have implemented flood defence measures, including the construction of sea walls and the enhancement of drainage systems, to mitigate the impact of tidal flooding and protect the community. Continuous monitoring and assessment of tidal flood risks remain essential for effective management and preparedness in Fishguard.

22.8.2.6 Climate Vulnerability Future Baseline

The UKCP18 provide data on projected change in climate variables for the UK.[9] The UKCP18 are the most up-to-date projections of climate change for the UK, providing projections until the end of the 21st Century. UKCP18 includes probabilistic projections of a range of climate variables for different emissions scenarios, termed Representative Concentration Pathways (RCPs) and for a range of time slices to the end of the 21st Century. The probabilistic projections mean that rather than a single 'best-guess' of the impact of climate change, they provide a range of outcomes based on an 'ensemble' of multiple climate model runs. This better represents the uncertainty of climate prediction science. To help demonstrate consideration of uncertainty inherent within climate modelling, projections for the 10th, 50th (central) and 90th percentiles are stated, where possible.

Climate projections are provided for the emissions scenario RCP8.5. This is a high emissions scenario which combines assumptions about high population and relatively slow income growth with modest rates of technological change and energy intensity improvements, leading in the long term to high energy demand and GHG emissions in absence of climate change policies. Furthermore, the EIA process and DMRB guidance relies on approaching the assessment by using the worst-case scenario (precautionary principle).

This page contains summary statistics of future changes over land for Wales for the periods 2020-2039, 2030-2049, 2040-2059, 2050-2069, 2060-2079, 2070-2079 and 2080-2099 at the 5th, 10th, 50th, 90th and 95th percentiles. For the purposes of this assessment regarding the assumed life span of the Proposed Development before reconstruction, the following time horizons have been detailed below:

- 2030-2049;

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[9] https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/summaries/headline-findings

- 2050-2069; and
- 2070-2089.

22.8.2.6.1 Precipitation

Climate change is projected to lead to wetter winters and drier summers although natural variation, including extreme events such as storms and heat waves, will continue to punctuate these trends. The projected changes to average summer and winter rainfall for the three time horizons are summarised in Table 22-12.

Table 22-12: Projected Change in Mean Summer and Winter Precipitation (%) for the Time Horizons

Season/Percentile		RCP8.5		
		2030-2049	2050-2069	2070-2089
Winter	10th	-5	-4	-2
	50th	6	12	19
	90th	18	30	43
Summer	10th	-29	-44	-55
	50th	-9	-21	-31
	90th	11	3	-3

22.8.2.6.2 Temperature

In general, UKCP18 predicts that climate change is projected to lead to hotter summers and warmer winters. Table 22-13 summarises the UKCP18 projections for changes in mean temperature for Wales in the chosen time horizons under RCP 8.5.

Table 22-13: Projected Change in Mean Summer and Winter Temperature (°C) for the Time Horizons

Season/Percentile		RCP8.5		
		2030-2049	2050-2069	2070-2089
Winter	10th	0.2	0.5	0.9
	50th	1.1	1.8	2.6
	90th	2.1	3.2	4.5
Summer	10th	0.3	1.0	1.9
	50th	1.4	2.6	4.3
	90th	2.5	4.3	6.7

22.8.2.6.3 Wind and Storms

UKCP18 depicts a wide spread of future changes in mean surface wind speed, however, there is large uncertainty in projected changes in circulation over the UK and natural climate variability contributes much of this uncertainty. It is therefore difficult to represent regional wind extreme winds and gusts within regional climate models.

With regards to storms, the analysis presented here is a summary of expected changes in storm patterns under a changing climate. A storm is defined by the Met Office as a wind event measuring 10 or higher on the Beaufort scale (equivalent to a wind speed of 24.5m/s or 55mp/h).

Studies relating to future projections of storms suggest that climate-driven storm changes are less distinct in the northern hemisphere than southern. However, such is the wide range of inter-model variation, robust projections of changes in storm track are not yet possible and there is low confidence in the direction of future changes in the frequency, duration or intensity of storms affecting the UK.

22.8.2.6.4 Sea Level Rise

Table 22-14 summarises the UKCP18 projections (marine simulations, 1981-2100) for changes in time-mean sea level anomaly (m) for the nearest coastal boundary to the Proposed Development (Fishguard) for the 2030, 2050 and 2070 under RCP8.5. Sea level rise is projected that under the worst-case scenario, by the 2070s there is a potential for sea level to rise by 0.6m.

Table 22-14: Projected Sea Level Rise for the Nearest Coastal Boundary under RCP8.5

Time slice	95th Percentile (m)
2030s	0.20
2050s	0.39
2070s	0.64

22.9 Impact Assessment

22.9.1 Do Nothing Scenario

In the event of a ‘do-nothing’ scenario, the site would remain ‘as-is’ with the undeveloped nature of the site. Without the Proposed Development, construction would not take place, and as such during construction emissions will not occur. The future baseline scenario involves no construction activities and therefore eliminates any additional operational emissions which then remain under the existing conditions.

22.9.2 Assessment of Construction Effects

The below definitions of the terms effect and impact are drawn from the glossary of the Highways Agency Design Manual for Roads and Bridges, which provides general guidance:

- **Impact:** Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact);
- **Effect:** Term used to express the consequence of an impact (expressed as the ‘significance of effect’), which is determined by correlating the magnitude of the impact to the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria. For example, land clearing during construction results in habitat loss (impact), the effect of which is the significance of the habitat loss on the ecological resource.

The term impact is used when discussing impact magnitude – the original impact on a receptor. The term effect is used when talking about significance (as this is the result of the impact and the sensitivity of the receptor). The following are set out:

- Magnitude of impact;
- Sensitivity of receptor;
- Significance of effect.

In terms of the Proposed Development the following key aspects are summarised:

- **Increased frequency of extreme weather** - Damage, delay, health and safety impact, increased costs. The sensitivity of construction phase receptors is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be minor.
- **Increased temperatures, prolonged periods of hot weather** - Warm and dry conditions exacerbate dust generation and dispersions, health risks to construction workers. Appropriate dust control measures will be put in place during the construction phase of the Proposed Development to aid in protection from fugitive dust dispersion and potential health impact on construction workers.
- **Increased precipitation, and intense periods of rainfall**. 1) Flooding of works and soil erosion; 2) Increased risk of contamination of waterbodies; 3) Disruption to supply of materials and goods; 4) Landslides. Appropriate assessment has been undertaken in relation to future flooding. Please refer to the FRA (submitted as part of the supporting documents) for full assessment details of future flood risk.

The sensitivity of construction phase receptors is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be negligible.

22.9.2.1 Construction Traffic

Traffic impact of the proposed development will be most onerous during the construction stage than the operational stage. The proposed construction traffic is expected to have a minimal impact on the surrounding highway network during the construction period, as even if all vehicles were to use a single approach route, the resulting impact would remain insignificant, falling within the 10% daily variance of traffic flows outlined in the Guidelines for Traffic Impact Assessments. According to these guidelines, a Traffic Impact Assessment is necessary only when traffic generated by a development exceeds certain thresholds, which in this case are not breached, indicating that the impacts, ranging from 3.4% to 1.8% on the approach routes, are negligible and do not require further analysis. The percentage impacts are based on existing traffic flows collected in 2025, and as the construction is expected to last for 12 months, any background traffic growth during this period will likely further reduce these percentage impacts.

22.9.2.2 Climate Change Resilience

During the construction process, receptors may be vulnerable to a range of climate risks. These are addressed by the mitigation measures in this chapter. Potential impacts during the construction phase could include:

- Inaccessible construction site due to severe weather events (flooding, snow and ice, storms) restricting working hours and delaying construction;
- Health and safety risks to the workforce during severe weather events;
- Unsuitable conditions (due to very hot weather or very wet weather, for example) for certain construction activities; and,
- Damage to construction materials, plant and equipment, including damage, material storage areas and worksites, for example from stormy weather.

With regard to climate change risks to the Proposed Development during the construction period, it is considered reasonable that construction contractors would be able to adapt working methods if necessary.

For example, warmer winter conditions may extend the time certain construction activities such as concrete pouring can be carried out, while a greater chance of summer heatwave conditions may require adaptations such as shading work areas or increased attention to construction dust control measures. Effects are considered to be negligible and not significant.

22.9.2.3 Embodied Carbon

Embodied carbon refers to the emissions during the construction of a development rather than when it is operational – or the carbon footprint of a material. With the pressure on to decarbonise the built environment and deliver carbon neutral buildings ahead of the government’s 2050 deadline, it’s becoming increasingly important for contractors and developers to tackle it appropriately. Some local authorities have also started to ask about the embodied carbon footprint of new developments, so understanding what it is and how to reduce it will be vital for projects moving forward.

Developing net zero carbon assets requires driving down embodied carbon to an absolute minimum. As industries commit to net zero pathways for their own emissions, they are now focusing on reducing the carbon footprint of developments. Less embodied carbon will mean a lower requirement for carbon sequestration. This is a vital step in reaching global emissions reduction targets. Reducing embodied carbon should be a priority for developers and contractors for many other reasons such as, mandated legal limits on embodied carbon, using fewer resources that can reduce costs and risk around resource availability.

The ICE database, which stands for "Inventory of Carbon and Energy," is a resource that's used in the construction industry to assess and calculate the embodied carbon emissions associated with various building materials. These embodied carbon emissions represent the greenhouse gases emitted during the production, transportation, and assembly of construction materials. Understanding these emissions is crucial for sustainable and environmentally friendly construction practices.

The update to ICE V3.0 signifies that the database has gone through a revision, likely to include more recent and accurate data on the environmental impacts of construction materials. This update process is guided by the pareto principle, or the 80:20 rule. In the context of the ICE database, this means that the focus of the update has been on the main construction materials that are responsible for the majority (around 80%) of embodied carbon in construction projects. These materials are particularly significant because reducing their carbon footprint can have a substantial impact on the overall sustainability of construction projects.

The exact types of construction materials and their embodied carbon content are not known at this early stage of the proposed development, however Table 22-15 provides a summary of generalised construction materials and their embodied carbon content portrayed as worst case scenario.

Table 22-15: Summary by Material Types: Construction Embodied Only (Worst-Case Scenario)

Materials	Embodied Carbon -
Aggregates and Sand	0.00747 $kgCO_2e/kg$
Aluminium	6.67 $kgCO_2e/kg$
Asphalt and bitumen	50.1 $kgCO_2e/tonne$
Concrete, cement, and cement substitutes (including steel reinforcement)	0.832 $kgCO_2e/kg$
Iron	2.03 $kgCO_2e/kg$
Steel	3.02 $kgCO_2e/kg$
Paint and coating	2.91 $kgCO_2e/kg$
Plastic	3.31 $kgCO_2e/kg$
Soil	0.024 $kgCO_2e/kg$
Stone	0.079 $kgCO_2e/kg$

(Source: Embodied Carbon Footprint Database - Circular Ecology)

22.9.2.4 Dredging

Within the Proposed Development, shipping emissions will occur during the dredging process.

CO_2e Emissions fall under three Scopes

- Scope 1 emissions refer to those emissions produced directly as a result of works, such as the burning of fuel in machinery while on site.
- Scope 2 emissions are those that are indirectly generated as a result of the scheme such as the emissions associated with energy provided by a supplier, e.g., electricity from the mains.
- Scope 3 emissions then include all emission sources not covered by scope 1 and 2, such as the emissions produced as a result of fuel extraction, refinement, and delivery.

Given the capital dredging works do not require mains electricity supply, Scope 2 emissions are not relevant.

The estimation of CO_2e Emissions is therefore based on an assessment of Scope 1 and Scope 3 emissions.

From the UK Government Department for Environment, Food and Rural Affairs (DEFRA), GHG conversion factors for fuel types are available[10]. The GHG conversion factor for marine gas oil (MGO) is 3.11 litres/kgCO_2e which represents for every 3.11 litres of MGO burnt, 1 kg of CO_2e is produced. This conversion factor is for the GHGs produced when burnt, i.e., Scope 1 emissions.

The fuel type typically used for capital dredging campaigns is marine MGO, similar to diesel but with higher density, which is currently the Dredging Industry Standard.

DEFRA also provide a well-to-tank (WTT) emission factor for fuels. WTT conversion factor accounts for all GHG emissions released into the atmosphere from the production, processing, and delivery of the fuel, thus taking account of Scope 3 emissions. For the purpose of this assessment, the WTT conversion factor for MGO will be used which is 3.74 litres/kgCO_2e.

22.9.2.4.1 The Blue Carbon Potential of the Marine Protected Area Network

Blue carbon is an area of increased interest and research following the release of The Blue Carbon Potential of the Marine Protected Area Network in the Welsh Marine Environment[11]. Blue carbon is defined in the report as *"… the carbon accumulating in vegetated, tidally influenced coastal ecosystems such as tidal marshes, tidal forests (including mangroves), and seagrass meadows*".

Blue Carbon refers to carbon which is stored, or sequestered, in the ocean, its sediments, and vegetated habitats. Irish blue carbon systems include coastal systems, such as saltmarshes, seagrass and macroalgae, coastal and offshore sediments, and potentially cold-water corals.

From using the most relevant literature values for carbon storage and sequestration for Welsh habitats and calculating the habitat extents within each SAC Annex I feature, the blue carbon potential of Annex I features could be estimated. The total contribution of Welsh SAC Annex I features to carbon storage was estimated to be approximately 11 Mt of carbon in the top 10 cm of sediment. This accounts for almost 10% of the total carbon storage across all habitats in the Welsh National Marine Plan area. The rate of sequestration was approximately 12,300 t of carbon per year across the SAC network, which accounts for 47% of the total carbon sequestered within Welsh habitats. Annex I features which covered large spatial extents such as estuaries and large shallow inlets and bays contributed the most towards carbon storage and sequestration across the network, however designated saltmarsh features contributed the most towards blue carbon per unit area.

Overall, this study highlighted that SACs make an important contribution towards blue carbon in Welsh waters, particularly in terms of carbon sequestration, and therefore the continued protection of the blue carbon habitats associated with designated features is of high importance. The collection and incorporation of site-specific data into future estimates of blue carbon potential should be a priority in order to assess the variability of carbon storage and sequestration across the SAC network.

With any dredging activity, carbon which has accumulated in seabed sediment has the potential of being released into the atmosphere. The carbon released is difficult to quantify due to a significant number factors having to be accounted for and the limited research data currently available. It is however known that the majority of the area does not have a high abundance of vegetation, with one of the project principles to renourish this sediment. Consequently, Blue Carbon emission sources are not considered to be significant in this case.

22.9.2.5 Waste Management

Waste is defined as '"any substance or object which the holder discards or intends or is required to discard" under the Waste Framework Directive (European Directive 2006/12/EC as amended by Directive 2008/98/EC).

Once a substance has become waste it will remain waste until it has been fully recovered and no longer poses a potential risk to the environment or human health. From that moment onwards, the material ceases to be waste, and it is no longer subject to the same legislative controls.

[10] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022

[11] //efaidnbmnnnibpcajpcglclefindmkaj/https://naturalresources.wales/media/695175/the-blue-carbon-potential-of-the-marine-protected-area-network-in-wales.pdf

This applies to waste used as aggregate or construction material in civil engineering applications and to exceed topsoils and sub-soils which need to be moved off-site. Waste recovery can be achieved when such waste is incorporated into a road, building or other infrastructure works, or in the case of inert waste, after processing if such a process is conducted following the criteria specified in the relevant quality protocols.

The principal objective of sustainable resource and waste management is to use material resources more efficiently, where the value of products, materials and resources are maintained in the economy for as long as possible and the generation of waste is minimised.

To achieve resource efficiency there is a need to move from a traditional linear economy to a circular economy (please refer to Figure 22.4).

