

13. Marine Ecology

Introduction

- 13.1 This Chapter reports the outcome of the assessment of likely significant environmental effects arising from the Proposed Scheme in relation to marine ecology.
- 13.2 This Chapter summarises the technical consultation that has been undertaken during the EIA, the scope of the assessment and assessment methodology, and a summary of the baseline information that has informed the assessment.
- 13.3 In line with **Chapter 2: Approach to EIA**, the assessment reports on the likely significant environmental effects, the further mitigation measures required to prevent, reduce or offset any significant adverse effects, or further enhance beneficial effects. The conclusions are provided both in terms of the residual effects, and whether these are considered significant. The assessment of effects takes into consideration both primary and tertiary mitigation (see **Chapter 2: Approach to EIA** for further details) and is informed by the EIA Scoping process (see **Chapter 2: Approach to EIA**) for further details.
- 13.4 This Chapter, and its associated **Figure 13.1** and **Appendix 13.1 – 13.2**, is intended to be read as part of the wider ES, with particular reference to the introductory chapters of this ES (**Chapters 1 – 5**). It should be noted that effects in relation to the terrestrial ecology are considered with **Chapter 7: Terrestrial Ecology**.
- 13.5 In addition, this Chapter should be read in conjunction with **Chapter 14: Assessment of Cumulative Effects**.
- 13.6 As established in **Chapter 1: Introduction** and **Chapter 2: Approach to EIA**, the works within the marine environment, as assessed within this Chapter, will require a Marine Licence, which will be sought separately to this Application. Notwithstanding this, through this Chapter, the ES has assessed environmental effects arising from the marine works on marine ecology. Furthermore, a Water Framework Directive (WFD) Assessment (**Appendix 2.4**) has been completed for the Proposed Scheme (see **Chapter 2: Approach to EIA** for more details). The outputs of the WFD Assessment, including mitigation, has been considered in the preparation of this Chapter, to ensure a coordinated assessment.

Summary of Consultation

- 13.7 **Table 13.1** provides a summary of the consultation that has been undertaken to inform the Proposed Scheme and EIA, including the consideration of likely significant effects and the methodology for assessment.

Table 13.1: Summary of Consultation

Body / Organisation	Date and Form of Consultation	Summary
Natural Resource Wales (NRW)	Email, 20th July 2023	Requirement for the inclusion of baseline information for marine mammals before determining the scope of assessment. Agreement on the scoping out of ornithological receptors. Confirmation on the use of Popper <i>et al.</i> , 2014 to determine sensitivity thresholds for marine fish.

- 13.8 It should be noted that additional consultation feedback from NRW was provided as part of the EIA Scoping process and the PAC, which are discussed together below in more detail.

Outputs of PAC Process

- 13.9 As set out in **Chapter 2: Approach to EIA**, NRW provided a response on several technical areas as part of PAC, with their full comments provided in **Appendix 2.3**. The NRW comment included several aspects that are to be addressed through this Chapter. In addition to the PAC comments, NRW did provide consultation comments to NPTCBC as part of the request for an EIA Scoping Opinion and these responses were shared with the Project Team by NPTCBC. There was a degree of repetition within NRW's comments at this stage with that provided at PAC. It is considered that the NRW response provided at PAC^a (**Appendix 2.3**) supersedes the NRW consultee comments provided to NPTCBC^b; however, both responses are included for information and considered in detail within **Table 13.2**.

^a Dated 04 October 2023

^b Dated 20 July 2023

Table 13.2: Summary of Natural Resources Wales PAC and EIA Scoping comments

Summary of NRW comments	Addressed within this report
Comments provided to NPTCBC as part of EIA Scoping Opinion consultation process	
The intention of the EIA is to scope out physical processes from further assessment. Physical processes are not described in any way and are embedded within the Marine Ecology Chapter 13. We advise that a baseline understanding of physical processes should be presented using an evidence based approach. Until a baseline description for physical processes is presented, it is not possible to agree with the conclusions in the marine ecology chapter 13 to rule out any impact on physical processes and impact to other receptors (benthic ecology, fisheries) at the scoping stage caused by the construction and operation of the proposed jetty.	These comments have been addressed by the inclusion of a baseline characterisation and evaluation processes provided in Appendix 13.1 (see ‘<i>Scope of Assessment</i>’ below for more details).
We note that the proposed jetty works and bank stabilisation are located in a land-locked area of the old Port Talbot Docks which is accessed through lock gates to the southwest of the site. It is also noted in the scoping report and benthic ecology report, that the old dock area is predominantly fresh water with infrequent saline intrusion when the lock gates are opened to allow the passage of vessels into the dock. The EIA should include a baseline description of the physical processes noting water depths, any current circulation in the dock area and the impact of waves and freshwater inflows will have on any circulation patterns and whether there are any tidal influences on the current circulation when the lock gates are opened to allow the passage of vessels. A description of the seabed sediment type should also be presented under the footprint of the proposed jetty.	

Summary of NRW comments	Addressed within this report
We cannot agree with the intention to scope out the impact of SSC plumes caused by jetty piling, until an assessment is carried out to determine the fate of SSC plumes, the sediment redeposition thickness and any potential impacts to receptors (fisheries, benthic ecology) caused by jetty piling and other activities associated with construction phase that may disturb the seabed. SSC plumes caused by jetty piling may persist for a length of time, depending on (not limiting) the sediment type/size under the jetty footprint, settling velocity, current velocity/direction (if any), wave induced agitation, amount of sediment being disturbed, piling methodology, pile dimension and number of piles to be inserted into seabed.	
Although we do not anticipate major concerns regarding hydrodynamics, we cannot agree with the conclusion that there will be no long-term changes to hydrodynamics caused by the new jetty until a baseline description of the physical processes of the old dock area and location/size of the proposed jetty is presented.	
We note that the current assumption is that no dredging will need to be undertaken. If this changes, the impacts of dredging must be included in the assessments undertaken. Regarding the works to the jetty, the worst-case scenario for each receptor must be assessed. If it is unknown what the methodology is to be used for construction, we recommend the effects be scoped in until a time where impacts can be appropriately assessed.	The Proposed Scheme does not include any form of dredging activity. This Chapter has considered the worst case scenario when assessing the effect arising from the works within the marine environment.
An assessment should be carried out to determine whether the proposed works will lead to an increase in ship activity in the old dock area and lead to a requirement for more frequent opening of the lock gates, which if more frequently opened, will increase the amount of saltwater intrusion and potentially alter the freshwater/saltwater balance. A change from freshwater to saltwater over time will affect the ecology.	This comment has been addressed by the inclusion of saltwater ingress evaluation provided in Appendix 13.1 (see ‘<i>Scope of Assessment</i>’ below for more details).

Summary of NRW comments	Addressed within this report
We cannot agree at scoping that piling will not release sediment bound contaminants as no sediment contaminant analysis has been conducted of the seabed sediments across the seabed area of the proposed jetty, which is unknown at this stage. It is not clear how much and to what depth the sediments will be disturbed through piling activities	This comment has been addressed by the inclusion of an evaluation of Sediment and Water Quality provided in Appendix 13.1 (see ' <i>Scope of Assessment</i> ' below for more details).
We do not agree that a WFD assessment does not need to be done. A WFD assessment must be undertaken to determine the impact on WFD water bodies and their objectives. It is unclear what will happen to the process effluent in terms of where it will be discharged. This must be included in the ES and the WFD assessment, even if it will be discharged via the Welsh Water wastewater treatment works. The risk of deterioration to the Afon Estuary Incl Docks transitional water body has not been assessed sufficiently in terms of direct impacts (operational and construction).	As per Chapter 1: Introduction a WFD Assessment (Appendix 2.4) has been completed and submitted with the Application. The content of the WFD assessment has been considered (where relevant) within this Chapter.
We note that further investigations are necessary to examine the risk of contamination across the site.	A baseline assessment of sediment and water quality within Port Talbot Docks is presented in the Sediment and Water Quality evaluation provided in Appendix 13.1 (see '<i>Scope of Assessment</i>' below for more details). It should be noted that the Applicant has committed to undertaking additional sampling to provide further information. The conclusions of the additional sampling will be used to validate the Sediment and Water Quality assessment, or where results indicate a change to any of the conclusions reached, updates to the assessment will be undertaken and re-submitted as part of the Application.

Summary of NRW comments	Addressed within this report
We agree that site drainage during construction can be mitigated via the use of a CEMP, we request to see the CEMP as part of the ES. Pollution Prevention Guidelines are no longer supported by the EA. The Guidance for Pollution Prevention are now in place and can be found on the netregs website. These are supported by Scotland, Northern Ireland and Wales. We recommend the applicant take note of this guidance when drawing up the CEMP, particularly GPP5: Works and Maintenance in or near water.	A Framework CEMP has been submitted as part of the Application. It is assumed that a detailed CEMP will be prepared by a contractor (once appointed) building on the content of the framework CEMP and submitted to NPTCBC prior to commencement of works for the Proposed Scheme. It is expected that the submission of the detailed CEMP will be conditioned by NPTCBC as part of any granting of planning permission and will account for GPP5. It is anticipated that the Marine License application will include either a corresponding condition for the marine aspects of the works
The process is said to produce contaminated water. It is unclear throughout this document what will happen to the contaminated water and what its contents will be. If it is to be sent to a wastewater treatment works, whose works are these and where will the discharge be? We must be presented evidence to show that the receiving water quality will not deteriorate. Furthermore, it is unclear if the discharge of this effluent will be permitted under the environmental permit	No foul water or effluent will be discharged into the dock but will instead be transported off-site for appropriate treatment and disposal. As noted in Chapter 4: Development Specification, process water abstracted from the dock will be returned to the dock following a treatment process. As set out within Chapter 1: Introduction and Chapter 4: Development Specification, the Applicant will be seeking an Environmental Permit (from NRW) which will include the proposed discharge of process water back to the dock, specifically the chemical composition of any treated water being returned to the dock.

Summary of NRW comments	Addressed within this report
We disagree that the impacts from the operation stage of the scheme on marine water quality will not be significant as we have not been presented sufficient evidence to show as such. In particular, it is currently not known what will happen to the process effluent or what it's content will be. Until further detail is available, we advise this should remain in the ES and its impacts on the Afan Estuary Incl Docks assessed.	This comment has been addressed by the inclusion of a baseline characterisation and evaluation of sediment and water quality within Port Talbot Docks provided in Appendix 13.1 (see '<i>Scope of Assessment</i>' below for more details). As noted above, the Applicant has committed to undertaking additional sampling. The conclusions of the additional sampling will be used to validate the Sediment and Water Quality assessment, or where results indicate a change to any of the conclusions reached, updates to the assessment will be undertaken and re-submitted as part of the Application.
We note that the Afon Estuary Incl Docks is at Moderate status for Hydromorphology and Mitigation Measures assessment. The mitigation measures can be found on the Water Watch Wales website, via the 3-bar menu in the top right corner. The WFD assessment will need to determine if the development prevents any mitigation measures already in place or prevents ones being put in place in the future.	As per Chapter 1: Introduction, a WFD Assessment (Appendix 2.4) has been completed and submitted with the Application.
We note that all of the proposed works are to take place in the semi-enclosed dock area of Port Talbot and separated from the sea via the lock gates and access via the mouth of the River Afan. Therefore, the habitats and species within the dock may not be relevant from a marine benthic ecology perspective.	This comment has been addressed by the inclusion of a baseline characterisation and evaluation of benthic ecology) provided in Appendix 13.1 (see '<i>Scope of Assessment</i>' below for more details).