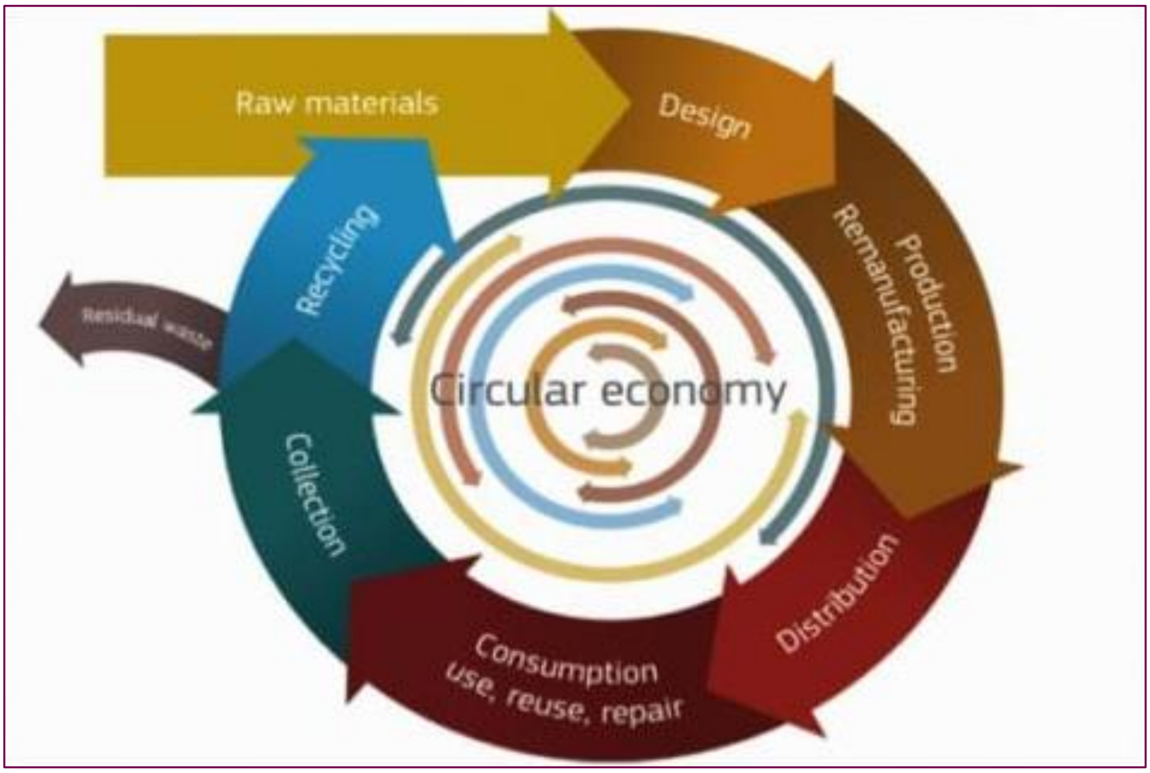

Figure 22.4: Circular Economy

In Wales, the waste hierarchy is both a guide to sustainable waste management and a legal requirement, enshrined in law through the Waste (England and Wales) Regulations 2011[12]. This hierarchy prioritizes waste prevention, followed by preparing for reuse, recycling, other forms of recovery (including energy recovery), and, as a last resort, disposal (e.g., landfill). The regulations emphasize the importance of reducing waste at the source and encourage the efficient use of resources throughout the lifecycle of materials. To minimise the construction impacts associated with the proposed development, the project will adopt an enhanced circular design that aligns with these regulations by integrating sustainability into its framework, improving material efficiency, utilizing secondary materials, and reducing waste. This approach includes retaining existing structures and reusing construction materials, thereby prioritizing circularity in the built environment and extending the life of buildings, their components, and materials in accordance with Welsh waste legislation.

In order to minimise the construction impacts associated within the construction phase of the proposed development, the adoption of an increased circular design that builds sustainability into design, improves material efficiency, utilise secondary materials and reduce waste. The project can provide this through retaining some of the existing structure and the reuse of construction materials. A helpful hierarchy for the built

[12] *Prevention, which offers the best outcomes for the environment, is at the top of the priority order; followed by preparing for re-use, recycling, other recovery and disposal, in descending order of environmental preference. The Waste Regulations 2011 transposed several aspects of the revised Waste Framework Directive (rWFD), with the aim to reduce the adverse impacts of the generation of waste and resource use on human health and the environment. The RPC considers the post-implementation review (PIR) to be fit for purpose.*

environment sector to prioritise circularity, with maintenance and prolonging the life of a building, its components, and materials at the top of the hierarchy is illustrated in Figure 22.5.

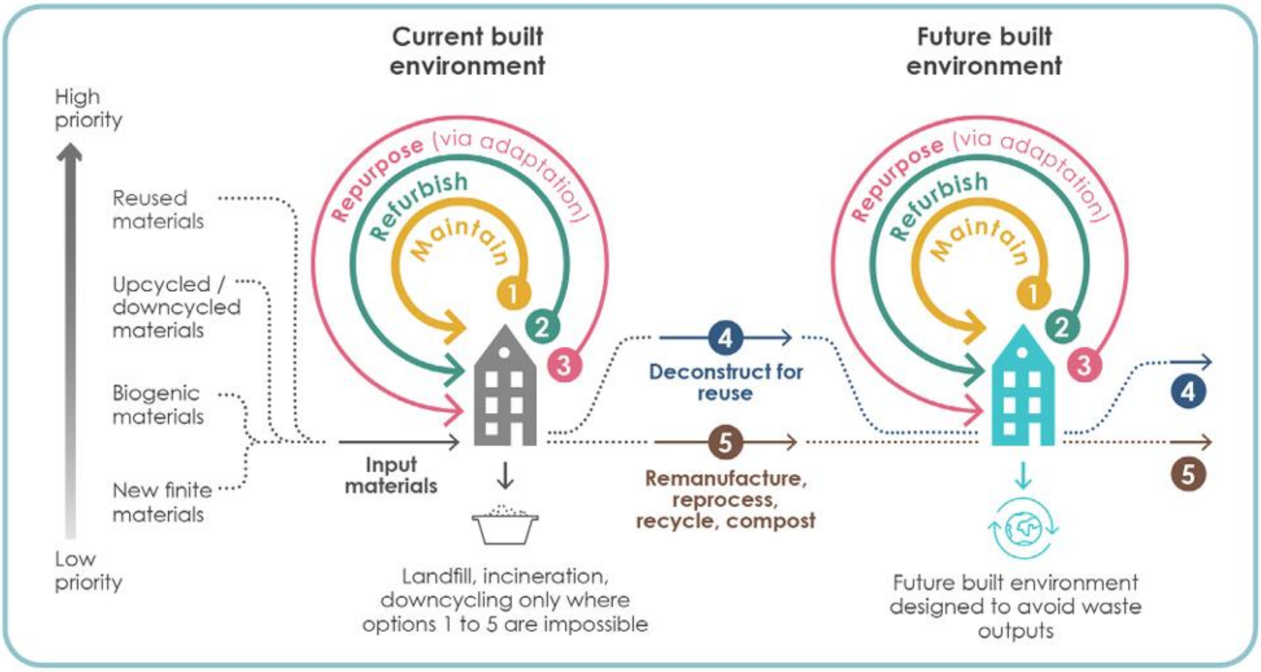

Figure 22.5: LETI London: CE for the Build Environment: A Summary[13]

22.9.3 Assessment of Operational Effects

22.9.3.1 Operational Traffic

The changes in regional emissions from traffic as a result of the Proposed Development were considered in the context of total UK emissions provided by the National Atmospheric Emissions Inventory (NAEI). The consideration of significance of the Proposed Development's impact on regional emissions was undertaken using professional judgement considering the change predicted and the sensitivity of the national (UK) total to change, with the outcome assessed as either Significant or Not Significant.

Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel size are not expected to increase above existing levels. The related number of generated vehicle movements are also not expected to increase above existing levels. Therefore, there will be no traffic impact associated with the replacement Linkspan scheme once construction is completed and no requirement for an assessment of operational effects.

22.9.3.2 Climate Change Resilience

The Proposed Development also has the potential to be impacted upon by a changing climate and, in particular, more frequent severe weather events, in the medium to longer-term. These are addressed by the mitigation measures in this chapter. Potential impacts on the Proposed Development during the operational phase include:

- Material and asset deterioration due to high temperatures;
- Health and safety risks to road users;
- Damage to roads from periods of heavy rainfall; and

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[13] https://www.economy-ni.gov.uk/consultations/circular-economy-strategy-northern-ireland

- Flood risk (surface, groundwater, fluvial and snow/ice melt) on the road network and damage to drainage systems with the potential for increased runoff from adjacent land contributing to surface water flooding.

The application is outline and therefore no detailed drainage design has been prepared at this stage, however a Drainage Strategy has been prepared. A preliminary storm water drainage design has been completed for the new area. It is proposed to use ACO channels and connect to the existing storm water drainage network. The closest outfall will be encompassed by the new reclamation works, and so the drainage will connect to this and the outfall will be extended out. There is no increase in storm water runoff to the Port because of the development. An application will be made to the SuDs Approving Body (SAB) as part of the planning application.

With regard to climate change risks to the Proposed Development during the operational period effects are considered to be negligible and not significant following mitigation.

22.9.3.3 Shipping Emissions

While maritime transport plays an essential role in the Welsh economy and is one of the most energy-efficient modes of transport, it is also a large and growing source of greenhouse gas emissions. In 2018, global shipping emissions represented 1,076 million tonnes of CO_2, and were responsible for around 2.9% of global emissions caused by human activities.

The Welsh Government's National Marine Plan (NMP) includes specific targets and objectives related to emissions from shipping, reflecting broader commitments to reducing air pollution and greenhouse gas emissions. While the NMP may not always detail specific numerical targets for shipping emissions, it aligns with various legislative frameworks and initiatives aimed at reducing emissions from maritime activities. The plan supports the implementation of international agreements and regulations, such as those established by the International Maritime Organisation (IMO), which has set a target to reduce total annual greenhouse gas emissions from international shipping by at least 50% by 2050 compared to 2008 levels.

The NMP emphasises the need to improve air quality in Welsh waters and coastal areas, which includes reducing emissions of nitrogen oxides (NOx), sulphur oxides (SOx), and particulate matter (PM) from shipping activities, significant contributors to local air pollution. It encourages the adoption of cleaner technologies and fuels in the shipping industry, such as liquefied natural gas (LNG), hydrogen, and battery-electric systems, to reduce emissions and enhance environmental performance. Additionally, the plan calls for integration with local and regional plans that may set specific targets for emissions reductions from shipping, particularly in areas with high levels of maritime traffic. The advantage of shipping fuels is that marine engines have a much higher operational flexibility on a mix of fuels, and shipping fuels do not need to undergo as extensive refining processes as road and aviation fuels to be considered drop-in. It is important to note that there has been no consensus reached as to what alternative fuel, or fuel mix, is suitable for the maritime industry in the long term. The lifespan of shipping vessels can be quite lengthy meaning a decision made today can have long-term implications. In addition, retrofitting an existing ship to a transitory fuel such as liquefied natural gas (LNG) has considerable technical considerations.

Monitoring emissions from shipping and assessing the effectiveness of measures implemented to reduce them is also a key aspect of the NMP, ensuring compliance with both national and international targets. The plan promotes sustainable maritime practices that minimize environmental impacts, including emissions reductions through efficient vessel operations, better port management, and the implementation of best practices in shipping logistics. While the NMP does not always specify exact numerical targets for emissions from ships, it provides a framework that supports the reduction of shipping emissions in alignment with international standards and national air quality objectives. The emphasis on cleaner technologies, monitoring, and integration with local plans reflects a commitment to improving air quality and reducing the environmental impact of maritime activities in Wales. For the most precise and updated targets, it is advisable to consult the latest documents from the Welsh Government and relevant maritime authorities.

22.10 Mitigation

22.10.1 Construction Phase Mitigation Measures

Embodied carbon in the materials employed in the construction phase dominate the impact, in particular, those relating to cement/concrete and steel. As such, to mitigate these impacts mandatory use of the following commitments could be included:

- Concrete poured in-situ for the proposed development could consist of 50% (as a minimum) ground granulated blast-furnace slag (GGBS) cement blend as a minimum; and
- All reinforcing steel or structural employed on site could be 85% (as a minimum) recycled steel.

Final construction materials will be finalised through the detailed design phase and all efforts will be made to seek to achieve greater embodied reductions where possible based on industry practices and availability of material at the time of construction.

In addition to the above mitigation regarding material choices, there are associated vehicle movement, emissions and reuse of materials. With respect to vehicle emissions, the following can help in reducing the GHGs emission to the atmosphere such that impacts will be negligible and not significant:

- All aggregates required for pavement materials shall be secondary aggregates. Virgin aggregates shall only be employed where it is demonstrated that secondary aggregates are unsuitable for structural reasons and/or they are unavailable.
- Wherever available, the contractor shall secure construction materials from local/regional sources or sources locally to minimise material transport emissions and reduce life cycle carbon emissions associated with the construction materials.
- For electricity generation at the construction compounds, hydrogen generators or electrified plant shall be utilised over traditional diesel generators. This shall also apply to lower powered mobile plant, as appropriate.
- A regular maintenance schedule for all construction plant machinery shall be undertaken to maintain optimum machinery efficiency.
- Sustainable timber post fencing will be specified over steel in boundary treatments where possible.
- Engines will be turned off when machinery is not in use.
- The use of private vehicles by construction staff to access the site will be minimised through the encouragement of use of public transport, encouragement of car sharing, and maximising use of local labour to reduce transport emissions. To implement this, the contractor shall prepare a Mobility Management Plan for site staff.
- Ensuring exhaust emissions are maintained to comply with the appropriate manufacturer’s limits (emissions to air controlled).
- The reuse of soil materials won from excavations.
- Only appropriately licensed waste carriers will be used in accordance with applicable legislation.
- It is important that waste arisings from the daily operations are managed appropriately in line with the waste management hierarchy in order to achieve good recycling performance and high landfill diversion.
- Segregation of waste will be carried out on site. This is very important and highly effective in regard to sustainable waste management. On-site segregation of waste materials into appropriate categories.
- All waste generated on site will be dealt with in accordance with the appropriate current legislation; The Waste Management (England and Wales) Regulations 2006 and The Hazardous Waste (Wales) Regulations 2005.
- Waste classification will be undertaken in accordance with The Waste Separation Requirements (Wales) Regulations 2023.
- A full record of waste transfer consignment notes will be kept on site of all material that is removed off-site for disposal to a licensed landfill. A copy of the consignment notes will be included within the Verification Report.
- Under The Contaminated Land (Wales) Regulations 2006 all those responsible for producing or handling wastes have legal requirements placed upon them for the safe keeping, transport and subsequent recovery or disposal. Consequently, at the basic minimum, the Appointed Contractor shall ensure that all waste leaving site must have a Waste Transfer Note.
- All waste types and amounts will be recorded and reviewed at regular intervals, to allow for continuous analysis and review of procedures that will be made to reduce waste to landfill, increase the percentage of recycling and reduce waste overall as much as possible.

These measures will be implemented throughout by the appointed contractor.

22.10.1.1 Climate Change Resilience

With the design and mitigation measures proposed, the development is considered to be resilient to projected climate change. The resilience of the development to climate change impacts is qualitatively assessed, based on professional expertise and judgement.

The assessment of effects takes into account mitigation embedded in the specimen design of the Proposed Scheme that has been identified through liaison with the design team, and subsequently revied by discipline leads due to the nature of the cross-cutting issues identified. Table 22-16 sets out the mitigation measures that address climate risks.

Table 22-16: Climate Change Resilience Mitigation

Weather Event	Climate Hazard	Potential Impact	Mitigation
Precipitation	Changes in annual average; and Extreme precipitation events.	• Increase in volume of water from watercourses; • Drainage infrastructure overwhelmed leading to surface water flooding.	• The proposals provide for the discharge of all roads related run-off to existing surface watercourses. A preliminary storm water drainage design has been completed for the new area. It is proposed to use ACO channels and connect to the existing storm water drainage network. The closest outfall will be encompassed by the new reclamation works, and so the drainage will connect to this and the outfall will be extended out. There is no increase in storm water runoff to the Port because of the development. An application will be made to the SuDs Approving Body (SAB) as part of the planning application.
		• Waterlogging and erosion leading to destabilisation; • Greater mobilisation of pollutants in soil/ground causing premature deterioration of materials; • Damage to structures due to increased runoff;	• Mitigation measures that would be applied in line with a number of Technical Guidance Notes (TGNs), good practice guidance documents available from the Natural Resource Wales website and by organisations such as CIRIA for site environmental management. • Following flooding events or heavy rainfall, debris removal and channel clearing would be carried out (information included within the CEMP).
Temperature	Extreme temperature events	• Deformation and melting of paved surfaces.	• The materials proposed are standard materials which have been developed for use in the UK. Asphalt in its very nature is highly susceptible to temperature variations. The design team can take into account the traffic loading and likelihood for deformation and early failure. This is then mitigated, as far as practicable, by choosing the best asphalt mix, considering aggregate interlock and the use of additives to withstand deformation as much as possible.
		• Loss of vegetation cover due to scorching leading to destabilisation	• Structures are designed in accordance with the Euro Codes, taking into account the requirements of the DMRB, for a design working life of 120 years.