Summary of NRW comments	Addressed within this report
However, limited survey of the dock environment has been undertaken and there may be potential impacts to species/habitats of a freshwater nature that require further assessment.	This comment has been addressed by the inclusion of a baseline characterisation and evaluation of benthic ecology provided in Appendix 13.1 (see ' <i>Scope of Assessment</i> ' below for more details). and associated survey reports indicating the dock as a hybrid between freshwater and brackish environments (ABPmer, 2022 ^{1,c})
We also advise that any dredging/piling may unlock potentially high levels of contaminants and mobilise sediments which may impact species and habitats within the dock and possibly outside the dock if allowed to disperse via the lock. Further investigation may be required in this respect (please see Physical processes, Water/Sediment Quality and WFD comments).	As noted above, no dredging is proposed for the Proposed Scheme. Piling is considered in the baseline characterisation and evaluation of physical processes) and benthic ecology provided in Appendix 13.1 (see ' <i>Scope of Assessment</i> ' below for more details).
Any biosecurity issues will likely be addressed with standard Construction Environmental Management Plans (CEMPs) and within the marine licence application.	A framework CEMP has been submitted as part of the Application. It is assumed that a detailed CEMP will be prepared by a contractor (once appointed) building on the content of the framework CEMP and submitted to NPTCBC prior to commencement of works for the Proposed Scheme. It is expected that the submission of the detailed CEMP will be conditioned by NPTCBC as part of any granting of planning permission. It is anticipated that the Marine License application will include either a corresponding condition or be supported by the detailed CEMP prepared by the Proposed Scheme.

^c Submitted as Appendix 13.1 to the EIA Scoping Report (**Appendix 2.1**).

Summary of NRW comments	Addressed within this report
We advise that their conservation importance includes consideration of the species specifically protected under various legislation including the Conservation of Habitats and Species Regulations 2017, Wildlife and Countryside Act 1981, the Environment (Wales) Act 2016, and listed by the OSPAR Commission. We advise that the applicant consults NRW on this list of species.	This comment has been addressed directly in Appendix 13.1 and considered through the ‘<i>Scope of Assessment</i>’ below.
The WFD assessment should consider the effect of the project on the fish quality element of the relevant transitional water body (Afan Estuary Incl Docks).	As per Chapter 1: Introduction a WFD Assessment (Appendix 2.4) has been completed and submitted with the Application. The content of the WFD assessment has been considered (where relevant) within this Chapter.
This EIA scoping report has not considered marine mammal in any way in its assessment. Particularly in the Marine Ecology Chapter 13 there is no mention of marine mammals, therefore it has not been adequately scoped in or out of this EIA scoping report. We advise that a baseline understanding of marine mammals is presented using an evidence based approach. Until a baseline description for marine mammals is presented, it is not possible to rule out any likely impact pathways to marine mammals at the scoping stage. Insufficient information is provided about the project design to assess the degree of impact on marine mammals, particularly in the context of potential piling and other sources of underwater noise from the construction and operation of the proposed jetty.	This comment has been addressed by the inclusion of a baseline characterisation and evaluation of marine mammals provided in Appendix 13.1 (see ‘<i>Scope of Assessment</i>’ below for more details).

Summary of NRW comments	Addressed within this report
This EIA Scoping and supporting documents have not considered marine mammals in its assessment. Due to the location of works in the marine environment, proximity to the marine mammal management units (MMMUs) and SACs, based on the information provided there is a possible viable pathway of impact to marine mammals as Annex II, Annex IV and EIA species, and they should be scoped into the relevant assessments. Given the insufficient information presented in the projects documents there are possible viable pathways of impacts to marine mammals, and they cannot currently be ruled out as they have not been assessment appropriately. We recommend to help inform this and the future HRA further, the use of the newest version of the Marine Mammal Atlas [Evans & Waggitt, 2023]. We advise that marine mammals and their SACs are included in the assessment using NRW’s position statement on the use of marine mammal management units in HRA [NRW, 2022]. Due to the mobile nature of all Annex II marine mammal features of Special Areas of Conservation (SACs), it is accepted that they do not stay within site boundaries. Where there is a potential and credible effect on the conservation objectives of a site, caselaw supports the need to consider offsite impacts (Moorburg case c-142/16 & Holohan case C-461/17). We generally consider that the appropriate scale at which to consider offsite impacts for marine mammals is the relevant species specific Marine Mammal Management Unit (MMMU). We consider SACs within an MMMU to be ‘functionally linked’ to the surrounding sea because evidence demonstrates a degree of connectivity between SACs and the wider area, and because SACs represent special areas of sea within the MMMU [Chapman & Tyldesley 2016].	This comment has been addressed by the inclusion of a baseline characterisation and evaluation of marine mammals provided in Appendix 13.1 (see ‘<i>Scope of Assessment</i>’ below for more details.)

Summary of NRW comments	Addressed within this report
Comments raised as part of PAC	
Physical Processes have been scoped out; they are not described in any way. Until a baseline description for physical processes is presented, it is not possible to agree with the conclusions in the marine ecology chapter 13 to rule out loss or damage to habitats from changes in physical processes.	This comment has been addressed by the inclusion of a baseline characterisation and evaluation of physical processes provided in Appendix 13.1 (see <i>‘Scope of Assessment’</i> below for more details).
Scoping Report section 13.22 - We cannot agree with the conclusion that there will be no long term changes to hydrodynamics or wave patterns caused by the new jetty until a baseline description of the physical processes of the old dock area and location/size of the proposed jetty is presented in the first instance and an assessment carried out to determine alteration to the prevailing flow patterns (if any), the wave approach and any change to the bedload sediment transport.	

Summary of NRW comments	Addressed within this report
There is a requirement for Physical Processes Baseline understanding of Old Port Talbot Docks - Impacts on habitats and species from a deterioration in water quality from increase in salt water intrusion We note that the proposed jetty works and bank stabilisation are located in a land-locked area of the old Port Talbot Docks which is accessed through lock gates to the south west of the site. It is also noted that the old dock area is predominantly fresh water with infrequent saline intrusion when the lock gates are opened to allow the passage of vessels into the dock. An assessment should be carried out to determine whether the proposed works will lead to an increase in ship activity in the old dock area and lead to a requirement for more frequent opening of the lock gates, which if more frequently opened, will increase the amount of saltwater intrusion and potentially alter the freshwater/saltwater balance. A change from freshwater to saltwater over time will potentially affect ecology.	This comment has been addressed by inclusion of an assessment of increased salinity caused by Dock's gates more frequent usage due to increased vessel traffic within this Chapter (see '<i>Scope of Assessment</i>' below for more details)
Chapter 13 Marine Ecology, para 13.14 - This paragraph states 'the habitat that would be lost within the footprint of the piles, or within the area contained by the sheet piles and backfill, is not afforded protection under UK or EU legislation' is not true as would be covered under WFD regs. Within the WFD assessment the footprint of the area should be considered and if significant compared to water body size (see guidance in Clearing the Waters for All), the potential for deterioration of the Infaunal Quality Index (IQI) element should be assessed (though please note the Benthic Ecology Comments below).	As per Chapter 1: Introduction a WFD Assessment (Appendix 2.4) has been completed and submitted with the Application. The content of the WFD assessment has been considered (where relevant) within this Chapter.
Chapter 13 Marine Ecology, para 13.22 - Please note that the WFD regulations include fish and, as such, should be included in this list.	

Summary of NRW comments	Addressed within this report
We have no specific concerns regarding impacts on marine benthic habitats given the freshwater habitat within the dock. Any biosecurity issues will likely be addressed with standard Construction Environmental Management Plans (CEMPs) and within the marine licence application.	This comment has been noted.
Chapter 13 – Marine ecology (13.18 and 13.19): We acknowledge the additional information supplied in paras 13.18 and 13.19. Given that “Port Talbot Docks are isolated from the wider marine environment via a series of lock gates”, and the absence of any publicly available record of marine mammals within the docks, we agree with the conclusion that “no significant effects are considered likely, and the decision to scope marine mammals out”.	This comment has been noted.
Appendix 13.1 – Jetty Piling Underwater Noise Modelling Report (Section 1.2 Noise propagation modelling): We note the use of a logarithmic calculation to predict transmission loss underwater, however point out that a noise spreading term of 10 is used for cylindrical spreading (rather than spherical), and a spreading term of 20 refers to spherical spreading (rather than cylindrical). NB* This is a minor point and maybe a result of a typological error?	Appendix 13.2 (formally Appendix 13.1) has been updated in response to this comment.
We have no concerns regarding the impact of the project on marine ornithological receptors.	This comment has been noted.
Given the small abstraction volume of 0.042m ³ s ⁻¹ , use of a 1mm mesh screen on the intake pipes, very limited amount of piling (~10 hours of piling in total over a 60 day period), and closure of the Port Talbot Docks gates during piling activities, We agree with the conclusion of the assessment presented in the draft ES and have no concerns about the impact of the project for marine fish.	This comment has been noted.

Scope of the Assessment

- 13.10 Given the extent of comments raised by NRW (**Table 13.2**), it has been considered appropriate to undertake a full evaluation of the proposed scope of assessment with respect to Marine Ecology. As such, the below section does differ from the scope of assessment original presented in the EIA Scoping Report, as well as the ES submitted with PAC. The evaluation of all effects, especially in response to the NRW comments, has been provided within **Appendix 13.1**.

Effects Not Considered to be Significant

- 13.11 The following effects were not considered significant as part of the EIA Scoping Report (**Appendix 2.1**) and, taking account of the changes occurring to the Proposed Scheme, and comments received from NRW (see **Table 13.2**) are considered to remain unchanged and, therefore, are not considered further in this Chapter (with detailed justification provided within the EIA Scoping Report):
- Impacts on habitats and species from a deterioration in water quality from discharges;
 - Disturbance of benthic invertebrates through underwater noise and vibration;
 - Disturbance of species from airborne noise and visual disturbance; and
 - Biological disturbance due to potential introduction and spread of non-native species.
- 13.12 In line with the conclusions provided as part of **Appendix 13.1**, the following effects are also not considered to be significant and will not be considered further in this Chapter:
- Direct or indirect effects for physical processes;
 - Direct or indirect effects upon benthic ecology; and
 - Direct or indirect effects upon marine mammals.

Effects Considered Likely to be Significant

- 13.13 The EIA Scoping Report (**Appendix 2.1**) identified only two effects considered likely to be significant and requiring further assessment as part of this Chapter. However, in line with the evaluation of effects, and commentary from NRW, additional effects have been considered significant and therefore scoped in for further assessment within this Chapter. **Table 13.3** provides a consolidate list of effects considered potentially significant and assessed within this Chapter.

Table 13.3: Effects Considered Likely to be Significant

Likely Significant Effect	Receptors	Applicable Development Stage
Remobilisation of sediments causing increased suspended solids concentration in the water column	Surface waters Ground waters Fish	Construction
Remobilisation of sediments causing potential resuspension of contaminated sediments into the water column	Surface waters Ground waters Fish	Construction
Accidental release of pollutants and sewage waste and into the water column from vessels during transit and construction operations	Surface waters Ground waters Fish	Construction
Accidental release of litter and debris into the water column from vessels during transit and construction operations	Surface waters Ground waters Fish	Construction
Water abstraction affecting water flow and volume within the water body	Surface waters Ground waters Fish	Operation
Removal of biofouling from the subsea structures and leeching of antifouling, anticorrosive agents from coated infrastructure	Surface waters Ground waters Fish	Operation
Accidental release of pollutants and sewage waste and into the water column from vessels during transit and operations	Surface waters Ground waters Fish	Operation

Likely Significant Effect	Receptors	Applicable Development Stage
Accidental release of litter and debris into the water column from vessels during transit and operations	Surface waters Ground waters Fish	Operation
Increased salinity caused by Dock's gates more frequent usage due to increased vessel traffic	Surface waters Ground waters Fish	Operation
Disturbance through underwater noise and vibration	Fish	Construction
Entrapment of fish during abstraction of water	Fish	Construction / Operation

13.14 Fish species of relevance have been determined through the baseline study and associated desk-based review (see '*Baseline Conditions*' below for more details).

Assessment Methodology

Legislative Framework, Policy and Guidance

13.15 The following legislation and policy has informed the assessment of effects within this Chapter:

- UK Marine Policy Statement;
- Welsh National Marine Plan;
- EU Habitats Directive (Directive 92/43/EEC);
- The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations) implements species protection requirements of the Habitats Directive in inshore waters;
- The Eels (England and Wales) Regulations 2009;
- Marine and Coastal Access Act 2009;
- UK Post-2010 Biodiversity Framework, superseding the UK Biodiversity Action Plan (BAP), the UK Government's response to the Convention on Biological Diversity (CBD) 1992;
- Conservation of European Wildlife and Natural Habitats Convention (Bern convention);
- Wildlife and Countryside Act 1981 (as amended);
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- Environment (Wales) Act 2016; which incorporates the same list of species of principal importance as originally presented in Section 41 and 42 of the Natural Environment and Rural Communities Act 2006;
- EC Directive 2008/105/EC on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC;
- The International Convention for the Prevention of Marine Pollution by Ships (MARPOL Convention) 73/78;
- European Commission (EC) Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (the Water Framework Directive), which has been transposed into UK law by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;

- OSPAR Convention;
- EC Directive 2006/7/EC concerning the management of bathing water quality and repealing Directive 76/160/EEC (the Bathing Waters Directive), which is transposed into UK law by The Bathing Water Regulations 2013;
- EC Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive), transposed into UK law by The Marine Strategy Regulations 2010; and
- The Bonn Convention, a framework for supporting legally binding agreements between countries regarding migratory species, such as the Agreement on the Conservation of Small Cetaceans in the Baltic, Iris, and North Seas (ASCOBANS).

13.16 The following guidance has informed the assessment of effects within this Chapter:

- Intake screening for fish, guidance on the design of intakes used for water abstraction activities (Natural Resources Wales, 2021)
- Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CSQG) (Canadian Council of Ministers of the Environment, 2002); and
- Cefas Action Levels for the disposal of dredged material.

Defining the Study Area

13.17 For the purposes of this Chapter a 'Marine Ecology Study Area' has been defined as the aquatic extent of Port Talbot Docks, up to and including the outer lock gate that provides access to the river Afan (**Figure 13.1**), and therefore incorporates impacts from both the Construction Wharf/Jetty and the Marine Loading/Uploading Facility. The Marine Ecology Study Area **does not**:

- Extend beyond the outer lock gate;
- Include feeder channels into Port Talbot Docks; or
- Include the Port Talbot Tidal Harbour.

13.18 The Marine Ecology Study Area has been defined to accommodate the maximum extent of potential underwater noise impacts (worst case) associated with piling during construction. The confined scale of the Marine Ecology Study Area is further influenced by the enclosed nature of Port Talbot Docks, the primarily freshwater/brackish environment, and the isolation from the marine environment via the presence of dual steel lock gates that are only opened to allow passage of vessels and are never opened simultaneously.

13.19 It is noted that the Marine Ecology Study Area differs from the EIA Study Area as indicated in **Figure 13.1**. The EIA Study Area defines the proposed area in which infrastructure may be constructed as part of the planning application. Potential effects upon Marine Ecology would not be limited to the EIA Study Area extent and would also not include terrestrial areas, therefore, the Marine Ecology Study Area has been defined separately to inform this submission.

Background Studies to Inform the ES / Establishing the Baseline

13.20 **Table 13.4** summarises all surveys and reviews undertaken (to date) to inform the assessment presented within this Chapter.

Table 13.4: Background surveys and literature

Survey / Study	Overview	Date of Completion
P&C Project Dragon - Marine Ecology Benthic Survey Report (APBmer, 2022)	This survey consists of drop-down video (DDV) data, collected at 11 sampling stations, located along the dock wall within the EIA Study Area.	December, 2022
Desk-based review	A desk-based review has been conducted to identify the potential species present within the Marine Ecology Study Area, to supplement the findings of the Proposed Scheme's Marine Ecology Benthic Survey.	October, 2023

13.21 It is noted that the Marine Ecology Survey (ABPmer, 2022) sampling station are located along the perimeter of the aquatic extent of the EIA Study Area (as defined in **Figure 13.1**); and, as a consequence, do not characterise the entire Marine Ecology Study Area. Therefore, the baseline Coastal Processes, Sediment and Water Quality, Benthic Ecology, Fish Ecology, and Marine Mammal characterisations have been supplemented by desk-based reviews in the following subsections.

13.22 Following feedback during PAC the Applicant has committed to undertaking further sediment quality and contaminant sampling survey work within the Marine Ecology Study Area. The results of these surveys are not available at the time of submission, but the results of the survey will be submitted for consideration as part of the Application. Where the result of the survey works identified a change to any of the conclusions reached within this Chapter, updates will be made to this Chapter and it will be re-submitted as part of the Application as supplementary information.

Assessment Processes

13.23 Due to the inclusion of impact assessments for sediment and water quality and fish ecology, this section outlines the two processes used to identify significance of effect for each of the topics, as the two are not related.

Assessment Process for Sediment and Water Quality

13.24 The Assessment Methodology Section sets out the general approach to the assessment of likely significant effects that may arise from the Proposed Scheme and provides a general framework to determine the significance of these effects on the identified receptors and pathways.

13.25 The assessment process considers the sensitivity of the particular receptor under consideration and the potential magnitude of the change to the baseline conditions arising from the Proposed Scheme activities. Embedded mitigation measures are considered and integrated within the assessment.

- 13.26 The sensitivity of the receptors for Marine Ecology topics is determined by a combination of parameters, which are heavily influenced by the quality and the value/importance of such receptors, and by their characteristics discussed in the baseline. The ability of the identified receptors to tolerate changes to adapt and recover, determines their overall sensitivity as shown in **Table 13.5**.
- 13.27 The determination of the magnitude of impact provides an indication of the scale, duration, and direction of change in the environment. It refers to the 'size' or 'amount' of a change and is a function of other aspects including duration, frequency, likelihood, extent and reversibility. The criteria for the determination of the magnitude of an impact in relation to Marine Ecology receptors are shown in **Table 13.6**.

Table 13.5: Categories for Assessing the Sensitivity of Sediment and Water Quality Receptors

Sensitivity	Definition
High	High importance and protected on national and international level with classification parameters from Good to Excellent. The receptor is very sensitive to pressures with little or no capacity to tolerate or adapt to changes.
Medium	High importance and protected on national and international level with classification parameters from Good to Excellent. The receptor is sensitive to pressures with moderate capacity to tolerate or adapt to changes.
Low	High importance and protected on national and international level with classification parameters below Good. The receptor is able to tolerate or adapt to changes.
Negligible	Low importance with no protected status and the ability to tolerate and adapt to changes.

Table 13.6: Categories for Assessing the Magnitude of Change for Sediment and Water Quality Receptors

Magnitude	Definition
Large	Permanent changes across the study area, to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Medium	Permanent changes to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Small	Noticeable, temporary change (for part of the Project duration), or barely discernible change for any length of time, restricted to the proximity or immediately adjacent to the Project activity, to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Negligible	Changes which are not discernible from background conditions.

13.28 The consideration of magnitude of a potential impact and sensitivity of the receptor determines an expression, which may be quantitative or qualitative and often informed by expert judgement. Determination of whether predicted effects are likely to be significant is made by relating receptor sensitivity to magnitude of environmental effects as shown in **Table 13.7**.

13.29 The predicted levels of effects are defined as:

- **Major effect** – A fundamental change to the environment or receptor, resulting in a significant effect;
- **Moderate effect** – A material but non-fundamental change to the environment or receptor, resulting in a possible significant effect;
- **Minor effect** – A detectable but non-material change to the environment or receptor resulting in no significant effect or small-scale temporary changes; and
- **Negligible effect** – No detectable change to the environment or receptor resulting in no significant effect.

13.30 Impacts will be assessed separately for the construction, operation and decommissioning phases of the Proposed Scheme.

Table 13.7: Matrix to Support Determining the Level of Effect for Sediment and Water Quality

		Sensitivity (or value / importance) of Receptors			
		High	Medium	Low	Negligible
Magnitude of Change	Large	Major	Moderate to Major	Minor to Moderate	Negligible
	Medium	Moderate to Major	Moderate	Minor	Negligible
	Small	Minor to Moderate	Minor	Negligible to Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Assessment Process for Fish Ecology

- 13.31 The first stage necessary in the assessment of the effects identified in **Table 13.3** has been to establish the likely fish species present within the Marine Ecology Study Area through a desk-based review of relevant literature and other publicly available sources. This step allows for the clear identification of relevant fish species to the two effects identified within **Table 13.3**.
- 13.32 The magnitude of impact (see '*Determining the Magnitude of Change*' below) will then be assessed against the sensitivity of identified receptors to determine the level of effect; and consequently, determine any likely significant effects.
- 13.33 This process will be conducted separately for the scoped-in effects associated with the construction and operational stages of the Proposed Scheme respectively.