Weather Event	Climate Hazard	Potential Impact	Mitigation
		• Overheating of electronic equipment and fire • Faster rate of deterioration of materials from increase in UV radiation e.g., fading, brittleness	• Equipment will be designed and constructed of materials which will mitigate the effects of damage and corrosion from weather, salt and traffic pollution. Suitable weather protection will be provided where applicable.
Wind and Storms	Gales and extreme wind events; and Storms (hail, lightning)	• Damage from high winds and rain-infiltration into surfaces and materials; • Windborne dust and debris clogging drainage channels and requiring clearing; • Trees blown down and increase in debris;	• Structures are designed in accordance with the Euro Codes, taking into account the requirements of the DMRB, for a design working life of 120 years. • The ongoing maintenance would involve a wide range of planned and reactive activities and will include regulation inspection and cleaning of all surface water drainage features so to remove a build-up of roadside slit and debris, typically annually.

22.10.2 Operational Phase Mitigation Measures

No significant adverse effect on the development due to climate change during operation is predicted. No mitigation measures are therefore suggested.

22.10.3 Future Monitoring

No project specific monitoring is proposed for climate during the construction or operational phases of the proposed development.

22.11 Assessment of Residual Effects

22.11.1 Construction Phase

Following consideration of the essential mitigation measures identified in Section 22.10.1, it is concluded that there would be no residual significant effects.

22.11.2 Operational Phase

It has been identified that there would be no residual significant effects for operation.

22.12 Cumulative Effects

22.12.1 In-combination effects

As stated by IEMA (IEMA, 2017), all GHG emissions are considered significant and therefore will contribute to climate change. The cumulative GHG emissions would not just be limited to the cumulative schemes listed, as the receptor of the GHG emissions assessment is the global climate, with the Wales National Carbon Budget used as a proxy. Consequentially, whilst any GHG emissions across the UK could be considered to have cumulative effects with the GHG emissions of the Proposed Development, the assessment methodology has by default already covered this wider perspective.

The cumulative impact of carbon emissions arising from global human activity is “High”. This is true to the nature of climate change as a global, cumulative problem. As committed developments have been assessed through the cumulative vehicular transport scenarios, the potential inter-scheme cumulative effects during the operational phase of the development have already been considered.

It is assumed that all committed developments will be required to meet relevant standards for emissions reduction and to comply with related planning policy. On this basis, it is considered appropriate to assume that any applications that are consented include ‘reasonable’ measures to avoid, reduce and /or offset the generation of greenhouse gas emissions and therefore that no significant cumulative effects are anticipated.

22.12.2 Effects interactions

All environmental factors are inter-related to some extent. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions may be influenced by the Proposed Development. An assessment of the interaction between environmental factors are required under Article 3(1)(e) of the EIA Directive –1. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

a) Population and human health;
b) Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
c) Land, soil, water, air and climate;
d) Material assets, cultural heritage and the landscape;
e) The interaction between the factors referred to in points (a) to (d).

The interactions between impacts on different environmental factors will be considered, addressed and

Climate is most likely to have an inter relationship with the following chapters:

- Chapter 12 Flood Risk– interaction between climate change and flooding. Flood risk assessments are presented in Chapter 12.
- Chapter 15 Air Quality – interaction between climate change and air quality emissions. Air Quality assessments are presented in Chapter 15.
- Chapter 19 Traffic & Transportation – emissions from vehicles during construction and operational phases. Traffic data details are presented in Chapter 19.

22.13 Limitations of the Assessment

To ensure transparency within the EIA process, the following limitations and assumptions have been identified in the subsections below.

22.13.1 Greenhouse Gases

- In EIA, there is currently no specific carbon emissions threshold, which, if exceeded, is considered significant. Professional judgement and current guidance have been used to derive findings in this assessment;
- This assessment has been completed based on current available information regarding the scale and nature of the Proposed Development. The type and quantities of materials and waste, planting schemes, excavation, and traffic data provided at this stage are not available at this design stage.

22.13.2 Climate Vulnerability and Resilience

- The UKCP18 projections have been used to infer future changes in a range of climate variables that may affect the resilience of the Proposed Development to climate change. At the time of writing, these represent the most up-to-date representation of future climate in the UK. However, the UKCP18 data currently available does not provide data for drought, snow and ice or wind;
- There are inherent uncertainties associated with climate projections and they are not predictions of the future. It is possible that future climate will differ from the future baseline climate against which the resilience of the Proposed Development has been assessed, depending on global emissions over the next century. A ‘high’ emissions scenario (RCP 8.5) using the 2080s time slice (2070 – 2099 - the longest temporal scale available through UKCP18) has been used to develop the baseline against which resilience has been assessed. This is consistent with the precautionary principle (i.e. ‘worst case’ scenario); and
- Any further research, analysis or decision-making should take account of the accuracies and uncertainties associated with climate projections. It is also important to note that the analysis is based on selected observational data, the results of climate model ensembles and a selected range of existing climate change research and literature available at the time of the assessment. Any future decision-making based on this analysis should consider the range of literature, evidence and research available at that time and any changes to this.

22.14 Summary of Effects and Conclusion

22.14.1 Greenhouse Gases

IEMA guidance suggests that all GHG emissions are significant in the absence of any significance criteria or defined threshold. In the absence of agreed thresholds for what level of GHG emissions is considered significant in an EIA context, IEMA guidance and professional judgement including previous experience of similar developments have been used to assess the magnitude of change based on schemes of a similar size and nature.

Based on professional judgement, the overall GHG emissions generated from the Proposed Development has been suitably mitigated to reduce the likelihood of such an event having a significant adverse impact. In short, the vulnerability of the works to climate change has been suitably mitigated and the potential impact is considered to be minor adverse for the construction and operational phase.

22.14.2 Climate Vulnerability and Resilience

Throughout the lifespan of the Proposed Development, climate variables over time are expected to become more inconsistent and intense. Precipitation is likely to increase in winter and decrease in summer, increasing the likelihood of flooding in winter and droughts in the summer.

In the absence of essential and embedded mitigation, effects during the construction and operation phase will be significant, particularly surrounding the impacts caused by increased precipitation and associated extreme events. This assessment has concluded that with all embedded and essential mitigation included, there are no significant residual potential impacts from the climate variables assessed in this Chapter.

Table 22-17 summarises the impacts and effects of the climate change for the Proposed Development.

Table 22-17: Summary of Effects and Conclusion

Description of impact	Phase C	Phase O	Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Traffic	✓	✓	The project includes civil engineering works designed to accommodate modern vessels, which may incorporate cleaner technologies and fuels, further contributing to reduced carbon emissions. The overall aim is to create a more sustainable terminal that aligns with broader efforts to mitigate climate change and support the transition to lower-carbon maritime operations.	C: Low O: Low	C: High O: High	C: Minor adverse O: Minor adverse	None	None	None
Carbon	✓	×	To address carbon emissions at the Stena Line ferry terminal in Fishguard, Wales, the proposed project involves replacing the existing temporary linkspan structure with a floating linkspan pontoon, which is expected to enhance operational efficiency and reduce the carbon footprint associated with ferry operations.	C: Low O: Low	C: High O: High	C: Minor O: N/A	None	C: None O: N/A	None
Waste Management	✓	×	None	C: Low O: N/A	C: High O: N/A	C: Minor O: N/A	None	None	None
Shipping Emissions	×	✓	This upgrade aims to enhance operational efficiency and safety while facilitating future maintenance dredging, thereby ensuring that the terminal can accommodate modern vessels and potentially reduce emissions associated with ferry operations.	C: N/A O: Low	C:N/A O: High	C: N/A O: Minor adverse	None	None	None
Climate Change Resilience	✓	✓	To enhance climate resilience at the Stena Line ferry terminal in Fishguard, Wales, the proposed project includes the replacement of the existing temporary linkspan structure with a floating linkspan pontoon, which is designed to adapt to changing water levels and tidal conditions. This upgrade aims to improve operational efficiency and safety while ensuring that the terminal can accommodate modern vessels in the face of climate change impacts, such as rising sea levels and increased storm intensity.	C: Low O: Low	C: High O: High	C: Minor adverse O: Minor adverse	None	None	None

22.15 References

- Design Manual for Roads and Bridges (DMRB) LA 114 – Climate (June 2021)
- Future Wales The National Plan 2040
- IEMA Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (2022)
- IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (2020)
- Met Office UK Climate Averages (https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages)
- Our progress report on the Prosperity for All: A Climate Conscious Wales plan in December 2022.
- Pembrokeshire County Council Local Development Plan
- The Climate Change (Carbon Budgets) (Wales) (Amendment) Regulations 2021
- The Climate Change Act 2008 (2050 Target Amendment)
- The Climate Change Committee's third UK climate risk independent assessment (CCRA3-IA), published in June 2021.
- The UK National Atmospheric Emissions Inventory
- Wales' Greenhouse Gas Emissions 2021

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 23 Major Disasters and Accidents

794-NI-POR-00886R
May 2025

23 MAJOR DISASTERS AND ACCIDENTS

23.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the expected effects of the Fishguard Linkspan Replacement (hereafter referred to as “the Proposed Development”) deriving from the vulnerability of the Proposed Development to risks of major accidents and/or disasters.

Based on professional judgement, major accidents or disasters are events or situations that have the potential to affect the Proposed Development causing immediate or delayed serious damage to one or more of the following: human health, welfare, and/or the environment. This assessment considers the risks of major accidents and disasters (hereafter referred to as major events) during construction and operation caused by natural hazards or manmade hazards (including operational failure).

The assessment presented is informed by the following key chapters of the ES

- Chapter 2: Project Description
- Chapter 11: Water Quality;
- Chapter 12: Flood Risk;
- Chapter 19: Transportation
- Chapter 15: Air Quality

These chapters provide a broader environmental context to the risks associated with these event types. These chapters also outline the proposed measures to prevent or mitigate significant effects and details of the preparedness for, and proposed response to emergencies.

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

23.2 Purpose of this chapter

The primary purpose of the ES chapter is to provide a high-level assessment of the expected significant adverse effects of the Project deriving from major accidents and disasters. In particular, this ES chapter:

- Presents the existing environmental baseline established from desk studies, relevant datasets and consultation (section 23.8);
- Identifies any limitations encountered in compiling the environmental information;
- Presents a high-level impact assessment of the demolition, construction and operation phases of the Proposed Development based on the information gathered and the analysis and assessments undertaken in section 23.9.
- Highlights any necessary monitoring (section 23.10) and/or measures to prevent, minimise, reduce or offset the likely significant environmental effects identified in the assessment.

23.3 Study Area

23.4 Policy Context

The consideration of risk of major accidents and/or disasters has followed the overall methodology and guidance relating to the EIA process and preparation as set out in Chapter 4 EIA methodology. This section summarises the legislation, policy, and guidance applicable to the major events assessment.

23.4.1 EU legislation and policy

The EIA Directive 2014/52/EU sets out the requirements to consider the vulnerability of a project (or Development) to either major accidents or disasters. The Directive requires *"a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment."*

Reg 5(2) and (3) of the EIA Regs:

5(2) The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of the proposed development on the following factors —

(a)population and human health;

(b)biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC(16) and Directive 2009/147/EC(17);

(c)land, soil, water, air and climate;

(d)material assets, cultural heritage and the landscape ; and

(e)the interaction between the factors referred to in sub-paragraphs (a) to (d).

(3) The effects referred to in paragraph (2) on the factors set out in that paragraph shall include—

(a)the operational effects of the proposed development, where the proposed development will have operational effects; and

(b)the expected effects deriving from the vulnerability of the proposed development to risks of major accidents or disasters that are relevant to the proposed development.

Schedule 4 para 5 of the EIA Regs –

5. A description of the likely significant effects of the development resulting from, inter alia:…

(d)the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);…

The description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development…

Schedule 4 para 8 of the EIA Regs:

8. A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks to major accidents and/or disasters which are relevant to the development concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of the Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.

23.4.1.1 European Union Guidance 2017 – Environmental Impact of Project Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)

The 'European Union Guidance 2017 - Environmental Impact of Project Guidance on the preparation of the Environmental Impact Assessment Report' provides useful guidance on the key changes from Directive 2011/92/EU as amended by Directive 2014/52/EU specifically Annex IV point 8. It states that two key considerations relating to major events emerge under the new directive:

- The Project's potential to cause either accidents or disasters or both; and,
- The vulnerability of the Project to either potential disasters or accidents or both.

The guidance goes on to state that, after risks have been identified and assessed, measures to control and manage their significant impacts should then be taken, to ensure compliance with existing minimum prevention standards, safety requirements, building codes and improved land use planning, as well as others. It also states that measures should be captured in a coherent risk management plan that also includes sufficient preparedness and emergency planning measures.

23.4.1.2 Institute of Environmental Management and Assessment (IEMA), Major Accidents and Disasters in EIA: A Primer, September 2020

This primer from IEMA aims to increase appreciation of the major accidents and/or disasters EIA topic and its application. The document suggests an assessment methodology based on known current practice within the UK to date and identifies key terminology that can be used. It has been structured around a typical assessment approach and offers a proportionate method for considering major accidents and/or disasters through screening, scoping and assessment. Reference has been made to this document and the advice contained within in it in this Chapter.

23.4.2 National Legislation and Policy

23.4.2.1 Health and Safety at Work Act 1974

The Health and Safety at Work etc. Act 1974 provides the framework for the regulation of workplace health and safety in the UK. It places general duties on employers, people in control of premises, manufacturers, and employees. The overriding principle is that foreseeable risks to persons will be reduced so far as is reasonably practicable and that adequate evidence will be produced to demonstrate that this has been done, including:

- Securing the health, safety, and welfare of persons at work.
- Protecting persons other than persons at work against risks to health or safety arising out of or in connection with the activities of persons at work.
- Controlling the keeping and use of explosive or highly flammable or otherwise dangerous substances, and generally preventing the unlawful acquisition, possession, and use of such substances.

23.4.2.2 Defra (2011) ‘Guidelines for Environmental Risk Management Assessment and Management

The Defra (2011) ‘Guidelines for Environmental Risk Assessment and Management’ provide generic guidance for the assessment and management of environmental risks. A cyclical framework for risk management is provided which identifies four main components of risk assessment:

1. Formulating the problem
2. Carrying out an assessment of the risk
3. Identifying and appraising the management options available
4. Addressing the risk with a risk management strategy

23.4.2.3 Construction (Design and Management) Regulations 2015

The Construction (Design and Management) Regulations 2015 (CDM Regulations) place legal duties on almost all parties involved in construction work. The regulations place specific duties on clients, designers and contractors, so that health and safety is considered throughout the life of a construction project from its inception to its subsequent final demolition and removal.

Under the CDM Regulations, designers must avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards from the construction, cleaning, maintenance, and proposed use and demolition of a structure, reducing risks from any remaining hazard, and giving collective safety measures priority over individual measures.

23.4.2.4 The Control of Major Accidents Hazards (COMAH) Regulations 2015

The principal aim of the regulations is to reduce the risks of potential major accidents involving dangerous substances, such as toxic substances (e.g. chlorine), flammable substances (eg liquefied petroleum gas), substances that are environmentally hazardous, and explosives.

If dangerous substances re used or stored at the site in quantities above certain thresholds, COMAH requires operators to take all measures necessary to prevent major accidents and limit the consequences for human health and the environment.

A major accident could involve a release of substance, fire or explosion resulting from uncontrolled developments involving one or more dangerous substance that causes serious danger to human health or the environment, whether immediate or delayed, inside or outside the site.

As part of Scotland's competent authority, it is SEPA's duty to ensure that business and industry adhere to the regulations, and to investigate and report on major incidents.

23.4.2.5 The Welsh Marine Plan 2019

The Welsh National Marine Plan was published in 2019 with the vision that Welsh seas are clean, healthy, safe, productive and biologically diverse. The Plan sets out areas of potential sector resource around the coastline identifying Fishguard as an aquaculture: water column area.

General Policy SOC 03 to ensure a strong, healthy and just society seeks that developments minimise the risk of causing or contributing to marine incidents. This policy relates the non-diffuse, point sources of pollution such as oil or chemical sills and focuses on activities that involve the use, transportation or storage of fuels in the marine environment (whether operationally or as part of construction, maintenance or decommissioning). Proposals should consider the inherent risks of causing or contributing to a major incident and act to address these where possible.

Policy SOC 08 and 09 seeks that developments demonstrate resilience to coastal change and flooding. Proposals should appropriately assess the risk of coastal change and flooding.

23.5 Consultation

No consultation responses are associated with this chapter.

23.6 Methodology to inform the baseline

23.6.1 Desktop study

Information on Natural Disasters and Accidents within the Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 23-1 Summary of key desktop reports. These sources provide the most up to date data for this assessment.