Underwater noise assessment

- 13.34 For underwater noise and vibration, project-specific modelling has been undertaken to understand the extent of potential impacts associated with the proposed construction and operation of the jetties/wharves. The underwater noise modelling methodology is based upon an industry standard, logarithmic noise propagation relationship:

$$TL = -N \log_{10} \frac{R}{R_0} - aR$$

where 'TL' is the transmission loss, 'N' is the underwater noise spreading term, 'R' is the distance from the source in metres, 'R₀' is the reference distance from the source, and 'a' is the water absorption (in dB/m). This transmission loss is then added to the noise source level at 1m to predict the noise level at any particular distance (R) from the source.

- 13.35 The model is applied to the numerical piling criteria for potential temporary or permanent injury and/or mortality for fish identified by Popper *et al.* (2014). Injury is defined in this case as auditory injury in the form of potential physical injury including injury to auditory functions on a permanent basis which is termed as Permanent Threshold Shift (PTS).
- 13.36 As set out within **Appendix 13.1**, the exact construction piling programme and details for the proposed construction and operation of the wharves/jetties, and associated mooring dolphins, has not yet been finalised; however it is expected that a combined total of up to 60 tubular and sheet piles will be installed during the construction of the 'construction' wharf/jetty and the 'operation' wharf/jetty. Tubular and sheet piles will not be installed concurrently as each method is specific to the type of jetty/wharf. Therefore the underwater noise modelling has been based on a series of assumptions from data derived from similar projects, robust publicly available reference material, and initial project-specific estimates as to the typical noise output associated with piling activities for both tubular piles and sheet piles. These assumptions include a combined total of up to 60 piles, through a combination of:

- Tubular piles:
 - 400mm diameter steel tubular piles to be installed within 60 days;
 - A maximum of 2 installs per day;
 - A strike rate of 60 per minute over a 5 minute period for each pile;

- Sheet piles:

0.6 m sheet piles to be installed within 60 days;

A maximum of 10 installs per day;

A strike rate of 60 per minute over a 10 minute period for each pile;

- Receptor movement:

All receptors are assumed to be stationary (due to the confinement within the Marine Ecology Study Area) and therefore experience an accumulation of constant noise levels for each strike.

- 13.37 These assumptions are considered sufficient for representing the worst case impact for the purposes of assessment within the ES. The model output provides values of distance from the piling activity at which non-recoverable injury (including mortality and potential mortality), recoverable injury, and temporary hearing loss/threshold shift (TTS) is achieved. For example, if the recoverable injury threshold for fish with an inner ear-swim bladder connection used in hearing (identified as occurring at 203 dB SEL_{CUM}; Popper *et al.*, 2014) occurs at 11m from the pile, and non-recoverable injury threshold (207 dB SEL_{CUM}; Popper *et al.*, 2014) occurs at 7m from the pile, then recoverable injury will occur between 7-11m from the piling activity.
- 13.38 As established within **Chapter 1: Introduction** and **Chapter 2: Approach to EIA**, it is expected that the Marine Licence application will consider the final details of the proposed wharves/jetties, and associated mooring dolphins, and where necessary, revise the outputs of this assessment. However, it is expected that the assumptions are sufficiently conservative that any further assessment would result in lower impact/effect, or at a minimum no worse an impact/effect than reported in the ES. This would be confirmed in the Marine Licence application.
- 13.39 Further information regarding the underwater noise assessment methodology and results is described in full in **Appendix 13.2**.

Reporting of the Environmental Effect and Significance Criteria

- 13.40 The assessment of likely significant environmental effects as a result of the Proposed Scheme has taken into account the construction stage and operational stage. The following sections define the approach adopted within the assessment for the determination of sensitivity (or value/importance), magnitude of change (or impact), the level of effect and significance.

Determining Sensitivity of Receptor

- 13.41 The sensitivity of affected receptors has been considered on a scale of **High, Medium, Low or Negligible**.
- 13.42 The level of sensitivity of a receptor to a potential impact/effect is dependent on the commercial or ecological value of the receptor, and the receptor's ability to tolerate, adapt, and/or recover from a potential impact/effect. For the purposes of this assessment, the categories for assessing the level of sensitivity for each receptor is shown in **Table 13.8**.

Table 13.8: Categories for Assessing the Sensitivity of Fish Receptors

Sensitivity	Description
High	An internationally or nationally important species or commercial stock with a very limited tolerance of, and inability to adapt to, the effect. The receptor is expected to be unable to recover from the effect to an acceptable level (no recovery within 10 years), likely as a result of mortality.
Medium	A regionally² important species or commercial stock with a very limited tolerance of, and inability to adapt to, the effect. The receptor is expected to be unable to recover from the effect to an acceptable level (no recovery within 10 years). OR An internationally or nationally important species or commercial stock with a limited tolerance of, and a limited ability to adapt to, the effect. The receptor is expected to show a moderate recoverability from the effect to an acceptable level within 1-5 years.
Low	A locally important species or commercial stock in Swansea Bay and/or the river Afan with a limited tolerance of, and a limited ability to adapt to, the effect. The receptor is expected to show a limited recoverability from the effect to an acceptable level within 5-10 years. OR A regionally important species or commercial stock in the Bristol Channel with some tolerance of, and ability to adapt to, the effect. The receptor is expected to show a moderate recoverability from the effect to an acceptable level within 1-5 years. OR An internationally or nationally important species or commercial stock with a high tolerance of, and ability to adapt quickly to, the effect. The receptor is expected to show a high recoverability from the effect to an acceptable level within 0-6 months.
Negligible	An internationally, nationally, or regionally important species or commercial stock with a complete tolerance of the effect. The receptor is expected to show a high recoverability immediately following cessation of the effect. OR A locally important species or commercial stock in Swansea Bay and/or the river Afan with a high tolerance of, and ability to adapt quickly to, the effect. The receptor is expected to show a high recoverability from the effect to an acceptable level within 0-6 months.

Entrapment of fish during abstraction of water

- 13.43 For the purposes of this assessment, diadromous, freshwater, and marine species will be categorised as one overarching receptor group ('fish'), for assessing the potential for impact associated with entrapment during abstraction of water, due to similarities in their potential exposure and sensitivity to entrapment. Diadromous fish are noted as having a higher ecological/conservation value than the other freshwater and marine species identified; however, it has been assumed that 100% mortality occurs for all fish species entrained and or impinged as a result of water abstraction activities, and therefore all fish species are considered to have a high sensitivity to the effect.

Underwater noise and vibration

- 13.44 The responses of all fish species to noise and vibration varies from minor immediate changes in behaviour to physical damage of physiological structures. Popper *et al.* (2014) established criterion for determining the likely sensitivity of fish species to noise and vibration, which assigned the greatest level of sensitivity to fish species with a swim bladder-inner ear connection used in hearing. Roach is the only species identified within the Marine Ecology Study Area that has been categorised within the most sensitive 'fish with a swim bladder-inner ear connection used in hearing' receptor group (Laming and Morrow, 1981^{vi}).
- 13.45 Noise and vibration has the potential to result in physiological damage to species with a swim bladder-inner ear connection used in hearing, and for that reason, the receptor group is assumed to have no adaptability to high intensity impulse sounds (SPL_{peak}) and cumulative (SEL_{cum}) noise sources that exceed TTS and PTS thresholds, despite fish being capable of repairing sensory cells (Smith *et al.*, 2011^{vii} in Popper *et al.*, 2014).
- 13.46 Fish species with the connection present are considered to have a greater sensitivity to underwater noise and vibration, in that they are more likely to experience damage to auditory systems via TTS and PTS. Other species, that lack the connection and rely on particle movement to detect underwater noise and vibration, are considered less sensitive to underwater noise. Therefore, for the purposes of assessment, the fish species identified as present will be categorised into two receptor groups: 'Fish species with a swim bladder-inner ear connection used in hearing' and 'Fish species without a swim bladder-inner ear connection used in hearing'.

Determining the Magnitude of Change

- 13.47 The magnitude of change has been considered as the change experienced from the current baseline conditions at the sensitive receptor and has been considered on a scale of **large**, **medium**, **small** or **negligible**.
- 13.48 The magnitude of change is dependent on the spatial scale, duration, frequency, and potential to return to baseline levels of the aforementioned potential effect. For the purposes of this report, the categories for assessing the magnitude of change, in relation to fish receptors scoped-in for assessment, is shown in **Table 13.9**.

Table 13.9: Categories for Assessing the Magnitude of Change for Fish Receptors

Magnitude	Description
Large	A scale of magnitude greater than the natural variation of effect within background conditions. OR A duration of measurable effect remaining after 10 years from the first instance. OR A continuous occurrence of effect. OR An irreversible effect.
Medium	A scale of magnitude noticeable above the background conditions but remains within the natural variation of effect. OR A duration of measurable effect remaining between 5-10 years from the first instance. OR A regular, but not continuous occurrence of effect. OR A reversible effect that returns to baseline conditions within 5-10 years from the first instance.
Small	A scale of magnitude barely noticeable above the background conditions and remains well-within the natural variation of effect. OR A duration of measurable effect remaining between 1-5 years from the first instance. OR An irregular occurrence of effect. OR A reversible effect that returns to baseline conditions within 1-5 years from the first instance.
Negligible	A scale of magnitude not noticeable above the background conditions and natural variation of effect. OR A duration of measurable effect remaining within 1 year from the first instance. OR A highly infrequent occurrence of effect. OR A reversible effect that returns to baseline conditions within 1 year from the first instance.

Determining the Level of Effect

- 13.49 The level of effect has been informed by the magnitude of change due to the Proposed Scheme and the evaluation of the sensitivity of the affected receptor. The level of effect has been determined using professional judgement and **Table 13.10** has been a tool which has assisted with this process.
- 13.50 Whilst **Table 13.10** provides ranges, the level of effect is confirmed as a single level and not a range, informed by professional judgement. For each effect, it has been concluded whether the effect is '*beneficial*' or '*adverse*'.
- 13.51 The following terms have been used to define the level of the effects identified and these can be 'beneficial' or 'adverse':
- **Major effect:** where the Proposed Scheme is likely to cause a considerable change from the baseline conditions and the receptor has limited adaptability, tolerance or recoverability or is of the highest sensitivity;
 - **Moderate effect:** where the Proposed Scheme is likely to cause either a considerable change from the baseline conditions on a receptor which has a degree of adaptability, tolerance or recoverability or a less than considerable change at a receptor that has limited adaptability, tolerance or recoverability;
 - **Minor effect:** where the Proposed Scheme is likely to cause a small, but noticeable change from the baseline conditions on a receptor which has limited adaptability, tolerance or recoverability or is of the highest sensitivity; or where the Proposed Scheme is likely to cause a considerable change from the baseline conditions at a receptor which can adapt, is tolerant of the change or/and can recover from the change; and
 - **Negligible:** where the Proposed Scheme is unlikely to cause a noticeable change at a receptor, despite its level of sensitivity or there is a considerable change at a receptor which is not considered sensitive to a change.
- 13.52 The duration of the effect has been assessed as either 'short-term', 'medium-term' or 'long-term'. Short-term is considered to be up to 1 year, medium-term is considered to be between 1 and 10 years and long-term is considered to be greater than 10 years.