Table 23-1 Summary of key desktop reports.

Title	Source	Year
British Geological Survey (BGS)	National Landslide Database	2020
Review of 2024: Multiple records broken in a year of mixed weather	Met Office	2024
Stena Line Fishguard – Rosslare timetable	Stenaline	2025

Public Information on establishments subject to COMAH 2015	Health & Safety Executive	2015
South Wales Gas Pipeline	www.Offshore-technology.com	2008

23.6.2 Site-specific surveys

No site-specific baseline surveys were undertaken as part of the assessment for major accidents and disasters. The baseline data presented in this section is derived from the above sources and may be taken as representative of the background conditions.

23.7 Assessment Methodology

The methodology and associated impact assessment had regard to the general guidance regarding the undertaking of an EIA, as presented in Chapter 4: Environmental Impact Assessment Process and Methodology Impact assessment criteria and as set out in Major Accidents and Disasters in EIA: A Primer (IEMA, 2020).

A methodology was adopted to systematically identify all potential risks, pathways for adverse effects to occur and suitable controls (for identified risks). This was broadly based on accepted technical risk assessment methods which allow the identification of risks, pathways, sensitive receptors and if required barriers/controls to mitigation risk to an acceptable level.

A review was undertaken of baseline conditions to identify existing facilities or natural features or scenarios (such as flooding) which could lead to risk events with associated major accident or hazard in combination with the Proposed Development. These developments were then screened to identify if any specific risk events required further consideration. This process also identified those, which could be screened out as not having a significant risk to retained proportionality and focus within the assessment.

The screening process considers if the risk event has a pathway and receptor so that if it occurred it would be expected to result in significant effects. Scoping was undertaken in more detail to determine whether there is potential for significant effects as a result of major accidents and disasters. The assessment stage provides further understanding on the likelihood of a risk event occurring and identifies the requirement for further mitigation.

23.7.1 Impact Assessment

Unlike other assessment within the EIA, the assessment does not deal with likely effects. The scope of this assessment focuses on potential events of low likelihood, which may reasonably occur, resulting in major negative impacts on receptors. This approach directs the assessment to focus on ‘low likelihood but potentially high consequence events’ such as a major spill, explosion or fire. Smaller incidents (spills, sediment loss) are addressed elsewhere in this EIA in the relevant topic chapters. This chapter focuses on major events only.

The IEMA (2020) approach defines a ‘*significant environmental effect’* as one which ‘*could include the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through major clean up and restoration’*.

The assessment then considered what activities could result in an adverse impact during construction / operation/ decommissioning and what barriers or embedded mitigation are in place to prevent the source pathway receptor risk from occurring. Finally, the assessment sought to identify any 'escalation factors' which could compromise the integrity of embedded mitigation and therefore any significant residual risks and accordingly the need for further mitigation / monitoring.

This assessment does not explicitly consider the decommissioning stage of the Proposed Development on the basis that the assessment of construction stages effects (and the need for any mitigation) effectively forms a more conservative scenario.

23.7.2 Sensitivity of Receptor

The environmental receptors are identified as those listed within Article 3 of the EIA Directive.

23.7.3 Magnitude of Impact

In the context of this chapter, typical methods employed within EIA to define magnitude are not applicable. By definition, a major accident or disaster would be a significant effect on the environment. Accordingly, any risks that could result in a major accident or disaster without suitable mitigation, management or regulatory controls in place will be assessed as significant.

23.7.4 Significance of Effect

Following screening and scoping, the potential risk of identified hazards brought forward into the assessment are then evaluated using criteria outlined in Table 23.2 Classification of Likelihood of Occurrence, Table 23.3 Consequence of Impact and Table 23.4 Risk Matrix, which have been adapted from the following:

- National Risk Register 2025[1] (Cabinet Office, 2025); and
- Major Accidents and Disasters in EIA: A Primer (IEMA 2020)

Table 23.2 Classification of Likelihood of Occurrence

<table>
<tr><th>Score</th><th>Percentage Change</th><th>PHIA Yardstick Designation</th></tr>
<tr><td>1</td><td><0.2%</td><td rowspan="3">Remote chance (0-5%)</td></tr>
<tr><td>2</td><td>0.2-1%</td></tr>
<tr><td>3</td><td>1-5%</td></tr>
<tr><td>4</td><td>5-25%</td><td>Highly unlikely (5-25%)</td></tr>
<tr><td>5</td><td>>25%</td><td>Almost certain (95-100%)
Highly likely (80-90%)
Likely or probable (55-75%)
Realistic probability (40-50%)
Unlikely (25-35%)</td></tr>
</table>

Table 23.3 Consequence of Impact

Rating	Classification of Potential Impact (Cabinet Office, 2023)	Significance of Effects (IEMA 2020)	Description

[1] National Risk Register 2025 - GOV.UK

1	Very Low Impact	Slight	Fatalities - 1-8 Casualties - 1-18 Economic cost - Millions of £
2	Low Impact	Moderate	Fatalities - 9-40 Casualties - 17-80 Economic cost - Tens of millions £
3	Moderate Impact	Significant	Fatalities - 41-200 Casualties - 81-400 Economic cost - Hundreds of millions £
4	High Impact	Very Significant	Fatalities - 201-1,000 Casualties - 400-2,000 Economic cost - Billions of £
5	Very High Impact	Profound	Fatalities - >1,000 Casualties - >2,000 Economic cost - Tens of Billions £

Hazards scoped in are evaluated and categorised using a risk matrix, developed using the approach and information outlined in both the national risk assessment documents, provisions outlined in the IEMA primer, and the National Risk Register 2025.

This matrix is used to determine the level of significant of each risk for each hazard scenario. Risks have been grouped in three categories outlined in Table 23.4 Risk Matrix, red refers to ‘high risk’ scenarios that have an assessment score between 15 – 25, orange refers to ‘Medium Risk’ scenarios that score between 8 – 12, and green refers to ‘Low Risk’ scenarios scoring between 1 – 6.

Table 23.4 Risk Matrix

		Consequence of Impact				
		1 – Slight	**2 – Moderate**	**3 – Significant**	**4 – Very Significant**	**5 – Profound**
Likelihood	**5 – Very Likely**	5	10	15	20	25
	4 – Likely	4	8	12	16	20
	3 – Unlikely	3	6	9	12	16

	2 – Very Unlikely	2	4	6	8	10
	1 – Extremely Unlikely	1	2	3	4	5

23.8 Baseline Environment

23.8.1 Context

Major accident and disaster risk relevant to the baseline in the absence of the Proposed Development include incidents involving natural gas, extreme weather events, associated flooding, road traffic collisions and accidental spillages. Baseline 'without project' conditions are described in the relevant chapters as follows Chapter 11 Water Quality, Chapter 12 Flood Risk & Drainage, Chapter 22 Climate and Chapter 19 Traffic & Transportation and are not repeated in this chapter in full.

23.8.2 Baseline Conditions

A review was undertaken of baseline conditions to identify existing facilities or natural features or scenarios (such as natural gas or flooding) which could lead to risk events with associated major accident or hazard in combination with the Proposed Development. These developments were then screened to identify if any specific risk events required further consideration. This process also identified those, which could be screened out as not having a significant risk to retained proportionality and focus within the assessment.

The baseline assessment sought to identify features (or sources of risk) within the existing environment that could be sources for major accidents and hazards comprising:

- local features external to the order limits that contribute a potential source of hazard to the Proposed Development;
- existing infrastructure and the built environment;
- baseline major accident and natural disaster risks (that exist with or without the Proposed Development).

The wider EIA topic baselines have been used to consider sensitive receptors at risk from the effects of the Proposed Development deriving from its vulnerability to major accidents or disasters for instance:

- members of the public and local communities;
- the natural environment, including ecosystems, land and soil quality, air quality, surface and groundwater resources and landscape.

The main risk sources identified have been divided into the following categories:

- Existing infrastructure and facilities (on both how they may impact the Proposed Development and how the Proposed Development may impact them); and,
- Wider natural disaster and hazard risks – for instance flood risk.

23.8.2.1 Existing Environment

The land is within the existing harbour of Fishguard comprising 36 hectares of the harbour to include an existing linkspan/pontoon, hinterland and within the bay foreshore. The Port was originally created in the 1910’s by reclaiming land at the base of the headland and is enclosed by steep cliff faces. The harbour itself includes a breakwater, a RNLI Lifeboat station and pontoon for Stena line public and freight ferry for a twice daily service to Rosslare, Ireland and the Fishguard train station. The berth is also infrequently used by cruise vessels and historic steamboats. The site is accessed from the A40/Station Hill to the south.

Figure 23-1 Site Location

23.8.2.2 COMAH Establishments

In Wales, the COMAH Regulations 2015 place an obligation on the operators of establishments that store, handle or process dangerous substances above certain thresholds to take all necessary measures to prevent major accidents and to limit the consequences for human health and the environment. Under the Regulations, a COMAH establishment may qualify as upper tier or lower tier, depending on the inventory of dangerous substances; sites that store, handle or process dangerous substances below a certain threshold do not qualify as establishments under the Regulations.

Lower Tier Establishment means an establishment where a dangerous substance is present in a quantity equal to or in excess of the quantity listed in the entry for that substance in *"column 2 of Part 1 or in column 2 of Part 2 of Schedule 1, but less than that listed in the entry for that substance in column 3 of Part 1 or in column 3 of Part 2 of Schedule 1, where applicable using the rule laid down in note 4 of Part 3 of that Schedule"*.

There are no COMAH establishments located within 3km of Fishguard Harbour. There are 5 top tier COMAH sites located in Pembrokeshire,

Table 23.5 COMAH Establishments

Name	Tier	Location	Approx. Distance from Proposed Development
Puma	Upper Tier	Milford Haven	37km
Valero	Upper Tier	Pembroke	55km

Valero Pembrokeshire Oil Terminal	Upper Tier	Waterson	36km
Dragon LNG	Upper Tier	Waterson	36km
South Hook LNG	Upper Tier	Herbranston	38km

23.8.2.3 Offshore Infrastructure

There are no offshore gas pipelines directly linked to the Proposed Development location.

23.8.2.4 Onshore Infrastructure (built)

The South Wales gas pipeline owned by National Grid plc is 316km long stretching from Milford Haven approximately 37km to the south of the Proposed Development, to Tirley in Gloucestershire.

23.8.2.5 Shipping and Navigation

The existing harbour serves the south-west of Wales and is owned by Stena Line and Pembroke Council. Stena Line ferry terminal provides passage to Rosslare in Ireland. The harbour is also used by the RNLI who have a lifeboat station located on the quay, at the northern breakwater. Alongside the ferry route there are ad hoc cruise vessels frequenting the harbour.

Table 6 Indicative Cruise Vessel Programme

FISHGUARD CRUISE VESSEL PROGRAMME 2025 Amended :

	Name of Ship	Line	Agents	Arr Date	Dep Date	Arr Time	Dep Time
1	Ocean Albatross	ANGLO-EASTERN	Denholms	05/05/2025	05/05/2025	09:00	15:00
2	Aidaluna	Aida	ISS	15/05/2025	15/05/2025	09:30	19:30
3	Le Boreal	Ponant	GAC	19/05/2025	19/05/2025	12:00	23:00
4	Seabourn Sojourn (SJ)	Seabourn	Denholms	04/06/2025	04/06/2025	08:00	17:00
5	Aidasol	Aida	ISS	05/06/2025	05/06/2025	06:30	15:30
6	AIDAluna	Aida	ISS	06/06/2025	06/06/2025	09:30	19:00
7	Corinthian	Grand Circle	GAC	09/06/2025	09/06/2025	09:00	19:00
8	Waveley	Waveley Steam Navigation		24/06/2025	24/06/2025	09:30	18:00
9	Silver Shadow	Silverseas	Denholms	28/06/2025	28/06/2025	08:00	19:00
10	Aidasol	Aida	ISS	17/07/2025	17/07/2025	06:30	15:30
11	Corinthian	Grand Circle	GAC	17/07/2025	17/07/2025	09:00	19:00
12	Corinthian	Grand Circle	GAC	19/07/2025	19/07/2025	09:00	19:00
13	Hebridean Princess	HIC	Denholms	26/07/2025	28/07/2025	21:30	06:00
14	Aidabella	Aida	ISS	08/08/2025	08/08/2025	10:00	20:00
15	Le Bellot	Ponant	GAC	24/08/2025	24/08/2025	23:00	13:00
16	Le Bellot	Ponant	GAC	24/08/2025	25/08/2025	19:00	20:00
17	Hebridean Sky	Noble Caledonia	Denholms	25/08/2025	25/08/2025	08:00	18:30
18	Seven Seas Grandeur	SS	Denholms	25/08/2025	25/08/2025	07:00	16:00
19	Corinthian	Grand Circle	GAC	26/08/2025	26/08/2025	09:00	19:00
20	Corinthian	Grand Circle	GAC	28/08/2025	28/08/2025	09:00	19:00
21	Le Bellot	Ponant	GAC	01/09/2025	02/09/2025	23:00	20:00
22	Silver Spirit	Silverseas	Denholms	06/09/2025	06/09/2025	08:00	19:00
23	Hebridean Princess	HIC	Denholms	11/09/2025	13/09/2025	19:30	17:30
24	Corinthian	Grand Circle	GAC	15/09/2025	15/09/2025	09:00	19:00
25	Aidasol	Aida	ISS	27/09/2025	27/09/2025	06:30	15:30
26	World Voyager	Atlas	Denholms	10/10/2025	10/10/2025	08:00	18:00

The Stena Line linking Wales and Ireland is operated by the vessel Stena Nordica which is a Ro-Pax ferry owned by Stena Line. The carrying capacity for this vessel is 699 passengers, 222 berths, 375 cars, 1949 lane metres and 4,768 Deadweight tonnage.

The Fishguard – Rosslare connection run with 2 crossings a day, with their timetables summarised below in

Table 23.7 Ferry Timetable

Departure	Arrival	Ferry
01:30 (Fishguard)	05:30 (Rosslare)	Stena Nordica
14:00 (Fishguard)	17:00 (Rosslare)	Stena Nordica
08:15 (Rosslare)	11:45 (Fishguard)	Stena Nordica
19:30 (Rosslare)	23:00 (Fishguard)	Stena Nordica

23.8.2.6 Natural Hazards

The future baseline for major accidents and disasters will evolve along a number of factors over the Proposed Development lifecycle. The anticipated impact on climate change on environmental conditions is considered further in Chapter 15 Air Quality and Chapter 22 Climate Change.

Climate change is predicted to lead to a number of changes including: an increase in peak rainfall intensities and resulting flood flows over time, with wetter winters and drier warmer summers; a rise in sea level. It is anticipated that there will be an increased frequency of lightning strikes and wind gusts. Climate change is expected to alter the prevalence of extreme weather conditions which could lead to disaster during different project phases (e.g. increased wind gusts impacting the construction phase or increased lightning strike frequency increasing risks during the operation and maintenance phase).

The magnitude of changes brought about by climate change is uncertain, but UK climate projections (UK CP18) are available until the end of the 21st century.

The effects of climate change on anticipated weather conditions within the construction phase are anticipated to be minimal.

There could be changes in land or water use in the surrounding environment; water use and climate change factors could impact the local ecology and associated environmental designations. These changes are anticipated to be gradual in nature and as there is minimal potential for major accidents during the all-project phases, this is unlikely to have a significant impact.

Wales’s geographic position means it is less vulnerable to extreme disasters and hazards such as earthquakes or tsunamis, which might pose risk to projects/schemes of this nature and scale in other locations. However, in recent times there has been an increase in the number of severe weather events in the country, particularly those leading to flooding and flash flood incidents.

The effects of these weather events are wide ranging and include heavy rainfall resulting in flooding (pluvial, fluvial and coastal), damaging gusts due to violent winds, periods of extreme heat resulting in gorse fires, roads melting, hose pipe ban, impact on delivery of services, and extreme cold resulting in extreme frost conditions and heavy snowfall in locations across the county.

Substantial development of technology during the lifetime of the Proposed Development is anticipated. This could include advances in power generation, power transmission, and decommissioning/maintenance techniques. These may reduce the risk posed to safety and the environment further. However, changes in technology may also introduce new hazards that would need to be managed at the appropriate time and through the appropriate process.

The framework in place is based upon risk assessment and risk management principles which are flexible and adaptable to changing context and environmental factors but will ensure that the risk of major accidents and disasters is reduced as low as reasonably practicable. Other potential extreme natural hazards such as earthquakes, volcanoes, tsunamis, etc. are not relevant to the baseline hazard conditions in the vicinity of the Proposed Development.

23.8.2.7 Extreme Weather Events

Wales has already experienced changes in climate, and these are projected to continue and intensify. Extreme weather is typically categorised as a weather event that significantly differs from usual or average weather patterns. The term “storm” is typically applied to severe atmospheric events, currently, however, there is no official meteorological definition.

Met Office records show that these events are becoming more frequent, with notable extreme events affecting Wales during 2024 as outlined in below in Table 23.8 Extreme Weather Events

Table 23.8 Extreme Weather Events

Event	Date	Impact
Storm Darragh	December 2024	High wind speeds Intense rainfall
Storm Bert	November 2024	Heavy Rain Snowfall Strong Winds
Storm Ashley	October 2024	Strong Winds
Record breaking temperature	February 2024 May/Spring 2024	Warmest on record

Details on historic extreme weather events and their impact is considered further in Chapter 22 Climate Change.

23.8.2.8 Flooding

Fishguard/Goodwick are small towns on the shores of the Irish Sea. The are is located within the Pembrokeshire County Council and in proximity to the Pembrokeshire Coast Park. The main source of flooding is coastal flooding, however there are also risks from river and surface water flooding. Further details on flood risk and its impact is considered further in Chapter 12 Flood Risk.

23.8.2.9 Geohazards

Using the British Geological Survey (BGS) National Landslide Database, no landslides have been recorded in close proximity to the Proposed Development site. The nearest landslide event recorded was between Carmarthan and Fishguard Harbour in 2015. The trigger of this geohazard event is unknown. The environs of the Proposed Development is not considered to be at risk from geohazards such as landslides and Wales in general is not prone to seismic activity.

23.9 Impact Assessment

23.9.1 Do Nothing Scenario

With respect to the risk of major disasters and/or accidents, the ‘Do nothing’ scenario means that there are no changes to existing infrastructure or utilities as a result of the Proposed Development. Therefore, there would be a Neutral impact on the risk of major disasters and/or accidents under the ‘Do Nothing’ scenario.

23.9.2 Assessment of Construction Effects

Major accidents and disasters to which the Proposed Development may be vulnerable during construction and the outcomes of the assessment are summarised in each specific ‘area’ of the Proposed Development has been considered, both separately and together.

Site clearance and structures to be demolished in shown below in Figure 23-2 Site clearance and demolition.

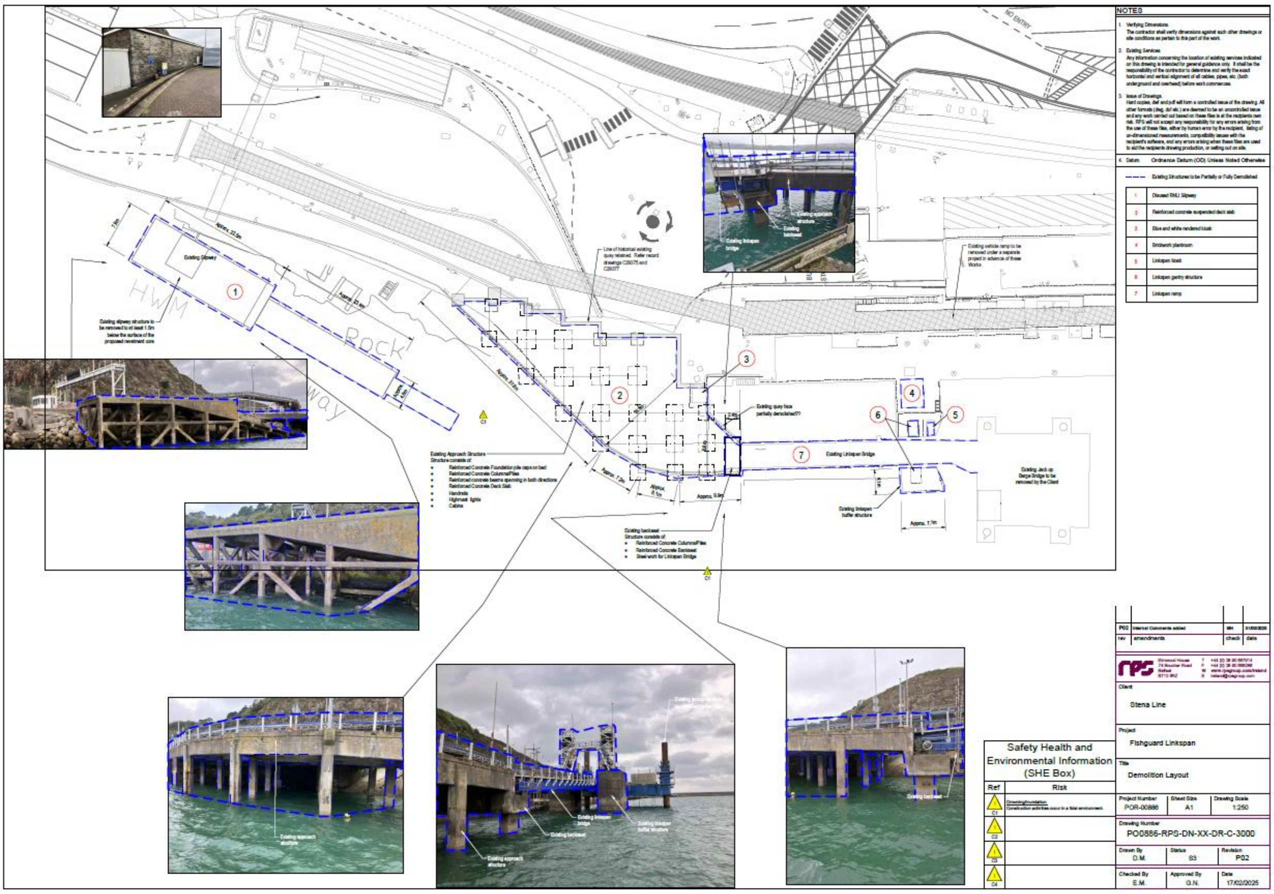


Figure 23-2 Site clearance and demolition

All risk events identified have been considered, but only those, which could impact a receptor and have the potential to be a major accident or disaster, have been included in the assessment. These are presented in Table 23.9 Construction Phase screening, risk events and mitigation and management measures.

Table 23.9 Construction Phase screening, risk events and mitigation and management measures

Feature	Source of Hazard	Consequence	Embedded Mitigation & Risk Management	Additional recommendation to reduce risk further	Risk Evaluation Likelihood	Potential Impact	Level of significance
Building Infrastructure	Construction plant collision risk or incidents during the process. Extreme weather has potential to impact construction.	Potential for injuries / fatality	Follow appropriate health and safety construction method statements. Employment of approved contractor (s). Construction will not be undertaken where weather warnings are in pace affecting Fishguard.	Further health and safety measures relating to construction plant are outlined in Appendix 2.A OCEMP.	3	1	3 – Low
Additional HGV traffic on road network	Additional HGV traffic mixing with other road users.	Potential injury or fatality to a member of the public	Traffic Management Plans if required for specific busy times during delivery or other sire activities. Assessment of Transport is provided in Chapter 19 of the EIA.	No further requirements	3	2	6 – Low
Flood Risk	Presence of construction materials, equipment and potential contaminants.	Potential release of contaminants onto environmental receptors (for instance surface water (rivers) or ground water) outside construction site	Mitigation measures will be adopted as set out in the Outline CEMP. An emergency response plan for the construction phase to minimise the consequences should the risk occur – this is set out in the CEMP and will be adopted by the appointed contractor. Please refer to Appendix 2.A Outline CEMP	No further requirements	2	3	6 – Low
Release of Pollutants into water bodies, water supply and sensitive ecological receptors	Proximity to Sea and Dredging.	Accidental spillage or release or contaminated materials, or sediment laden run off; effecting sea.	To minimise spillages all oils, solvents, paints and other potential contaminates used during construction will be stored within suitably designed bunded areas. All chemical and fuel filling locations will be contained within bunded areas. On site facilities including surface and foul water collection will be designed and provided at both site compounds to	No further requirements	2	3	6 – Low

			manage surface water and foul water arising from the compounds.				
Utilities – Risk of striking watermains supply	Construction ground works	Potential minor injury for nearby personnel and potential displacement of local residences and business in the event of flooding. Potential to disrupt water supply. Clean mains water supply so no potential for contamination.	Mitigation by avoidance will be the primary mitigation measure during the construction and operational phase of the Proposed Development. This will be applied to avoidance of utilities such as underground services and pipes. Construction will be made with utility providers to determine the location of services prior to commencement of works.	No further requirements	2	2	4 – Low
Existing foul and storm water and existing combined sewer infrastructure	Incidents during construction ground works. Contractor error.	Potential release of contaminants onto environmental receptors (for instance surface water (rivers) or ground water) or sea water outside construction site	An Ecological Clerk of Works (EcoW) should be employed to provide advice both pre-construction and during construction in relation to relevant legislation relating to proposed works to provide advice on the timing of works and the implementation of mitigation and enhancement measures; to monitor identified works; and to produce site inspection reports. In accordance with BS 42020:2013 Biodiversity, and EcoW is a person who has the qualifications, training, skills, and relevant experience to undertake appropriate monitoring and to provide specialist advice to site personnel on the necessary working practises required to safeguard ecological features on site and to aid compliance with any consents and relevant wildlife legislation (BSI 2013).	No further requirements	2	2	4 - Low

Shipping and Navigation Collision: risk of physical impacts from other existing navigation and shipping vessels (collision/Allison)	Other navigational and shipping vessels operating in the area	Physical damage to project vessels and infrastructure. Potential significant impact on water quality through fuel/chemical loss and subsequent impact on biodiversity. Potential for loss of life or serious injury.	Promulgation of information and warnings through Notice to Mariners and other appropriate Maritime Safety Information (MSI) dissemination methods. Project to undertake vessel traffic monitoring for all Project-related vessels throughout all phases of the Project. Safety zones and rolling advisory clearance distances to be implemented during construction, decommissioning and major maintenance activities.	Adherence to Stena Lines existing vessel and navigational management.	2	3	6 - low
Asbestos	Presence of asbestos in the building fabric	Potential risk to human health	Take reasonable steps to determine the location of materials likely to contain asbestos. Presume materials to contain asbestos, unless there are good reasons not to do so. Make and maintain a written record of the location of asbestos and presumed asbestos materials. Monitor the condition of asbestos and presumed asbestos materials. Assess the risk of exposure from the asbestos and presumed asbestos materials and document the actions necessary to manage the risk.	No further requirements	2	3	6 – low

23.9.3 Assessment of Operational Effects

Major accidents and natural disasters to which the Proposed Development may be vulnerable during operation (and maintenance) and the outcomes of the assessment are summarised in Table 23.10 Operational Phase Screening, Risk Events and Mitigation and Management Measures.

Each specific 'area' of the Proposed Development has been considered.

The table also includes the management and mitigation measures embedded in the Proposed Development to reduce these risks to as low as reasonably practicable. In all cases, compliance with legal and regulatory requirements is assumed as outlined in the embedded mitigation section.

Table 23.10 Operational Phase Screening, Risk Events and Mitigation and Management Measures

Feature	Source of Hazard	Consequence	Embedded Mitigation & Risk Management	Additional recommendation to reduce risk further	Risk Evaluation Likelihood	Potential Impact	Level of significance
Flood Risk	Extreme weather events	Potential damage to asset	Mitigation measures are required to ensure there is no increased risk to flooding to the Proposed Development or elsewhere once constructed.	No further requirements. Further detail in Chapter 12 – Flood Risk	2 – remote chance	3 – significant	6 – Low
	Land use has potential to increase flood patterns in area	Potential secondary effects on off-site environmental or anthropogenic receptors	Mitigation measures are required to ensure there is no increased risk of flooding to the Proposed Development or elsewhere once constructed.		2 – remote chance	3 – significant	6 – Low
Asset Failure	Risk of lightning strike leading to asset damage, including electrical failure, and potential subsequent fires/explosions.	A lightning strike could pose a major accident, harm to people and damage the infrastructure. A lightning strike could damage the distribution network, leading to damage to the national electricity transmission system. Lightning could also present a source of ignition to flammable materials. A subsequent major fire could harm people both offsite and onsite.	The engineering design of the Proposed Development will include appropriate electrical bonding and earthing systems. The design and maintenance of these systems will reduce the likelihood of a major accident being initiated by a lightning strike to a very low level.	Guidance is provided by the HSE on the management of potential ignition caused by lightning (HSE, 2014)	2 – Remote chance	3 – Significant	6 – Low
Navigation and shipping Collision: risk of physical impacts from other existing navigation and shipping vessels	Other navigation and shipping vessels operating in the area	Physical damage to project vessels and infrastructure. Potential significant impact on water quality through fuel/chemical loss and subsequent impact on biodiversity. Potential for	Project to undertake vessel traffic monitoring for all Project related vessels throughout all phases of the project. Safety zones and rolling advisory clearance distances to be implemented during major maintenance	No further requirements Adherence to Stena Lines existing vessel and navigational management	2 – Remote chance	3 – Significant	6- Low

(collision/Allision) impacting on all phases		loss of life or serious injury.	activities. Marker buoys and other aids to navigation. Development of an Emergency Response Cooperation Plan				

23.10 Mitigation – Construction/Operational and Future Monitoring

The assessment provided above has concluded that with the implementation of the measures included in the development (i.e. designed in and management measures, being the replacement of the existing linkspan pontoon or regulatory or industry standard practise requirement), that the development's vulnerability to risks of major accidents and/or natural disasters will not result in significant adverse effects on the environment. Therefore, no further measures are proposed.

23.11 Assessment of Residual Effects

There needs to be a general acceptance when conducting a major accident and/or disasters assessment that some risks, however unlikely, may still occur. Mitigation is therefore identified pre-event and post event to reduce the effects to an acceptable level. For those risks that cannot be completely designed out, emergency plans are available to provide the response in order to minimise the significance of any impacts. It is considered that there will not be any likely significant environmental effects arising from the vulnerability of the Proposed Development to major accidents and natural disasters, please refer to the Impact Assessment Section of this chapter for the assessment of effects.

23.12 Cumulative Effects

It is importance to consider effects, not just in isolation, but also cumulatively, as this may show that individually analysed impacts can become significant when they are added together, or with, other effects. The co-existence of impacts may increase or decrease their combined impact. Impacts that are considered to be insignificant, when assessed individually, may become significant when combined with other impacts. Cumulative effects can occur at different temporal and spatial scales. The spatial scale can be local, regional or global, while the frequency or temporal scale includes past, present, and future impacts on specific environment or region. Other projects can cumulatively increase the use of road network (both during construction and operational phases) but the management and control of the risk of accidents within this context is controlled by the design standards of the road and the governing authority (Transport for Wales).

There are no developments in close proximity that are considered to have a cumulative relationship with the Proposed Development. In summary, when considering the Proposed Development in combination with other proposed and consented developments within 5km of the Proposed Development, there will be no significant cumulative impacts.

23.12.1 In-combination effects

Future projects of large scale would need to conduct an EIA to ensure that there are no significant impacts as a result of the development.

23.12.2 Effects interactions

The EIA Regulations require that the EIA identifies , describes , and assesses the direct and indirect significant effects of the Proposed Development on population and human health, biodiversity, land, soil, water, air and climate, materials assets, cultural heritage and landscape and the interaction between these factors, arising from the vulnerability of the Proposed Development, there are interactions with Chapter 11 Water Quality, Chapter 12 Flood Risk, Chapter 22 Climate and Chapter 19 Traffic and Transport and Chapter 8 Marine Ecology. This is set out in Chapter 25: Interactions.

23.13 Limitations of the Assessment

The data used is the most up to date available information which can be obtained from the applicable data sources as cited. It is therefore considered that the data employed in the assessment is robust and sufficient for the purposes of the assessment presented. It is, considered that the information available provides a suitable basis for describing the baseline environment in relation to major accidents for EIA purposes.

23.14 Summary of Effects and Conclusion

Environmental effects associated with unplanned events that do not meet the definition of major accidents and/or natural disaster (e.g. minor leaks and spills that may be contained within construction sites) are addressed in the topic Chapters and not in this chapter.