Determining Significance

- 13.53 For each effect, a statement has been made as to whether the level of effect is '**Significant**' or '**Not Significant**'. This determination has been based on professional judgement and/or relevant guidance/legislation where applicable.
- 13.54 Significance has only been concluded for residual effects (i.e., following the identification of secondary mitigation).

Table 13.10: Matrix to Support Determining the Level of Effect for Fish Ecology

		Sensitivity (or value / importance) of Receptors			
		High	Medium	Low	Negligible
Magnitude of Change	Large	Major	Moderate to Major	Minor to Moderate	Negligible
	Medium	Moderate to Major	Moderate	Minor	Negligible
	Small	Minor to Moderate	Minor	Negligible to Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Baseline Conditions

- 13.55 The baseline section below relates to those effects scoped into the assessment within this Chapter (as set out in **Table 13.3**) and replicates the baseline information set out within **Appendix 13.1** to evaluate the potentially significant effects. Baseline information for effects scoped out is provided in **Appendix 13.1** and not represented as these effects are not being taken forward for further assessment within this Chapter.

General

- 13.56 The Site is set within the industrial town of Port Talbot, known for its significant steelmaking history; the Port Talbot Steelworks is one of the largest in Europe. Driven by the steelworks emissions, a source of particulate matter pollution, the area is affected by poor air quality (Hayes and Chatterton, 2009²). The Port Talbot Docks are separate from the steelworks but are situated in a heavily industrialised area, bounded to the north and east by a private road, a disused railway line to the south, and existing industrial development to the west. Further to the east and south of the proposed development site lies the operational Port Talbot Steelworks, and Hanson Cement Works lies to the north. The Site forms part of the wider dock facilities of Port Talbot, operated by Associated British Ports (ABP).

Sediment Quality

- 13.57 Sediments are a major repository of anthropogenic chemical compounds and pollutants, driven by water column contamination, which can carry and transport their particulate and dissolved forms over long distances, before precipitating or sinking to the bottom. Contaminant concentration in sediments can vary spatially, seasonally and interannually; however, particulate grain size and organic carbon content are critical co-factors, affecting distribution and concentrations. Fine sediments of smaller grain size, with greater amount of organic matter concentration, have been found to trap and retain a greater amount of deposited compounds than coarser substrates (Cefas, 2012³).
- 13.58 *In situ* survey data (imagery data) show a substrate comprising primarily of fine muddy sediment (at 6 stations), rocky substrate (at 4 of the stations), and 1 station consisting of mixed sediment with a combination of fine muddy sediment and loose pebbles and cobbles. Currently, no chemistry data are available for the proposed development area, however, polluted particulate matter from the atmosphere, urban run-off, and historical industrial discharges, prior to strict legislative guidance on pollution, are expected to influence the quality of the sediment. For instance, complex constituents, including phenol, cyanide, ammonia, oil and grease, and suspended solids, are present in the effluents of coke oven from the steelworks (Suvio, 2011), which could have settled into the sediment over the course of many years of unregulated discharge, in the past century.
- 13.59 The existing steelworks in Port Talbot Docks are currently subject to consent limits for discharges to the aqueous environment, which are constantly monitored; therefore, active sources of contaminants are currently limited and infrequent, primarily originating from possible water treatment system malfunctions. Currently, only natural coolant water from the steelworks, which is not affected by industrial processing impurities, is discharged into Port Talbot Docks, limiting its role as a potential source of active pollution. However, air pollution in the form of particulate matter PM₁₀ and polycyclic aromatic hydrocarbons (PAH) is actively found at the steelworks site (Neath Port Talbot County Borough Council, 2020⁴), which is expected to indirectly affect (via sink) the dock water, creating a pathway for reducing sediment quality.

- 13.60 The current absence of *in situ* data leads to a number of uncertainties and, therefore, the worst case scenario has been assumed. Potentially high concentrations of sedimentary organic matter, associated with freshwater and enclosed bodies of water (Stumn *et al.*, 2012⁵), are expected within the Marine Ecology Study Area, composed primarily of deposited material and detritus originated from decaying biological activity. This is because, in the absence of active sediment transport driven by tidal dynamics (flushing action), organic matter sinks directly through the water column and accumulates passively on the bottom of the dock, decaying and remineralising over time, and releasing dissolved inorganic nutrients. The accumulation of organic material and finer sediments (e.g. from dust) therefore promotes the accumulation of other potentially polluting substance. Precautionarily, and in the worst case scenario, metal contaminants at Cefas Action Level (AL) 2 concentrations and CSQG Probable Effects Levels (PELs) of hydrocarbons, such as Polycyclic Aromatic Hydrocarbons (PAHs) and Total Hydrocarbons (THCs) could, potentially, be present within the Marine Ecology Study Area.
- 13.61 Sensitive receptors to sediment quality would typically include surface waters, ground waters, and biota. For the purposes of this assessment, effects upon physical processes, benthic ecology, and marine mammals have been scoped out of consideration, and therefore will not be included as receptors in relation to effects on sediment quality. As such, surface waters, ground waters, and fish represent the colloquial term 'receptors' used within the assessment of sediment quality.

Water quality

- 13.62 Port Talbot Docks are classified as a heavily modified transitional water body under the Water Framework Directive (WFD) (Afan Estuary Incl. Docks ID GB541005800600), with an overall status of Moderate ecological potential (Water Watch Wales, 2021⁶). The transitional water body has an overall Chemical Status of Good potential, indicating High status of EQS Dangerous Substances concentrations (priority hazardous substances have not been assessed in 2021) and highlighting unpolluted levels of inorganic macronutrient at the stations sampled, scoring Good for Dissolved Inorganic Nitrogen concentration and High for Dissolved Oxygen concentration.
- 13.63 The water within Port Talbot Docks is abstracted by Port Talbot steelworks to be used as a coolant. At peak production levels in 2007, the limit of abstraction volume was 206,343,000 m³/yr (Suvio 2011). Process water is treated, impurities are removed, and the water is released back into Port Talbot Docks. The water, when recycled back into the dock, is typically at least 3°C warmer than neighbouring bodies of water (Holmes and Callaway, 2021⁷).
- 13.64 The water within Port Talbot Docks is classified as freshwater, influenced by saline water which is introduced through the opening of the dock gates. On average eight vessels per month transit through the seaward lock gates (Holmes and Callaway, 2021) which leads to brackish conditions, exacerbated by seasonal variations driven by increased temperatures, solar radiation, decreased freshwater input (from the Afan River through a weir) and evaporation in the summer months. Typical analysis of Dock water is (Suvio, 2011):
- pH 7.6;
 - Chloride ranging from 110 ppm to 1,060 ppm (seasonal variation); and

- Conductivity ranging from 486 $\mu\text{S}/\text{cm}$ to 2,840 $\mu\text{S}/\text{cm}$.
- 13.65 Brackish water is defined as having a chloride content more than 400 ppm or an electrical conductivity greater than 1,500 $\mu\text{S}/\text{cm}$ (Shevah, 2014⁸).
- 13.66 SSC for the Steelworks service water (collected from different locations within and outside the Docks), has been measured at ~12 mg/l. Background SSC within the river Afan ranges from 5 mg/l to 170 mg/l (Suvio, 2011), indicating elevated background turbidity in the area generally associated with freshwater and muddy sediments. This correlates with the poor water clarity identified within the benthic survey (ABPmer, 2022), and suggests that the background SSC within the Marine Ecology Study Area falls within the normal range of the surrounding waterbodies.
- 13.67 Sensitive receptors to water quality would typically include surface waters, ground waters, and biota. For the purposes of this assessment, effects upon physical processes, benthic ecology, and marine mammals have been scoped out of consideration, and therefore will not be included as receptors in relation to effects on water quality. As such, surface waters, ground waters, and fish represent the colloquial term ‘receptors’ used within the assessment of water quality.

Fish Ecology

- 13.68 The fish species identified within the Marine Ecology Study Area include freshwater game species, hardy marine species, and diadromous species (Angling Trust, 2023⁹). As a result, the Marine Ecology Study Area is a popular haunt for recreational fishermen. However, no commercial fishing occurs within Port Talbot Docks and, therefore, the fish resident within the Marine Ecology Study Area are not considered of commercial importance. Species of fish that are considered potentially present within Port Talbot Docks, based on the desk-based review and online data, are presented in **Table 3.11**.
- 13.69 The freshwater species present within the Marine Ecology Study Area, such as roach *Rutilus rutilus*, rudd *Scardinius erythrophthalmus*, perch *Perca fluviatilis*, and pike *Esox lucius*, are characteristic of larger freshwater ponds, lakes, and reservoirs in Wales (ABPmer, 2022; Wildlife Trust Wales, 2023; Fishing in Wales, 2023¹⁰), and are, therefore, expected to be resident within Port Talbot Docks. These species are native to freshwater environments in the UK, and Port Talbot Docks are not thought to be artificially stocked with additional, non-native, coarse (game) fish stocks. Tench *Tinca tinca* are less common in Welsh waterways than in the remainder of the UK, however this species is likely to prefer silt sediments within the Marine Ecology Study Area (Wildlife Trust Wales, 2023¹¹).
- 13.70 The marine species present within the Marine Ecology Study Area are limited, due to the predominantly freshwater environment within Port Talbot Docks, with periodic increases in salinity bringing salt/brackish water into Port Talbot Docks. Whilst unidentified, there is potential for marine species to enter the Marine Ecology Study Area when lock gates are open, however this is unlikely unless species are well adapted to the brackish environment outside the lock gates.
- 13.71 Bass *Dicentrarchus labrax* is the only marine species (that is not diadromous) identified as present within the Marine Ecology Study Area (APBmer, 2022; Angling Trust, 2023). This species is naturally found within marine and estuarine environments and is, therefore, considered highly adaptable to both (brackish) freshwater and saltwater environments. It is

expected that this species will be present in the southwest corner of the Marine Ecology Study Area, around the lock gates, where salinity is likely to be greatest.

- 13.72 Diadromous species that may be present within the Marine Ecology Study Area are likely to be in transit to and from freshwater spawning grounds (anadromous species) or marine spawning grounds (catadromous species). The river Afan itself provides a migratory pathway for diadromous fish, which are able to navigate up-and down-river, through the inclusion of a fish pass at the newly refurbished Green Park Weir (Afan Valley Angling, 2023¹²); which feeds water from the river Afan into Port Talbot Docks via a feeder channel. The Green Park Weir also includes a smolt screen, which is intended to prevent Atlantic salmon *Salmo salar* smolts from entering Port Talbot Docks via the feeder channel and, therefore, from being caught in a 'migratory trap' and unable to complete their respective spawning cycles (Hawkins *et al.*, 2020¹³).