23.15 References

- EIA Directive 2014/52/EU;
- European Union Guidance 2017 - Environmental Impact of Project Guidance on the preparation of the Environmental Impact Assessment Report';
- Institute of Environmental Management and Assessment (IEMA), Major Accidents and Disasters in EIA: A Primer, September 2020;
- Health and Safety at Work etc. Act 1974;
- Defra (2011) 'Guidelines for Environmental Risk Assessment and Management';
- The Construction (Design and Management) Regulations 205 (CDM Regulations);
- The Control of Major Accidents Hazards (COMAH) Regulations 2015; and
- The Welsh Marine Plan 2019
- National Risk Register 2025[2] (Cabinet Office, 2025);

[2] National Risk Register 2025 - GOV.UK

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 24 Shipping and Navigation

794-NI-POR-00886R
May 2025

24 SHIPPING AND NAVIGATION

24.1 Introduction

This chapter of the Environmental Statement (ES) provides an assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as "the Proposed Development") on shipping and navigation and the vulnerability of the Proposed Development to shipping and navigation factors. This chapter considers the potential impacts on shipping and navigation from the Project during the construction and operational phases of the Proposed Development.

The main objectives of this assessment are to:

- Undertake a desktop study of the existing shipping and navigation patterns to assess current environmental baseline conditions locally and nationally;
- Assess the potential impact of the proposed construction and operation phases of the Proposed Development on shipping and navigation; and
- Recommend mitigation measures in relation to the proposed construction and operational and phases, if necessary, and predict residual impacts.

The assessment presented is informed by the following key chapters of the ES

- Chapter 2: Project Description

Other aspects relevant to shipping and navigation are addressed in the specific chapters of the ES, namely:

- Chapter 23: Major Disasters and Accidents

The details and competencies of the specialist who prepared this chapter can be found in Chapter 1: Introduction of this ES.

24.2 Purpose of this chapter

The primary purpose of the ES chapter is to provide an assessment of the likely direct and indirect significant effects of the Project on climate. In particular, this ES chapter:

- Presents the existing environmental baseline established from desk studies, relevant datasets and consultation (section 24.8);
- Identifies any limitations encountered in compiling the environmental information (section 24.13);
- Presents an assessment of the potential likely significant effects on shipping and navigation arising from the Proposed Development (section 24.14) based on the information gathered and the analysis and assessments undertaken. An assessment of potential cumulative impacts is provided in section 24.12.
- Highlights any necessary monitoring (section 24.10.2) and/or measures to prevent, minimise, reduce or offset the likely significant environmental effects identified in the assessment (section 24.11).

24.3 Study Area

The shipping and navigation study area is considered to include water within Figure 24-1 Admiralty Chart of the Proposed Development seaward of the Mean High-Water Springs (MHWS). A wider shipping and navigation study area to consider cumulative impacts is defined as the Irish sea, including waters with 5km of the Proposed Development. This study area provides a local context to the analysis by capturing the relevant vessel routes and movements within and in proximity to the Proposed Development.

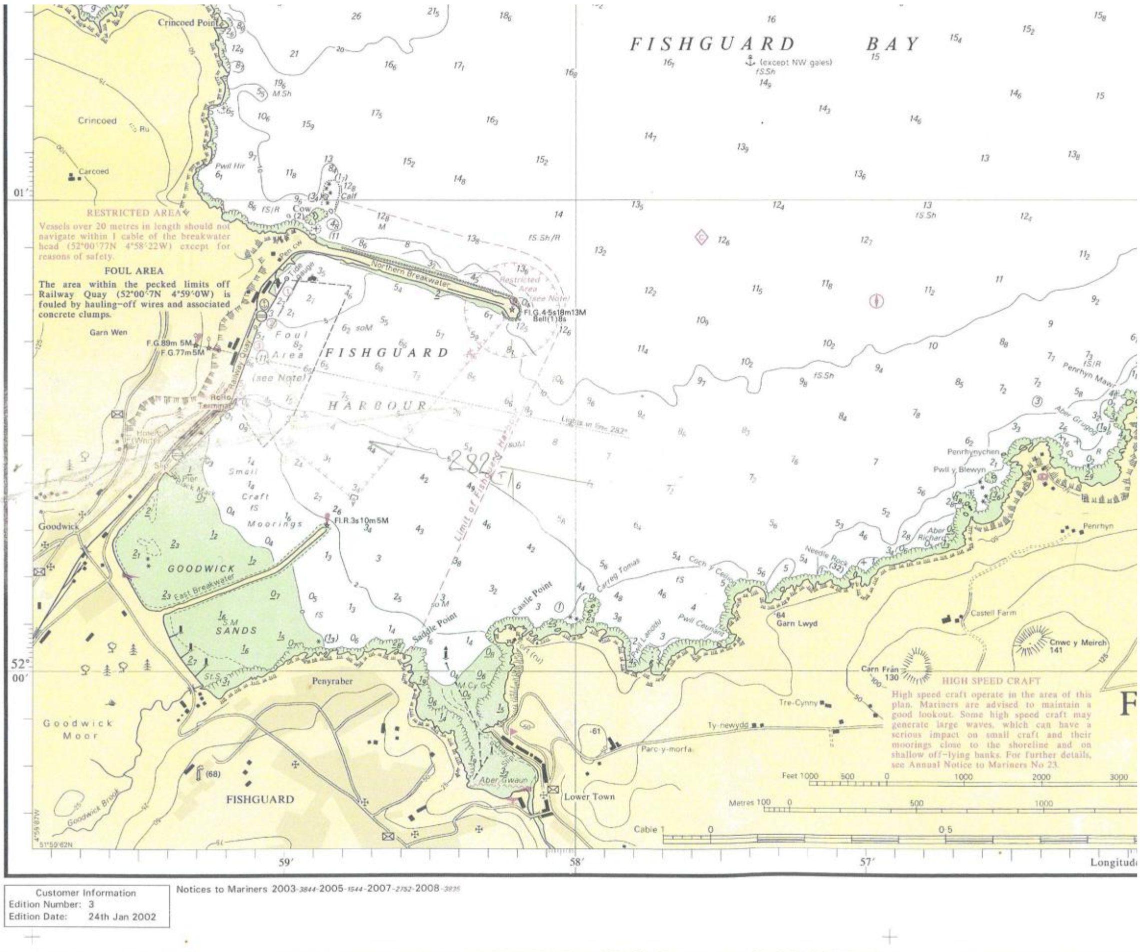


Figure 24-1 Admiralty Chart

24.4 Policy Context

24.4.1 EU legislation and Policy

- United Nations Convention on the Law of the Sea (UNCLOS) (United Nations) (UN), 1982;

24.4.2 National Legislation and Policy

- Convention on the International Regulations for Preventing Collisions at Sea (COLREGs) (International Maritime Organisation (IMO), 1972/77);
- Safety of Life at Sea (SOLAS) Chapter V (IMO, 1974)
- UK Martine Policy Statement (HM Government), 2011; and
- Wales National Marine Plan (Welsh Government)

24.5 Consultation

Table summarises the issues raised relevant to shipping and navigation, which have been identified during consultation activities undertaken to date, together with how these issues have been considered in the preparation of this ES chapter. Chapter 5: Scoping and Consultation provides details on the types of consultation activities undertaken for the Project between 5th November 2024 and 18th March 2025 and the consultees that were contacted.

Table 24-1: Summary of key consultation issues raised during consultation activities undertaken for the Project relevant to shipping and navigation.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
31.01.25	NRW PS Scoping Opinion	Requirement for shipping & navigation to be scoped in	Chapter 24 (this chapter)
31.01.25	NRW PS Scoping Opinion	Navigation Safety Plan & Vessel Management Plan	Stena Lines existing Navigational Safety and Vessel Management of Fishguard Harbour will apply
31.01.25	NRW PS Scoping Opinion	Consider impact on recreational users	Chapter 24, section 1.8 considers the baseline environment

24.6 Methodology to inform the baseline

24.6.1 Desktop study

Information on shipping and navigation within the Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in. These sources provide the most up to date data for this assessment.

Table 24-2 Summary of key desktop reports.

Title	Source	Year
Admiralty charts – Latest nautical charts for the study area	UKHO	2024
Incident Data – Locations and details of maritime accidents reported to MAIB	MAIB	
Incident Data – Locations and details of maritime incidents responded to by RNLI.	RLNI	

24.6.2 Site-specific surveys

No site-specific baseline surveys were undertaken as part of the assessment for shipping and navigation.

24.7 Assessment Methodology

The methodology and associated impact assessment had regard to the general guidance regarding the undertaking of an EIA, as presented in Chapter 4: Environmental Impact Assessment Process and Methodology.

24.7.1 Impact assessment criteria

Determining the significance of effects is a process that involves defining the magnitude of the impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 4: Environmental Impact Assessment Process and Methodology.

The criteria for defining impact magnitude in this chapter are outlined in below.

Table 24-3 Definition of terms relating to the magnitude of an impact.

Magnitude of impact	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).

The criteria for defining receptor sensitivity in this chapter are outlined in below.

Table 24-4 Definition of terms relating to the sensitivity of the receptor.

Sensitivity	Definition
High	High importance and rarity, national scale, and limited potential for substitution. Those affected will not be able to adapt to changes and continue to maintain-pre impact status.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution. Able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.
Low	Low or medium importance and rarity, local scale Those affected are able to adapt with relative ease and maintain pre-impact status.

Negligible	Very low importance and rarity, local scale Those affected are able to adapt easily and maintain pre-impact status.

The significance of the effect upon shipping and navigation is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 24-5. Where a range of significance of effect is presented in Table 24-5, the final assessment for each effect is based on calculated assessment and professional judgement.

For the purposes of this assessment, any effects with a significance level of slight or less have been concluded to be not significant in terms of the EIA Regulations.

Table 24-5 Matrix used for the assessment of the significance of the effect.

		Sensitivity of Receptor / Receiving Environment to Change / Effect			
Magnitude of Change		**High**	**Medium**	**Low**	**Negligible**
	High	**Major**	**Major**	**Moderate**	Negligible
	Medium	**Major**	**Moderate**	Minor	Negligible
	Low	**Moderate**	Minor	Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

24.8 Baseline Environment

List and reference baseline studies and surveys undertaken (please see notes above on correct approach to quotes/referencing).

24.8.1 Navigational Features

The Proposed Development is located at Fishguard Port. The port is owned by the Fishguard &Rosslare Railway Harbour Company, a 100% owned and controlled by Stena Line Ports Limited. The port is primarily use and business is for passenger and freight ferry services to Rosslare in Ireland, with limited other vessels such a cruise ships calling on ad-hoc base. There is a RNLI station located in the northern part of the port, away from the ferry terminal. There is no Traffic Management Systems (VTS) but a limited Local Port Services (LPS) is provided at Fishguard to disseminate information to vessels.

No aggregate extraction, oil and gas or offshore wind farm licences or proposals are identified in the study area.

24.8.2 Vessel Traffic Activities

The existing harbour serves the south-west of Wales and is owned by Stena Line and Pembroke Council.

The Stena Line linking Wales and Ireland is operated by the vessel Stena Nordica which is a Ro-Pax ferry owned by Stena Line. The carrying capacity for this vessel is 699 passengers, 222 berths, 375 cars, 1949 lane metres and 4,768 Deadweight tonnage. There were 1400 commercial vessel transits that intersected the Proposed Development footprint over a 12-month period. The Stena ferry between Fishguard and Rosslare undertakes 4 crossings (2 round trips) per day and accounts for all the commercial movements as noted above.

The Stena ferry route from Fishguard to Rosslare timetable is summarised below Table 24-6 Ferry Timetable.

Table 24-6 Ferry Timetable

Departure	Arrival	Ferry
01:30 (Fishguard)	05:30 (Rosslare)	Stena Nordica
14:00 (Fishguard)	17:00 (Rosslare)	Stena Nordica
08:15 (Rosslare)	11:45 (Fishguard)	Stena Nordica
19:30 (Rosslare)	23:00 (Fishguard)	Stena Nordica

Small craft moorings lie to the south of the site as shown in Figure 24-3 Construction area and existing slipways. There are no commercial fishing activities undertaken with the limits and no fishing is permitted within the ferry operation and proposed development area.

Alongside the ferry route there are ad hoc cruise vessels frequenting the harbour of approximately 25 per annum as shown below in Figure 24-2 Indicative Cruise Vessel Programme.

FISHGUARD CRUISE VESSEL PROGRAMME 2025 Amended :

	Name of Ship	Line	Agents	Arr Date	Dep Date	Arr Time	Dep Time
1	Ocean Albatross	ANGLO-EASTERN	Denholms	05/05/2025	05/05/2025	09:00	15:00
2	Aidaluna	Aida	ISS	15/05/2025	15/05/2025	09:30	19:30
3	Le Boreal	Ponant	GAC	19/05/2025	19/05/2025	12:00	23:00
4	Seabourn Sojourn (SJ)	Seabourn	Denholms	04/06/2025	04/06/2025	08:00	17:00
5	Aidasol	Aida	ISS	05/06/2025	05/06/2025	06:30	15:30
6	AIDAluna	Aida	ISS	06/06/2025	06/06/2025	09:30	19:00
7	Corinthian	Grand Circle	GAC	09/06/2025	09/06/2025	09:00	19:00
8	Waveley	Waveley Steam Navigation		24/06/2025	24/06/2025	09:30	18:00
9	Silver Shadow	Silverseas	Denholms	28/06/2025	28/06/2025	08:00	19:00
10	Aidasol	Aida	ISS	17/07/2025	17/07/2025	06:30	15:30
11	Corinthian	Grand Circle	GAC	17/07/2025	17/07/2025	09:00	19:00
12	Corinthian	Grand Circle	GAC	19/07/2025	19/07/2025	09:00	19:00
13	Hebridean Princess	HIC	Denholms	26/07/2025	28/07/2025	21:30	06:00
14	Aidabella	Aida	ISS	08/08/2025	08/08/2025	10:00	20:00
15	Le Bellot	Ponant	GAC	24/08/2025	24/08/2025	23:00	13:00
16	Le Bellot	Ponant	GAC	24/08/2025	25/08/2025	19:00	20:00
17	Hebridean Sky	Noble Caledonia	Denholms	25/08/2025	25/08/2025	08:00	18:30
18	Seven Seas Grandeur	SS	Denholms	25/08/2025	25/08/2025	07:00	16:00
19	Corinthian	Grand Circle	GAC	26/08/2025	26/08/2025	09:00	19:00
20	Corinthian	Grand Circle	GAC	28/08/2025	28/08/2025	09:00	19:00
21	Le Bellot	Ponant	GAC	01/09/2025	02/09/2025	23:00	20:00
22	Silver Spirit	Silverseas	Denholms	06/09/2025	06/09/2025	08:00	19:00
23	Hebridean Princess	HIC	Denholms	11/09/2025	13/09/2025	19:30	17:30
24	Corinthian	Grand Circle	GAC	15/09/2025	15/09/2025	09:00	19:00
25	Aidasol	Aida	ISS	27/09/2025	27/09/2025	06:30	15:30
26	World Voyager	Atlas	Denholms	10/10/2025	10/10/2025	08:00	18:00

Figure 24-2 Indicative Cruise Vessel Programme

24.8.3 Marine Accidents

No unique accidents were recorded in the Marine Accident Investigation Branch (MAIB) database within 3 nautical miles of the Proposed Development. No collisions were reported.

The RLNI database identified no casualties and responded to no incidents within 1Km of the Proposed Development.

24.9 Impact Assessment

24.9.1 Do Nothing Scenario

As per EIA protocol, the likely evolution of the existing shipping and navigation within Fishguard Harbour in the absence of the Proposed Development (i.e. the 'Do Nothing Scenario') has been assessed. Given that the Proposed Development is located within an active harbour with Stena Line's existing operational ferry crossing, it is likely that this will continue under a Do Nothing Scenario, and that the current shipping arrangements will persist.

24.9.2 Assessment of Construction Effects

Impacts identified for the construction phase of the Proposed Development for shipping and navigation are listed below.

24.9.2.1 Ferry Shutdown

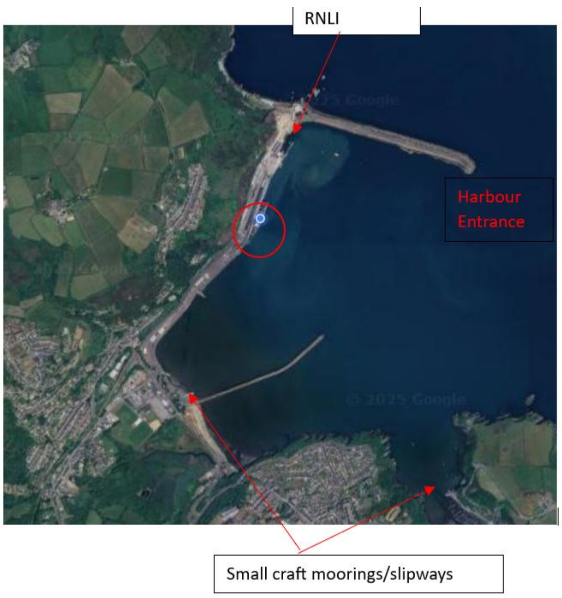
The existing Stena line ferry service will be temporarily shutdown for 3 months of the 9-month long construction phase and there are no plans for alternative ferry crossings. The planned shutdown is during the low season and it is considered that customers will utilise alternative ferry crossings or means of transport or delay travel. The impact is predicted to be of short term duration, temporary, and high reversibility. It is predicted that the impact will affect the receptors (Stena Line customers on the Fishguard – Rosslare route) directly, however the overall magnitude is considered to be low. The effect will, therefore, be of tolerable adverse significance, which is not significant in EIA terms.