Table 13.11: Fish species identified within the Marine Ecology Study Area

Species	Receptor group	Description	Reference
Bass <i>Dicentrarchus labrax</i>	Fish with swim bladders not involved in hearing.	A marine fish. A common predatory species around southern UK coastlines, forming schools of young fish before becoming more independent when mature. Prefers shallow marine environments, but is known to reside in brackish estuarine environments, particularly in summer months.	Angling Trust, 2023; APBmer, 2022; Wierniki <i>et al.</i> , 2020 ¹⁴ ; Kastelein <i>et al.</i> , 2017 ¹⁵ ; Popper <i>et al.</i> , 2014; Reeve, 2007 ¹⁶ .
Mullet spp. <i>Chelon</i> spp.	Fish with swim bladders not involved in hearing.	A diadromous fish. Grey thick-lipped mullet (<i>Chelon labrosus</i>) is common within southern UK estuarine environments, but also present in Scottish waters, and is the most likely species present within the Marine Ecology Study Area. Thin-lipped mullet (<i>C. ramada</i>) is potentially present within the Marine Ecology Study Area during warmer months. Both species feed on algae and vegetation.	Angling Trust, 2023; APBmer, 2022; Wierniki <i>et al.</i> , 2020; Barnes, 2008 ¹⁷ ; Thompson, 1990 ¹⁸ .
Brown/sea trout <i>Salmo trutta</i>	Fish with swim bladders not involved in hearing.	A diadromous fish. Specifically, an anadromous species and therefore present within the coastal marine environment after maturing. Returns to freshwater to spawn as is characteristic of salmonids. A predatory species of small fish and invertebrates.	Angling Trust, 2023; APBmer, 2022; Harding <i>et al.</i> , 2016 ¹⁹ ; Nash, 2021 ²⁰ .
Atlantic salmon <i>Salmo salar</i>	Fish with swim bladders not involved in hearing.	A diadromous fish. Specifically, an anadromous species and, therefore, present within the coastal marine environment after maturing. Returns to freshwater to spawn as is characteristic of salmonids. This species has been included as a precaution due to the presence of Atlantic salmon on the river Afan, and the consequent, but very limited, potential for the species to enter the Marine Ecology Study Area via the lock gates. There is also	APBmer, 2022; Cefas, 2022 ²¹ ; Harding <i>et al.</i> , 2016; Jensen <i>et al.</i> , 2012 ²² ; Mawle <i>et al.</i> , 2003 ²³ .

Species	Receptor group	Description	Reference
		very limited potential for smolts to be present within the Marine Ecology Study Area due to the smolt screen present on the Green Park Weir. Despite this, it cannot be determined that Atlantic salmon will not be present within the Marine Ecology Study Area, particularly as brown/sea trout are identified as present, despite being known to have larger smolt sizes than Atlantic salmon. A predatory species of small fish and invertebrates.	
Bream <i>Abramis brama</i>	Fish with a swim bladder not involved in hearing.	A freshwater fish. A potamodromous species which is mostly present in rivers, lakes and backwaters. However, this species can also be found in brackish waters. Adults are usually found in shoals in these habitats, whereas larvae and juveniles are present in still water bodies. Adults feed on insects, small crustaceans, molluscs, and plants.	Angling Trust, 2023; APBmer, 2022; Kirin and Chunchukova, 2017²⁴.
Pike <i>Esox lucius</i>	Fish with a swim bladder not involved in hearing.	A freshwater fish. A species which can be found in eutrophic and oligotrophic lakes, rivers and brackish waters. This species is predatory towards other fish species and is a keystone freshwater species.	Angling Trust, 2023; APBmer, 2022; Wierniki <i>et al.</i>, 2020; Forsman <i>et al.</i>, 2015²⁵; Mann <i>et al.</i>, 2007²⁶.
Perch <i>Perca fluviatilis</i>	Fish with a swim bladder not involved in hearing.	A freshwater fish. This species is common throughout the UK's rivers, ponds, and lakes. Perch is predatory and feeds on other fish and invertebrates.	Angling Trust, 2023; Wildlife Trust Wales, 2023 APBmer, 2022; Wierniki <i>et al.</i>, 2020; Amoser <i>et al.</i>, 2004²⁷.
Roach	Fish with a swim bladder-inner ear	A freshwater fish.	Angling Trust, 2023;

Species	Receptor group	Description	Reference
<i>Rutilus rutilus</i> .	connection used in hearing.	This freshwater species commonly found in ponds, lakes, and rivers in shoals. This species is omnivorous and will feed on invertebrates, fish eggs, plants, and seeds. This species is noted for having developed ossicles connecting the swim bladder to the inner ear, and thus expresses a swim bladder-inner ear connection used in hearing.	Wildlife Trusts, 2023 ²⁸ ; APBmer, 2022; Wierniki <i>et al.</i> , 2020; Amoser <i>et al.</i> , 2004; Laming and Morrow, 1981.
Rudd <i>Scardinius erythrophthalmus</i>	Fish with a swim bladder not involved in hearing.	A freshwater fish. This species is usually found in stagnant lakes, dams, reservoirs, or slowly flowing streams. Rudd prefer areas rich in plants as they spawn on the vegetation. Juveniles consume unicellular algae and phytoplankton, with their diet shifting towards soft macrophytes. Their diet can also be seasonal, as they will prefer to consume zooplankton and small invertebrates in the spring and autumn, and macrophytes and algae in the summer.	Angling Trust, 2023; APBmer, 2022; Zapletal <i>et al.</i> , 2019 ²⁹ ; Wolnicki <i>et al.</i> , 2009 ³⁰ .
Tench <i>Tinca tinca</i>	Fish with a swim bladder not involved in hearing.	A freshwater fish. This species is present in lowland lakes and slow-flowing rivers throughout the UK which have lots of plant life. This species tends to conceal itself within vegetation. Tench consumes invertebrates such as pond snails and will spawn in the summer months.	Angling Trust, 2023; Wildlife Trust Wales, 2023; APBmer, 2022.
European eel <i>Anguilla anguilla</i>	Fish with a swim bladder not involved in hearing.	A diadromous fish. Specifically, a catadromous species and therefore present within freshwater environments for the majority of the lifecycle. The species exclusively returns to the Sargasso Sea to spawn. European eel is well known to occupy riverine environments along the south coast of Wales and has been identified as present within the Marine Ecology Study Area.	Angling Trust, 2023; APBmer, 2022; Piper <i>et al.</i> , 2019 ³¹ ; Pelster, 2017 ³² .

- 13.73 Additional species, such as Allis shad *Alosa alosa*, twaite shad *Alosa fallax*, river lamprey *Lampetra fluviatilis*, and sea lamprey *Petromyzon marinus* are present within the wider Swansea Bay area (Tidal Lagoon (Swansea Bay) PLC, 2017³³; Lowe *et al.*, 2022³⁴; Countryside Council for Wales, 2009³⁵). However, based on the documents reviewed (as outlined in the reference list), there are no records of these species within the Marine Ecology Study Area, or the river Afan. In addition, the Marine Ecology Study Area and the river Afan are not considered important as facilitators for the spawning migrations of these species, and therefore these species are not considered present within the Marine Ecology Study Area.
- 13.74 Most diadromous fish species identified as potentially present within the Marine Ecology Study Area are of high conservation value and afforded protection within UK and EU legislation. **Table 13.12** summarises the legislation afforded to each diadromous fish species identified within the Marine Ecology Study Area. There are no designated Special Areas of Conservation (SAC) or Natura2000 sites that afford protection to diadromous fish species identified in **Table 13.12**. The closest SAC with designated fish populations is the Carmarthen Bay and Estuaries/Bae Caerfyrddin ac Aberoedd SAC designated for diadromous fish species that, due to distance from the Marine Ecology Study Area are not considered present within the Marine Ecology Study Area.

Table 13.12: Conservation status and protection measures afforded to diadromous fish species within the Marine Ecology Study Area

Species	Conservation Status (Europe)	UK/EU Protection
Mullet spp. <i>Chelon</i> spp.	Listed as Least Concern on the IUCN Red List of Threatened Species (Freyhof, 2010 ³⁶).	None
Brown/sea trout <i>S. trutta</i>	Listed as Least Concern on the IUCN Red List of Threatened Species (Freyhof, 2011 ³⁷).	A UK Biodiversity Framework (2010) Priority Fish Species (superseding the UK Biodiversity Action Plan (2007)). Listed as a Schedule 7 Priority Species under the environmental (Wales) Act, 2016.
Atlantic salmon <i>S. salar</i>	Listed as Vulnerable on the IUCN Red List of Threatened Species (Freyhof, 2014 ³⁸). Assessed as having Poor Status (assessed in 2022) on the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR, 2022b ³⁹).	A UK Biodiversity Framework (2010) Priority Fish Species (superseding the UK Biodiversity Action Plan (2007)). Listed as an Annex II and Annex V Protected Species (EU Habitats Directive). Note this listing only applies in freshwater. Listed as a Schedule 7 Priority Species under the environmental (Wales) Act, 2016. Listed within the OSPAR List of Threatened and/or Declining Species and Habitats
European eel <i>A. anguilla</i>	Listed as Critically Endangered on the IUCN Red List of Threatened Species (Freyhof and Kottelat, 2010 ⁴⁰). Assessed as having Poor Status (assessed in 2022) on the OSPAR List of Threatened and/or Declining Species and Habitats (OSPAR, 2022a ⁴¹).	A UK Biodiversity Framework (2010) Priority Fish Species (superseding the UK Biodiversity Action Plan (2007)). Listed as a Schedule 7 Priority Species under the environmental (Wales) Act, 2016. Protected under the England and Wales Eel Management Plan.

Future Baseline

- 13.75 Due to significant infrastructure works undertaken to construct and maintain Port Talbot Docks (Swansea Docks, 2023), the habitats within the Marine Ecology Study Area are not well established. The fish species identified within the Marine Ecology Study Area are considered opportunistic, and therefore unlikely to deviate from baseline composition in the near future.
- 13.76 However, the advancement of climate change is likely to introduce warmer water fish species to southern UK coastlines and, as such, there is potential for species such as thin-lipped mullet to become more prevalent within the Marine Ecology Study Area. However, predicting the future baseline is challenging, and dependent on many external factors that cannot be identified within the scope of this Proposed Scheme. As such, the future baseline is assumed to be similar to the current baseline, until evidence becomes available to suggest otherwise.