24.9.2.2 Risk of Physical Impacts

There is risk of physical impacts on existing navigation and shipping vessels from collision and Allison and the ferry is operational for 6 months of the construction phase. As per Chapter 2: Project Description and the contractor's methodology, these works include a phase of dredging and demolitions.

The area marked red in Figure 24-3 Construction area and existing slipways below, indicates working area during construction. The area is clear of the ferry operation and away from small boat channels from public quays and moorings to the harbour entrance. This area is on the edge of an existing prohibited anchorage area for non-ferry traffic as marked on Admiralty Chart 1484- Plans in Cardigan Bay – Fishguard Bay.

Figure 24-3 Construction area and existing slipways



The area is to be marked by two cardinal marks, to the east and south as shown in Figure 24-4 Cardinal Markers below.

Local Notice to Mariners issued by Harbour Master giving direction to keep clear of the area, promulgated to:

- Master of Ferry
- RNLI
- Fishguard Bay Yacht Club, Lower town Fishguard.
- Fishguard Rowing Club
- Port Users Group
- Posted at public slip ways as marked.

Figure 24-4 Cardinal Markers

Fishguard is a working harbour with a harbour master and existing areas prohibiting non-ferry traffic are in place. The sensitivity of the receptors therefore is considered medium due to limited other vessel movements. The magnitude of impact is predicted to be of local spatial extent, short term duration and infrequent and overall considered to be low. The significance of effect will therefore be of minor adverse significance, which is not significant in EIA terms.

24.9.3 Assessment of Operational Effects

Following construction, the existing ferry service is return to its habitual schedule of crossings.

24.10 Mitigation

24.10.1 Construction Phase Mitigation Measures

The ferry downtime is planned to coincide with low season winter months, therefore avoiding busy high season demand. Therefore there will be no commercial vessel movements during these 3 months.

The area is clear of the ferry operation and away from small boat channels from public quays and moorings to the harbour entrance.

The area is on the edge of an existing prohibited anchorage area for non-ferry traffic as marked on Admiralty Chart 1484- Plans in Cardigan Bay – Fishguard Bay.

The area is to be marked by 2 cardinal marks, to the east and south as shown in Figure 24-4 Cardinal Markers above as safety zones.

Advance warning to mariners will be issued by the Harbour Master to keep clear of the area.

24.10.2 Operational Phase Mitigation Measures and future monitoring

There are no planned changes to the route or frequency of ferry crossings and therefore no further measures are proposed.

24.11 Assessment of Residual Effects

Mitigation is identified pre-event and post event to reduce the effects to an acceptable level. For those risks that cannot be completely designed out, emergency plans are available to provide the response in order to minimise the significance of any impacts. It is considered that there will not be any likely significant environmental effects arising from the vulnerability of the Proposed Development to shipping and navigation.

24.12 Cumulative Effects

There are no developments in close proximity that are considered to have a cumulative relationship with the Proposed Development. In summary, when considering the Proposed Development in combination with other proposed and consented developments within 5km of the Proposed Development, there will be no significant cumulative impacts.

24.12.1 In-combination effects

Future projects of large scale would need to conduct an EIA to ensure that there are no significant impacts as a result of the development.

24.12.2 Effects interactions

The EIA Regulations require that the EIA identifies, describes, and assesses the direct and indirect significant effects of the Proposed Development on population and human health, biodiversity, land, soil, water, air and climate, materials assets, cultural heritage and landscape and the interaction between these factors, arising from the vulnerability of the Proposed Development. This is set out in Chapter 25: Interactions of this EIA document.

24.13 Limitations of the Assessment

The data used is the most up to date available information from Stena Line. It is considered that the data employed in the assessment is robust and sufficient for the purposes of the assessment provided. It is, considered that the information available from Stena Line provides a suitable basis for describing the baseline environment in relation to shipping and navigation with Fishguard Harbour.

24.14 Summary of Effects and Conclusion

A summary of the assessment of significance for the impacts as identified is presented below in Table 24-7 Summary of Impact.

Table 24-7 Summary of Impact

Description of impact	Phase C	Phase O	Measures included in the Project	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Risk of physical impacts from other existing navigation and shipping vessels (collision/Allison)	✓	×	Promulgation of information and warnings through Notice to Mariners and other appropriate Maritime Safety Information (MSI) dissemination methods. Project to undertake vessel traffic monitoring for all Project related vessels throughout all phases of the Project Safety zones/Cardinal marks	C: minor O: None	C: medium O: None	C: slight adverse O: None	Adherence to Stena Lines existing vessel and navigational management	None	None
Ferry Shutdown	✓	×	Shutdown over the low season	C:minor O: None	C: Medium O: None	C:slight adverse O:None			

FISHGUARD LINKSPAN REPLACEMENT

Environmental Statement
Volume I Main Text

Chapter 25 Interactions

794-NI-POR-00886R
April 2025

25 INTERACTIONS

25.1 Introduction

This chapter of the Environmental Statement (ES) presents the assessment of the potential impacts of the Fishguard Linkspan Replacement (hereafter referred to as the “Proposed Development”) in relation to interactive effects during the construction and operational phases. The potential for interaction of effects has been assessed as part of the impact assessment process in the following ES Volume I Chapters:

Chapter 7: Population and Human Health

Chapter 8: Marine Biodiversity

Chapter 9: Terrestrial Ecology

Chapter 10: Coastal Processes

Chapter 11: Water Quality

Chapter 12: Flood Risk Assessment

Chapter 13: Noise and Vibration

Chapter 14: Underwater Acoustics

Chapter 15: Air Quality

Chapter 16: Cultural Heritage

Chapter 17: Soils and Geology

Chapter 18: Land Use & Material Assets

Chapter 19: Traffic & Transport

Chapter 20: Landscape & Visual

Chapter 21: Waste Management

Chapter 22: Climate

Chapter 23: Risk of Major Accidents and Disasters

Chapter 24: Shipping & Navigation

The detailed technical information which underpins the impact assessments presented in this chapter is contained within Chapter 2: Project Description and within the technical ES chapters and their supporting appendices. These chapters provide a detailed characterisation of the physical, biological and human environment of the Proposed Development, based on desk-based data sources and/or site-specific surveys, including information on receptors of importance and of conservation value.

25.2 Legislation

Part 3 of the Marine Works (Environmental Impact Assessment) Regulations requires that the interaction between human beings, fauna, flora, soil, water, air, climate, the landscape, material assets and cultural heritage is identified, described and assessed in the ES.

25.3 Assessment Methodology

The assessment of interactive effects has considered likely significant effects that may arise during construction and operational phases of the Proposed Development. The assessment of interaction of effects has been undertaken on a qualitative basis by each of the environmental specialist leads based on best scientific knowledge. There is no standard method for assessing interactive effects on receptors and therefore professional judgment has been used to inform the assessment. The ES coordination team facilitated data exchange and subsequent assessment review by the relevant specialists to inform the assessment of interactive effects. This was undertaken throughout the specialist impact assessment process.

25.4 Interactions Matrix

The likely relevant interactions between factors are identified in Table 25-1. The effects matrix identifies the factors in the left-hand column, which have the potential to impact on other factors listed in the top row of the matrix. Where a cross ‘x ‘exists, this indicates that the Proposed Development results in an interaction between the two factors. The purpose of the matrix is to identify the likely interactive effects of significance. A description of the interactive effect is provided along with a reference to where the assessment has been completed in chapters 7-24.

	Population & Human Health	Marine Biodiversity	Terrestrial Ecology	Coastal Processes	Water Quality	Flood Risk	Noise	Underwater Acoustics	Air Quality	Cultural Heritage	Soils & Geology	Land Use & Material Assets	Traffic & Transport	Landscape & Visual	Waste Mgmt.	Climate	Accidents & Disasters	Shipping & Navigation
Population & Human Health					X		X		X				X	X		X		
Marine Biodiversity				X	X			X										
Terrestrial Ecology																		
Coastal Processes		X			X													
Water Quality	X	X		X							X						X	
Flood Risk																X	X	
Noise	X												X					
Underwater Acoustics		X																
Air Quality	X										X		X		X	X		
Cultural Heritage														X				
Soils & Geology					X				X				X		X			
Land Use & Material Assets																		
Traffic & Transport	X						X		X		X				X	X	X	
Landscape & Visual	X									X								
Waste Mgmt.									X		X		X					

	Population & Human Health	Marine Biodiversity	Terrestrial Ecology	Coastal Processes	Water Quality	Flood Risk	Noise	Underwater Acoustics	Air Quality	Cultural Heritage	Soils & Geology	Land Use & Material Assets	Traffic & Transport	Landscape & Visual	Waste Mgmt.	Climate	Accidents & Disasters	Shipping & Navigation
Climate	X					X			X				X					
Accidents & Disasters					X	X							X					X
Shipping & Navigation																	X	

Table 25-1 Interactions Matrix

25.5 Description of Interactions

As indicated in the matrix (Table 25-1) there are linkage between the topic-specific chapters presented within this ES, whereby the effects assessed in one chapter have the potential to result in secondary effects on another receptor (e.g. impacts on water quality have the potential to result in secondary effects on biodiversity with respect to the ecological status of the receiving water bodies). These are summarised in the following sections under each topic heading.

25.5.1 Population & Human Health

The potential impacts to population and human health during the construction and operational phases of the Proposed Development have been assessed in Chapter 7: Population and Human Health. As identified in Table 25-1, interactive effects exist between population and human health and the following topics:

- Water Quality

During construction, there is potential for the accidental release of lubricants, fuels and oils from construction machinery. This can occur because of spillages, leakage from vehicle storage areas and direct release from construction machinery working directly in or adjacent to water bodies, including land drainage channels.

Pollution of surface water or groundwater bodies which are subsequently used as a potable source could pose a risk to public health. Bathing water quality at the nearshore may be temporarily affected by activities of the pontoon installation and construction of related supporting structures. The key health outcomes relevant to this determinant of health arise from toxicological exposure by skin contact, accidental swallowing of water or inhalation and can cause a wide range of acute or chronic illnesses.

For the Proposed Development, although nearshore works would result in some dispersion in relation to bathing water, the use of standard good practice mitigation measures to avoid and contain spills or appropriately respond to historic contamination encountered ensures the magnitude of any impact would be low. It is considered unlikely that any increased suspended sediment concentrations would be directly harmful or could have secondary effects, e.g. via toxic algal blooms. The level of exposure to any contaminants would likely be very low, short-term and associated with one-off events.

The significance of the population health effect for this determinant of health is minor adverse (not significant). Water quality is expected to be well within standards for bathing and drinking water and the changes are not expected to affect delivery of health policy or influence inequalities.

- Noise & Vibration

Construction of the Proposed Development has the potential to result in noise nuisance from construction activities, particularly night-time noise that may be detrimental to population health where sleep is disturbed to a high degree.

Environmental noise can initiate physiological stress responses in an individual that leads to a cascade of effects including a rise in heart rate and in levels of stress hormones. These responses influence risk factors for cardiometabolic health issues including blood pressure, blood sugar and blood fats and long-term exposure may affect mental health and lead to diseases such as diabetes, heart attack, and stroke. Night-time noise may disrupt the total sleep time and the required physiological and mental restoration in an individual even at low levels.

Construction noise impacts of the Proposed Development are considered to result in a minor adverse (not significant) effect on population health. This assessment conclusion reflects that although the scientific literature indicates a clear association between elevated and sustained noise disturbance and reduced health outcome, the changes would result in a very limited effect in the health baseline of the site-specific populations. The temporary and localised construction noise effects are not expected to affect health inequalities.

- Air Quality

The scientific literature indicates that there is an association between air quality emissions and health and wellbeing effects. Environmental air pollution is associated with increased risk of respiratory and cardiovascular diseases. This can include dust and air pollutants (particularly NO_2, $PM_{2.5}$ and PM_{10}) from construction activities and plant/vehicle emissions.

Occasionally, weather conditions may coincide with construction activities to generate high levels of dust. This can cause temporary annoyance, and for people with existing poor health, higher levels of coarse dust in the air it can exacerbate some conditions (e.g. asthma). For the Proposed Development a comprehensive set of mitigation measures and dust monitoring will be implemented during the construction phase to minimise construction dust impacts as detailed in Chapter 15: Air Quality.

- Landscape and Visual

The proposals have the potential to impact on the landscape and visual resources perceived by human beings which contributes to overall well being and quality of life. Changes to visual amenity such as the introduction of built structures or alterations to natural views can affect psychological health. Degraded visual environments may reduce opportunities for outdoor activity and diminish residential satisfaction, and erode community identity, especially in areas dependent on tourism or with strong ties to the land. Conversely, the preservation or enhancement of landscape quality can support mental health, promote social cohesion, and encourage active lifestyles.

For the Proposed Development, a total of 8 viewpoints have been assessed for both construction and operational phases. None of the viewpoint's assessment are considered to experience significant effects during either the construction phase or operational phase of the Proposed Development, as whilst portions of the Proposed Development are predicted to be visible, visible elements of the Proposed Development will be difficult to discern and perceived as a minor alteration to the existing character and composition of the view.

- Traffic & Transport

The interaction between air quality and traffic health effects, particularly through emissions from construction vehicles and potential changes in local traffic patterns, has been considered. The potential for adverse health outcomes from combined exposure to traffic related air and noise pollution is considered limited. These effects are not expected to result in significant health effects, either individually or in combination, given the assessed individual effects results and the mitigation measures in place.

- Climate

Dredging activities can release carbon from seabed sediments, but significant emissions from this source are not expected due to limited vegetation and ongoing sediment renourishment efforts. Meanwhile, maritime transport, vital to the Welsh economy, is a growing source of greenhouse gas emissions, contributing to global shipping emissions of 1,076 $MtCO_2e$ in 2018.

Overall, the population health effects associated with climate change include heat-related disorders (e.g. heat stress and lower work capacity), respiratory disorders (e.g. worsened asthma), infectious diseases, food insecurity (e.g., lower crop yields), population migration and injury and mental stress associated with natural disorders (e.g. flooding or fires). Research also correlates UHIs with poor air quality, suggesting that elevated levels of air pollutants in urban areas due to heat-induced atmospheric reactions can worsen respiratory and other cardiovascular issues.

Chapter 22: Climate Change concludes the vulnerability of the works to climate change has been suitably mitigated and the potential impact is considered to be minor adverse for the construction and operational phase.

25.5.2 Marine Biodiversity

The potential impacts to marine biodiversity during the construction and operational phases of the Proposed Development have been assessed in Chapter 8: Marine Biodiversity. As identified in Table 25-1, interactive effects exist between marine biodiversity and the following topics:

- Underwater acoustics

Fish and Shellfish Ecology

Various piling and construction activities will occur as part of the construction phase of the Proposed Development, which can cause auditory injury and behavioural change to fish and shellfish. Impact piling (i.e. an impulsive noise source) will only take place in connection with the installation of four support piles, each of which will require less than half an hour of impact piling each, for a total maximal duration of two hours of impact piling spread over two to four days. The impact is predicted to affect the receptor directly, but to be of local spatial extent, short term duration, intermittent and high reversibility.

The underwater noise modelling (detailed in Chapter 14: Underwater Acoustics) concluded that the noise producing activities at the Proposed Development will be limited both spatially and temporally, with impacts upon fish receptors not predicted to occur over large ranges.

Marine Mammals

The results of the noise modelling indicated that impact piling of the four support piles had the greatest potential for an adverse effect on marine mammals out of the different piling scenarios involved with the construction of the Proposed Development. Mitigation measures detailed in Chapter 8: Marine Biodiversity are therefore proposed to ensure that the risk of any auditory injuries in marine mammals is reduced to negligible.

- Water Quality

Benthic habitats and species

Benthic habitats and species can be sensitive to toxic contamination, when concentrations of contaminants exceed sensitivity thresholds. Release of sediment bound contaminants during construction can occur through the resuspension of sediment during dredging which can lead to the release and mobilisation of sediment-bound contaminants into the water column. Given that the overall level of contamination in the proposed dredge area is low, the period of dredging is temporally limited, and the extent of sediment dispersal considered to be spatially limited (see section **Error! Reference source not found.**), changes in water quality are likely to be minimal, if at all.