Primary and Tertiary Mitigation

Construction Stage

- 13.77 The following primary mitigation, which has been evaluated as part of the construction stage assessment for sediment quality, water quality, and fish receptors, is outlined below.
- The steel lock gates at the entrance of Port Talbot Docks will be closed during any piling activities within the environment associated with the construction of the Proposed Scheme, to isolate underwater noise and vibration associated with the Proposed Scheme from the mouth of the river Afan and the subsequent marine environment. The closure of the Docks will also help to confine any dispersion of potentially contaminated sediments and contain the sediment plume within the waters of the Proposed Scheme area;
 - A detailed Construction Environmental Management Plan (CEMP) will outline measures for pollution prevention, biosecurity assessment and waste management during construction, including the use of low-toxicity paints for submerged infrastructure (e.g. piles); and
 - All Project vessels will follow the requirements set out in The International Convention for the Prevention of Pollution from Ships (MARPOL).

Operational Stage

- 13.78 The following primary mitigation, which has been evaluated as part of the operational stage assessment for sediment quality, water quality, and fish receptors, is outlined below:
- Intake screen mesh grade of 1 mm will be included in the design of water intakes used for abstraction activities during the operational stage, in line with NRW guidance on prevention of entrainment during water abstraction activities; and
 - All Project vessels will follow the requirements set out in The International Convention for the Prevention of Pollution from Ships (MARPOL).

Assessment of Effects, Secondary Mitigation and Residual Effects

- 13.79 The impacts of the Proposed Scheme activities on WFD designated water bodies and protected sites are addressed in the WFD Assessment (**Appendix 2.4**) A brief summary of the outputs of the WFD Assessment is set out in **Chapter 2: Approach to EIA**.

Construction Stage

Remobilisation of sediments causing increased suspended solids concentration in the water column

- 13.80 During the construction phase, the existing derelict wooden quay is to be removed, and a new wharf/jetty is to be installed with the banks/dock walls also being strengthened/reinforced. The sediment layer will therefore be disturbed by the removal process and consequently penetrated for the installation (depth unknown) of new sheet piles and tubular piles. This will lead to sediment disturbance and the release of a finer sediment plume into the water column. The sediments will remain in suspension and transported up to a maximum of approximately 700 m from the source, remaining within the Marine Ecology Study Area.
- 13.81 The sensitivity of the receptors is determined by their physico-chemical attributes and their ability to tolerate and recover from the effects of increased SSC and resuspended sediment deposition. The overall sensitivity of Sediment Quality is **Low** as the impact will be limited to the immediate impact area and the receptor is highly tolerant to change. The sensitivity of Water Quality is **Medium**, due to the reduced ability to recover quickly driven by the absence of significant tidal activity, promoting flushing and plume clearance. The plume is expected to remain in suspension for a number of hours to days, affecting water clarity for a period of time upon completion of the construction activities.
- 13.82 Although the sediments comprise primarily of fine particles, the magnitude of change is expected to be small, due to the small area the construction activities will actively disturb, which includes a total area footprint of 3,015.93 m² (60 tubular piles 40 cm in diameter) for sediment displacement, not including the area of influence and settling of the plume. Additionally, with the Dock's gate closed during construction (embedded mitigation), the disturbance and effects will remain strictly localised to the Dock's area of influence. Furthermore, with limited sediment and water transport inputs in the area, the sediment plume is expected to remain *in situ* and within the proximity of the footprint of the activity, remaining temporarily resuspended. An increase in SSC is not expected to considerably impact the water column and be overall comparable to weather driven increases of SSC (see the '*Baseline*' hydrodynamics subsections within the Physical Processes section), lasting for a similar amount of time.
- 13.83 Overall, the sensitivity of the receptors to the effect associated with increased SSC and deposition during construction has been assessed as low for Sediment Quality and medium for Water Quality. The magnitude of change is considered to be low. Therefore, there is considered to be a direct, temporary, short-term adverse effect which is considered to be **Minor to Negligible**.

Secondary Mitigation or Enhancement

- 13.84 No additional mitigation measures are required.

Residual Effect

- 13.85 In the absence of secondary mitigation, the residual effect is the same as that reporting in the pre-mitigation scenario.

Significance

- 13.86 This effect is considered to be **Not Significant**.

Remobilisation of sediments causing potential resuspension of contaminated sediments into the water column

- 13.87 During the construction phase, the existing derelict wooden quay is to be removed, and two new wharves/jetties are to be installed with the banks/dock walls also being strengthened/reinforced. The sediment layer will therefore be disturbed by the removal process and consequently penetrated for the installation (depth unknown) of new sheet piles and tubular piles. This will lead to sediments disturbance and the release of a potentially contaminated sediment plume into the water column. The sediments and the chemical substances will remain in suspension and be transported over distance.
- 13.88 The impact intensity and range will vary depending on the activity, the substrate type and the baseline conditions of the sediment quality. At this stage of the design process, construction techniques for the proposed construction wharf/jetty and the marine loading/unloading facility are still to be confirmed. A worst case scenario considers a small amount of seabed clearance (removal or shifting of small obstructions) for each facility prior to piling (hammering), therefore limiting disturbance. Currently the depth penetration of the piles is unknown, and a total volume of sediment displacement cannot be estimated; however, increased suspended fine sediment concentrations are expected to be limited to approximately 700 m from the pile, based on a worst-case estimate of current speed within the dock.
- 13.89 The sensitivity of the receptors is determined by their physico-chemical attributes and their ability to tolerate and recover from the effects of resuspended contaminated sediments and consequential deposition. The overall sensitivity of Sediment Quality is **Low** as the impact will be limited to the immediate impact area and the receptor is highly tolerant to changes without the need to recover or adapt. The sensitivity of Water Quality is **Medium**, due to the reduced ability to recover quickly driven by the absence of significant tidal activity promoting flushing and plume clearance. The potentially contaminated plume is expected to remain in suspension to a maximum distance of approximately 700 m from the pile and settle quickly (within hours) due to the lack of circulation within the dock. This results in potential effects upon water quality and its chemical properties for a small period of time during the construction stage.
- 13.90 Although the sediments comprise primarily of fine particles, the magnitude of change is expected to be **Low**, due to the small area the construction activities will actively disturb, which includes a total area footprint of 3,015.93 m² (60 tubular piles 40 cm in diameter) for sediment displacement, not including the area of influence and settling of the plume. Additionally, with the Dock's gate closed during construction (see '*Primary Mitigation*'), the impact disturbance and effects will remain strictly localised to the Dock's area of influence. Furthermore, with limited sediment and water transport inputs in the area, the sediment plume is expected to remain *in situ* and within the proximity of the footprint of the activity, remaining temporarily resuspended.

- 13.91 However, due to the fine nature of the substrate in consideration, and the unlikely but potential presence of polluted sediments (Cefas AL2 metals and CCEM PEL hydrocarbons), the magnitude of change is categorised as **Medium**.
- 13.92 Overall, the sensitivity of the receptors to the impacts associated with the potential release of contaminated sediments into the water column during construction has been assessed as Low for Sediment Quality and Medium for Water Quality. The magnitude of change is considered to be Medium. Therefore, there is considered to be a direct, temporary, short-term adverse effect which is considered to be **Moderate to Minor**.

Secondary Mitigation or Enhancement

- 13.93 This assessment has been conducted in the absence of site-specific data regarding contamination levels within the sediment. Sediment sampling is currently underway at the time of writing, and will be used to validate the findings of the above assessment. Based upon the findings of the initial assessment, the following mitigation measure has been proposed on a precautionary basis:
- Use of temporary silt curtains to control plume dispersion and therefore shield the surrounding environment from potentially contaminated sediment. The curtains will remain in place for a time to allow for dispersed sediments to settle back to the bottom and remain *in situ*.
- 13.94 Refer to the WFD Assessment (**Appendix 2.4**) for further information on mitigation measures (such as the sediment management plan) and potential impacts on the WFD statutory receptors.

Residual Effect

- 13.95 The sensitivity of the receptors to the impacts associated with the potential release of contaminated sediments into the water column during construction remains as Low for Sediment Quality and Medium for Water Quality. The magnitude of change following implementation of secondary mitigation is considered to be **Small**. Therefore, there is considered to be a direct, temporary, short-term adverse residual effect which is considered to be **Negligible to Minor**.

Significance

- 13.96 This effect is considered to be **Not Significant**.

Accidental release of pollutants and sewage waste into the water column from vessels during transit and construction operations

- 13.97 During the construction stage of the Proposed Scheme, a small number of construction barges/ships are likely to be present, introducing the risk of accidental pollution from fuel and fluids leaks/spills on board of the barge/ship and from the accidental release of sewage waste into the water column. The duration of the construction phase of the jetty is currently unknown.
- 13.98 Such unlikely and accidental events could affect water quality in two ways; firstly, through the introduction of toxic substances and hydrocarbons from accidental leaks and spills; this would cause pollution and water quality degradation. Secondly, the accidental release of sewage, would cause the increase of organic and inorganic nutrients concentration in the

water column, such as nitrogen and phosphorous, which could lead to elevated algal growth, and enhanced eutrophication events.

- 13.99 The sensitivity of the receptors is determined by their physico-chemical attributes and their ability to tolerate and recover from the effects of accidental spills and leaks of polluting compounds or sewage material. Taking into consideration the attribute of the site, with little to no tidal flushing effects, nor active sediment transport, the receptor sensitivity was determined as **Medium** for Sediment Quality and **Medium** for Water Quality. This is due to their tolerance but inability to quickly recover if such an event were to happen.
- 13.100 13.105 A maximum number of 10 small barge/ship movements are expected during the construction period, limiting the impact potential. Barges/ships will strictly adhere to pollution prevention and environmental management plans agreed prior commencement of construction to reduce the risk of pollution events (e.g. EMP and MARPOL). Additionally, an emergency response procedure would be in place, should an incident occur, which would further reduce the potential of an impact. The impact magnitude is therefore categorised as **Small** as it would be considered localised and temporary in the unlikely event it would occur.
- 13.101 Overall, the sensitivity of the receptors to the impacts associated with the accidental release of pollutants and sewage from barges/ships during construction has been assessed as Medium for Sediment Quality and Medium for Water Quality. The impact magnitude was assessed as Small, therefore resulting in **Minor** adverse effect, **Not Significant** in EIA terms.

Secondary Mitigation or Enhancement

- 13.102 No additional mitigation measures are required.

Residual Effect

- 13.103 In the absence of secondary mitigation, the residual effect is the same as that reported in the pre-mitigation scenario.

Significance

- 13.104 The effects is considered to be **Not Significant**.

Accidental release of litter and debris into the water column from vessels during transit and construction operations

- 13.105 During the construction stage of the Proposed Scheme, a number of construction barges/ships may potentially be present in the area, introducing the risk of accidental release of litter and construction debris into the water column. The litter and debris considered include materials such as concrete, wood, metals and plastics and damaged parts of jetty components. The increase of litter and debris in waters and sediments can pose a danger to wildlife and can damage and degrade water and sediment quality receptors/pathways. Each instance of barge/ship presence at the site introduces a degree of risk of accidental release of litter and debris to the environment.
- 13.106 The sensitivity of the receptors is determined by their physico-chemical attributes and their ability to tolerate and recover from the effects of accidental release of litter and construction debris. Taking into consideration the attribute of the site, with little to no tidal flushing effects, nor active sediment transport abilities, the receptor sensitivity was determined as **Medium** for Sediment Quality and **Medium** for Water Quality. This is due to their tolerance but inability to quickly recover if such an event were to happen.