Fish and Shellfish ecology

The potential release of contaminants during construction activities may result in them becoming available for uptake by any fish shellfish in the water column or at the seabed. There is also an indirect risk to some fish species, as sediment-bound contaminants may be temporarily bioaccumulated in the tissues of their prey. Given that the overall level of contamination in the proposed dredge area is low, the period of dredging is temporally limited, and the extent of sediment dispersal considered to be spatially limited (see section **Error! Reference source not found.**), changes in water quality are likely to be minimal, if at all.

25.5.3 Terrestrial Ecology

The potential impacts to terrestrial ecology during the construction and operational phases of the Proposed Development have been assessed in Chapter 9: Terrestrial Ecology. As identified in Table 25-1, interactive effects exist between terrestrial ecology and the following topics:

- Noise

Otter

During the 12-month construction period there will be increased human activity in the harbour, quayside development areas. Noise, vibration and dredging activities could disturb otter using the aquatic environment in the harbour. Temporary behavioural changes in otter behaviour are expected within the harbour, especially when construction activities generating underwater noise are undertaken outside of the core daytime working hours. The anticipated effect would be the displacement of animals to alternative foraging habitat for the duration of the higher noise generating activities.

Otters are more likely to use the harbour for foraging during nighttime periods when there would be much less construction activity. Consequently, outside of the working hours foraging habitat within the harbour would remain available for use otter during the 12 month construction period. Potential effects are limited to indirect disturbance of individuals hunting (primarily at night) at the eastern section of the open water dock. With alternative feeding opportunities along the coastline and in the rivers and brooks that flow into Fishguard Bay.

Chapter 9: Terrestrial Ecology concludes the magnitude of the impact on the otter population from construction related impacts is predicted to be low. The sensitivity of the application site for the otter is low and the overall effect on otter population is assessed as minor adverse, which is considered to be not significant. During the operational phase the potential magnitude of effects is negligible and equivalent to existing operations. The significance is classified as negligible with no change to the current baseline conditions. This is considered to be not significant.

Wintering and Passage birds

During the construction period of the Proposed Development wintering and passage birds using the harbour could be affected by noise. Chapter 9: Terrestrial Ecology concludes the magnitude of the effect on the assemblage of wintering bird species is predicted to be low. The sensitivity of the receptor is low (important in a local context). This could result in a minor adverse effect on the assemblage and individual species, which is considered to be not significant. During the operational phase use of the ferry terminal would have a negligible magnitude effect on the assemblage of birds using the harbour. The significance is classified as negligible which is not significant.

25.5.4 Coastal Processes

The potential impacts from coastal processes during the construction and operational phases of the Proposed Development have been assessed in Chapter 10: Coastal Processes. As identified in Table 25-1, interactive effects exist between coastal processes and the following topics:

- Cultural Heritage

The Proposed Development has the potential to impact on cultural heritage remains on the seabed by modifying the sedimentation and erosion regime at Fishguard Port. The assessment does not however identify any likely significant coastal process effects.

- Flood Risk

Modelling of the Proposed Development on coastal processes is described in Chapter 10. This has demonstrated that there is a limited spatial change to tides, waves, and sedimentation processes within Fishguard Harbour as a result of the Proposed Developments' bathymetric changes, including the reclamation area within the water column. The change in risk of potential coastal flooding due to the Proposed Development at neighbouring sites is considered to be negligible and no mitigation is required.

- Water Quality

Coastal processes involve the movement of sediments along the shoreline and in the water column. Activities such as dredging, construction, or land reclamation can disrupt these natural sediment dynamics. Increased sedimentation can lead to elevated turbidity levels.

Based on the low level of contamination in the sediments that are to be dredged and the coastal process modelling, which has demonstrated that the sediment plumes and subsequent deposition from the dredging activities will remain very localised, there is no potential for significant effects on bathing waters.

From an operational standpoint, ongoing maintenance dredging is not expected to significantly impact the water body. Furthermore, the introduction of new structures and land reclamation has been shown to have a negligible effect on the coastal processes of the Cardigan Bay South Coastal Water Body. Consequently, the impact on the supporting hydromorphological conditions of the water body is deemed insignificant.

25.5.5 Water Quality

The potential impacts to water quality during the construction and operational phases of the Proposed Development have been assessed in Chapter 11: Water Quality. As identified in Table 25-1, interactive effects exist between water quality and the following topics:

- Population and Human Health

See section 25.5.1 for interactive effects with water quality.

Marine Biodiversity

See section 25.5.1 for interactive effects with marine biodiversity.

- Coastal Processes

See section 25.5.4 for interactive effects with water quality.

- Soils, Geology and Hydrogeology

Potential contamination issues may arise during construction from with the use of fuel storage tanks, vehicles and the use of paints and oils. In addition, suspended sediment due to run off from stripped construction areas, stockpiled earth and the dewatering of excavations can have a severe negative impact on water quality which can impact biodiversity receptors. If allowed to enter surface watercourses this run off can give rise to high suspended solids and lead to detrimental impacts on ecological receptors. The dredging of marine sediments will have a minor effect due to the irreversible loss of a high proportion of local low fertility sediments. Dredged marine sediments will be disposed at sea to an appropriately licensed dumping at sea facility.

- Major Accidents and Disasters

In the event of a major accident or disaster there is a risk of releasing pollutants into water bodies, water supply and sensitive ecological receptors. This will adversely impact on water quality. To minimise spillages all oils, solvents, paints and other potential contaminates used during construction will be stored within suitably designed bunded areas. All chemical and fuel filling locations will be contained within bunded areas. On site facilities including surface and foul water collection will be designed and provided at both site compounds to manage surface water and foul water arising from the compounds. Chapter 23 concludes the significance of the effect is low.

25.5.6 Flood Risk

The potential impacts from flood risk during the construction and operational phases of the Proposed Development have been assessed in Chapter 12: Flood Risk. As identified in Table 25-1, interactive effects exist between flood risk and the following topics:

- Climate

An increased flood risk, associated with climate change, has the potential to result in considerable impacts on riparian and coastal developments, higher sea levels have already been observed, while wetter winters are anticipated. Predicted impacts of climate change include an increase in the frequency and intensity of rainfall, an increase in peak flows in rivers, a rise in sea levels and increased storminess. These climate change effects are likely to increase pluvial, fluvial and coastal flooding and will require that future development be adaptable or resilient to future climatic changes and its associated impacts.

Fishguard, located on the Pembrokeshire coast of Wales, is susceptible to tidal flooding due to its geographical position and the influence of sea level rise. During the construction and operational phases of the Proposed Development, there is a potential impact from flooding, including surface, groundwater, fluvial, and snow/ice melt. This could affect the road network and damage drainage systems, as increased runoff from adjacent land may contribute to surface water flooding.

Chapter 22: Climate Change concludes the vulnerability of the works to climate change has been suitably mitigated and the potential impact is considered to be minor adverse for the construction and operational phase.

- Coastal Processes

See section 25.5.4 for interactive effects with coastal processes.

- Major Accidents and Disasters

In the event of a flood, there is a risk that contaminants could be released from the construction site into environmental receptors, such as surface water bodies or groundwater resulting in a pollution event. Mitigation measures to reduce this risk which are outlined in the Outline Construction Environmental Management Plan (CEMP) will be implemented, including an emergency response plan specifically designed for the construction phase. Chapter 23 concludes the significance of the effect is low.

25.5.7 Noise and Vibration

The potential impacts from noise and vibration during the construction and operational phases of the Proposed Development have been assessed in Chapter 13: Noise and Vibration. As identified in Table 25-1, interactive effects exist between noise and vibration and the following topics:

- Terrestrial ecology

See section 25.5.3 for interactive effects with terrestrial ecology.

- Traffic and Transport

There is an interaction between noise and traffic through the generation of construction traffic. Chapter 3 Project Description states “Transport by road will be minimal – there is no estimated impact on the road transport network”. Therefore, there is no construction traffic noise impact associated with the proposed development and scoped out of the noise assessment.

The traffic flows generated by Fishguard Port relate to the number vessel sailings and the times of the sailings. Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel sizes will not increase above existing levels, therefore the number of vehicle movements generated by the Port are also not expected to increase above existing levels, resulting in a negligible traffic impact in the operational phase of the Proposed Development.

- Population and Human Health

See section 25.5.1 for interactive effects with population and human health.

25.5.8 Underwater Acoustics

The potential impacts from underwater acoustics during the construction and operational phases of the Proposed Development have been assessed in Chapter 14: Underwater Acoustics. As identified in Table 25-1, interactive effects exist between underwater acoustics and the following topics:

- Marine Biodiversity

See section 25.5.2 for interactive effects with marine biodiversity.

25.5.9 Air Quality

The potential impacts to air quality during the construction and operational phases of the Proposed Development have been assessed in Chapter 15: Air Quality. As identified in Table 25-1, interactive effects exist between air quality and the following topics:

- Population and Human Health

See section 25.5.1 for interactive effects with population and human health.

- Traffic and Transport

Potential air quality effects during the construction phase can occur due to dust emissions and from construction traffic movements, with the pollutants of most concern being nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). Chapter 15: Air Quality concludes that due to the nature and scale of the project the construction traffic volumes will not be significant and the resultant air quality impact from construction traffic is negligible.

Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel size are not expected to increase above existing levels. The related number of generated vehicle movements are also not expected to increase above existing levels. Therefore, there will be no traffic impact associated with the replacement Linkspan scheme once construction is completed.

- Climate

The generation of road traffic due to construction phase deliveries of materials, removal of waste and redistribution of other road users has the potential to impact air quality including an increase in the emissions of Greenhouse Gases that contribute towards global warming. Chapter 15: Air Quality concludes that due to the nature and scale of the project the construction traffic volumes will not be significant and the resultant air quality impact from construction traffic is negligible.

- Waste Management

Demolition works and loading of wastes associated with the Proposed Development have the potential to cause fugitive dust emissions. The air quality impact assessment identifies this as a likely significant effect during the construction phase. Mitigation measures are therefore proposed which to control dust during the construction phase and reduce the risk of dust emissions from demolition works to negligible/not significant.

- Soils, Geology and Hydrogeology

Excavation works and exposure of soils during the construction phase can influence air quality. The movement of soils during the construction phase may result in the spread of dust and mud onto surrounding land and public roads, however no likely significant effects have been predicted.

25.5.10 Cultural Heritage

The potential impacts to cultural heritage during the construction and operational phases of the Proposed Development have been assessed in Chapter 16: Cultural Heritage. As identified in Table 25-1, interactive effects exist between cultural heritage and the following topic:

- Seascape, Landscape and Visual

Archaeological and cultural heritage contribute to the landscape characteristics of an area. Developments can sometimes infringe upon the amenity use and visual setting of a cultural heritage feature and as a result lead to unacceptable impacts. The introduction of the Proposed Development will not negatively impact upon any inter-relationships between monuments located within the local landscape. A slight improvement will be realised to views of the ferry port both from The Fishguard Bay Hotel (Cadw 12345) and the Registered Park and Garden.

25.5.11 Soils Geology and Hydrogeology

The potential impacts to Soils during the construction and operational phases of the Proposed Development have been assessed in Chapter 17: Soils and Contamination. As identified in Table 25-1, interactive effects exist between Soils and Contamination and the following topics:

- Water Quality

See section 25.5.5 for interactive effects with water quality.

- Traffic and Transportation

There is potential for generation of contaminated soils at construction phase, which will be removed from the port by road transport if not suitable for re-use on site. The soils and contamination assessment does not however identify any likely significant effects.

- Air Quality

See section 25.5.9 for interactive effects with air quality.

- Waste

Improper management of waste can lead to soil and contamination through leachate, spills, or improper disposal methods. This can have direct implications for soil quality. However, Chapter 21: Waste Management concludes that this can be managed by implementing appropriate mitigation measures and by managing wastes in accordance with the waste hierarchy as required.

It is estimated that dredging will generate around 78,000 m^3 of silty sands and gravels. Sediment sampling previously undertaken confirmed that the sediment did not contain any hazardous substances so is classified as non-hazardous waste. A further campaign of sediment sampling was undertaken in March 2025 confirming that no hazardous chemicals were present in locations that will be targeted for dredging and the results will feed into the development of the management strategy. Higher levels of contaminants were identified at one sampling location but this was confirmed as being at depth beyond proposed works.

The proposed management strategy for the dredgings is offshore disposal at an existing licenced location at Milford Haven (as detailed in Chapter 2 Project Description). No dredged material will be disposed of onshore.

25.5.12 Traffic & Transport

The potential impacts to traffic and transport during the construction and operational phases of the Proposed Development have been assessed in Chapter 19: Traffic and Transport. As identified in Table 25-1, interactive effects exist between traffic and transport and the following topics:

- Population and Human Health

See section 25.5.1 for interactive effects with population and human health.

- Noise

See section 25.5.7 for interactive effects with noise.

- Air Quality

See section 25.5.9 for interactive effects with air quality.

- Climate Change

Road traffic and shipping vessels have the potential to impact air quality including an increase in the emissions of Greenhouse Gases that contribute towards global warming. Once the replacement Linkspan is constructed and operational, the vessel numbers and vessel size are not expected to increase above existing levels. The related number of generated vehicle movements are also not expected to increase above existing levels. Therefore, there will be no traffic impact associated with the replacement Linkspan scheme once construction is completed and no requirement for an assessment of operational effects.

- Waste Management

During the construction phase of the Proposed Development there will be an increase in the vehicle movements associated with hauling or removing wastes. An assessment of the proposed construction traffic indicates that it will have a minimal impact upon the surrounding highway network during the construction period.

- Major Accidents and Disasters

Additional HGV traffic mixing with other road users has the potential to cause injury or fatality to a member of the public. Proposed mitigation measures to reduce the risk include the implementation of a traffic management plan for specific busy times during delivery or other site activities. Chapter 23 concludes the significance of the effect is low.

25.5.13 Seascape, Landscape and Visual

The potential impacts to seascape, landscape and visual during the construction and operational phases of the Proposed Development have been assessed in Chapter 20: Seascape, Landscape and Visual. As identified in Table 25-1, interactive effects exist between seascape, landscape and visual and the following topics:

- Population and Human Health

See section 25.5.1 for interactive effects with population and human health.

- Cultural Heritage

See section 25.5.10 for interactive effects with landscape a visual

25.5.14 Waste Management

The potential impacts from waste management during the construction and operational phases of the Proposed Development have been assessed in Chapter 21: Waste Management. As identified in Table 25-1, interactive effects exist between waste management and the following topics:

- Air Quality

See section 25.5.9 for interactive effects with air quality.

- Traffic and Transport

See section 25.5.12 for interactive effects with traffic.

25.5.15 Climate Change

The potential impacts to Climate Change during the construction and operational phases of the Proposed Development have been assessed in Chapter 22: Climate Change. As identified in Table 25-1, interactive effects exist between climate change and the following topics:

- Air Quality

See section 25.5.9 for interactive effects with air quality.

- Flood Risk

See section 25.5.6 for interactive effects with flood risk.

- Traffic and Transport

See section 25.5.13 for interactive effects with traffic and transport.

- Population and Human Health

See section 25.5.1 for interactive effects with population and human health.

25.5.16 Risk of Major Accidents & Disasters

The potential impacts from major accidents and disasters during the construction and operational phases of the Proposed Development have been assessed in Chapter 23: Risk of Major Accidents and Disasters. As identified in Table 25-1, interactive effects exist between waste management and the following topics:

- Water Quality

See section 25.5.5 for interactive effects with water quality.

- Flood Risk

See section 25.5.6 for interactive effects with flood risk.

- Traffic and Transport

See section 25.5.12 for interactive effects with traffic.

- Shipping and Navigation

There is a risk of physical impacts from existing navigation and shipping vessels, including collisions. Such incidents could result in physical damage to project vessels and infrastructure. Additionally, there is a potential for significant impacts on water quality due to fuel or chemical spills, which could adversely affect local biodiversity. Furthermore, these collisions pose a serious risk of loss of life or serious injury. Chapter 23 details mitigation measures to reduce the risk concludes the significance of the effect is low.

25.5.17 Shipping & Navigation

The potential impacts to Shipping and Navigation during the construction and operational phases of the Proposed Development have been assessed in Chapter 24: Shipping and Navigation. As identified in Table 25-1, interactive effects exist between shipping and navigation and the following topics:

- Major Accidents and Disasters

See section 25.5.9 for interactive effects with major accidents and disasters.