13.107 A maximum number of 10 small barge/ship movements are expected during the construction period, limiting the impact potential. Barges/ships will strictly adhere to pollution prevention and environmental management plans agreed prior commencement of construction to reduce the risk of pollution events (e.g. EMP and MARPOL). Additionally, an emergency response procedure for dropped objects, would be in place, should an incident occur, which would further reduce the potential of an impact. The impact magnitude is therefore categorised as **Low** as it would be considered localised and temporary in the unlikely event it would occur.

13.108 Overall, the sensitivity of the receptors to the impacts associated with the accidental release of litter and debris from barges/ships during construction has been assessed as Medium for Sediment Quality and Medium for Water Quality. The magnitude of change is assessed as Small. Therefore, there is considered to be a direct, temporary, short-term adverse effect which is considered to be **Minor**.

Secondary Mitigation or Enhancement

13.109 No additional mitigation measures are required.

Residual Effect

13.110 In the absence of secondary mitigation, the residual effect is the same as that reported in the pre-mitigation scenario.

Significance

13.111 The effects is considered to be **Not Significant**.

Disturbance (to Fish Ecology) through underwater noise and vibration

13.112 Underwater noise and vibration will be generated during the construction stage via the removal of the existing derelict wooden quay and tubular/sheet piling activity during the construction of the 'construction' and 'operation' wharves/jetties and associated mooring dolphins. The 'construction' wharf/jetty will be constructed prior to the 'operation' wharf/jetty as it is required for the offloading of equipment modules (see **Chapter 4: Development Specification** for more details).

13.113 The output distances of the underwater noise modelling (i.e. to non-recoverable injury, recoverable injury, and TTS) are shown in **Table 13.13** and **Table 13.14** below, and presented within **Appendix 13.2**.

Table 13.13: Calculated Distances at which Underwater Noise Levels for Jetty Piling Meet the Injury Criteria for Fish – Tubular Piling

Type of Animal	Metric	Distance to Mortality and Potential Mortal Injury (m)	Distance to Recoverable Injury (m)	Distance to Temporary Threshold Shift - TTS (m)
Fish: no swim bladder (particle motion detection)	SEL _{cum}	2	3	134
	SPL(Peak)	4	4	N/A
Fish: swim bladder not involved in hearing (particle motion)	SEL _{cum}	5	12	134
	SPL(Peak)	8	8	N/A
Fish: swim bladder involved in hearing (primary pressure detection)	SEL _{cum}	8	12	134
	SPL(Peak)	8	8	N/A
Fish: Eggs and Larvae	SEL _{cum}	5	(N/A – Moderate potential near to source)	(N/A – Moderate potential within tens of metres, and low beyond)
	SPL(Peak)	8	(N/A – Moderate potential near to source)	(N/A – Moderate potential within tens of metres, and low beyond)

Source: ERM, 2023

Table 13.14: Calculated Distances at which Underwater Noise Levels for Jetty Piling Meet the Injury Criteria for Fish – Sheet Piling

Type of Animal	Metric	Distance to Mortality and Potential Mortal Injury (m)	Distance to Recoverable Injury (m)	Distance to Temporary Threshold Shift - TTS (m)
Fish: no swim bladder (particle motion detection)	SEL _{cum}	2	2	153
	SPL(Peak)	6	6	NA
Fish: swim bladder not involved in hearing (particle motion)	SEL _{cum}	5	11	153
	SPL(Peak)	14	14	NA
Fish: swim bladder involved in hearing (primary pressure detection)	SEL _{cum}	7	11	153
	SPL(Peak)	14	14	NA
Fish: Eggs and Larvae	SEL _{cum}	5	(N/A – Moderate potential near to source)	(N/A - Moderate potential within tens of metres, and low beyond)
	SPL(Peak)	14	(N/A – Moderate potential near to source)	(N/A - Moderate potential within tens of metres, and low beyond)

Source: ERM, 2023

- 13.114 The assumptions of the underwater noise model are presented in the ‘Assessment Process’ section above. Based upon the results of the underwater noise modelling presented in **Table 13.13** and **Table 13.14**, the worst-case scenario for effects associated with piling activity are specific to the sheet piling option, with a distance to recoverable and non-recoverable injury of 14m and a distance to TTS of 153 m. Beyond the 153 m boundary surrounding piling activities, underwater noise may result in short-term behavioural responses that are unlikely to result in a significant reduction of fitness in fish above that caused by TTS.
- 13.115 It should be noted that the Proposed Scheme will include a combination of tubular and sheet piling activities for both of the construction and operational jetty/wharf facilities, and therefore the assumption that up to 60 piles are to be installed using the sheet piling method represents a precautionary worst-case assumption for the distance at which fish receptors may be exposed to a physiological effect (153 m). This assumption is considered acceptable for the purposes of the EIA, prior to refinement of the Proposed Scheme. It is expected that all piling activities will be conducted within a 60 day period (dependent on the number of piles required) with no concurrent piling activity for the tubular and sheet pile types.
- 13.116 This assessment will consider the sensitivity of ‘fish with a swim bladder-inner ear connection used in hearing’ and ‘fish without a swim bladder-inner ear connection used in hearing’ receptor groups separately within the following subheadings.

Fish with a swim bladder-inner ear connection used in hearing

- 13.117 For fish with a swim bladder-inner ear connection used in hearing, the TTS threshold is 186 dB SEL_{cum}, the recoverable injury threshold is 203 dB SEL_{cum} or >207 dB SPL_{peak}, and the mortality/mortal injury threshold is >207 dB SEL_{cum} or >207 dB SPL_{peak} (Popper *et al.*, 2014). Therefore, fish species with a swim bladder-inner ear connection used in hearing are considered to have a medium sensitivity to disturbance through underwater noise and vibration due to the potential for physiological damage and the potential for short-term behavioural responses to the effect.
- 13.118 Due to the short-term and localised nature of the Proposed Scheme within an active working dock, it is expected that receptors will already be exposed to underwater noise produced by anthropogenic activities. The existing underwater noise environment is likely to be predominantly characteristic of vessel movement and activities on land, as opposed to piling activity. The magnitude of underwater noise and vibration associated with piling activity is, therefore, likely to be measurable above baseline conditions and outside of natural variation.
- 13.119 It is important to consider the enclosed nature and limited spatial extent of the Marine Ecology Study Area, where relatively small zones of effect of underwater noise (e.g. 153 m) may encompass a significant extent of the available habitat to fish receptors. Therefore, whilst the magnitude of effect is not considered to be regular, long-term, or reversible within >1 year, the magnitude of effect has been considered large on a precautionary basis, prior to refinement of the piling specification of the Proposed Scheme and implementation of secondary mitigation measures.
- 13.120 To summarise, the sensitivity of fish with a swim bladder used in hearing is considered to be medium. The magnitude of change is considered to be large. Therefore, there is likely to be a

direct, temporary, short-term, adverse effect which is considered to be **Moderate** given the precautionary assessment of magnitude as large.

Fish without a swim bladder-inner ear connection used in hearing

- 13.121 For fish without a swim bladder-inner ear connection used in hearing, the TTS threshold is >186 dB SEL_{cum}, the recoverable injury threshold is >203 dB SEL_{cum} or >207 dB SPL_{peak}, and the mortality/mortal injury threshold is >210 dB SEL_{cum} or >207 dB SPL_{peak} (Popper *et al.*, 2014). Sensory organs for detecting noise in these species rely on particle motion as opposed to pressure detection, with a greater likelihood of short-term behavioural responses to the effect, rather than physiological damage.
- 13.122 Full recoverability of the population of fish with a swim bladder not used in hearing to baseline conditions is assumed, due to a limited potential for physiological damage in comparison with fish species with a swim bladder-inner ear connection used in hearing. Therefore, fish species without a swim bladder-inner ear connection used in hearing are considered to have a low sensitivity to disturbance through underwater noise and vibration.
- 13.123 Due to the short-term and localised nature of the Proposed Scheme within an active working dock, it is expected that receptors will already be exposed to underwater noise produced by anthropogenic activities. The existing underwater noise environment is likely to be predominantly characteristic of vessel movement and activities on land, as opposed to piling activity. The magnitude of underwater noise and vibration is, therefore, likely to be measurable above baseline conditions and outside of natural variation.
- 13.124 It is important to consider the enclosed nature and limited spatial extent of the Marine Ecology Study Area, where relatively small zones of effect of underwater noise (e.g. 153 m) may encompass a significant extent of the available habitat to fish receptors. Therefore, whilst the magnitude of effect is not considered to be regular, long-term, or reversible within >1 year, the magnitude of effect has been considered large on a precautionary basis, prior to refinement of the piling specification of the Proposed Scheme and implementation of secondary mitigation measures.
- 13.125 To summarise, the sensitivity of fish without a swim bladder-inner ear connection used in hearing is considered to be low. The magnitude of change is considered to be large. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be **Minor**.

Secondary Mitigation or Enhancement

- 13.126 Due to the assessment of the effects of underwater noise and vibration resulting in a moderate effect for fish with a swim bladder-inner ear connection used in hearing, additional secondary mitigation will be required to reduce the magnitude of effect of underwater noise and vibration. It is recommended that a soft-start procedure should be implemented for all piling events, to present the opportunity for receptors to flee the 14 m distance to recoverable injury, and potentially the 153 m distance to TTS threshold.
- 13.127 Despite the limited distance to recoverable injury and mortality from the source of underwater noise and vibration associated with piling activity (<14 m), the use of bubble curtain(s) (a standard mitigation measure) is advised as a precaution, given the spatially restricted nature of the Marine Ecology Study Area and the presence of species with medium sensitivity to underwater noise (fish with a swim bladder-inner ear connection used in

hearing). Furthermore, the implementation of this bubble curtains to reduce noise at source by 5 dB is expected to reduce the distance to TTS threshold by >40% when applied to the underwater noise model (assuming the bubble curtain(s) can surround sheet piles), and result in underwater noise and vibration of magnitudes within the Marine Ecology Study Area that are more consistent with natural variation within operational docks.

Residual Effect

13.128 The sensitivity of fish with a swim bladder-inner ear connection used in hearing is considered to be medium. The magnitude of change, following secondary mitigation, is considered to be small. Therefore, there is likely to be a direct, temporary, short-term, adverse residual effect which is considered to be **Minor**.

13.129 The sensitivity of fish without a swim bladder-inner ear connection used in hearing is considered to be low. The magnitude of change, following secondary mitigation, is considered to be small. Therefore, there is likely to be a direct, temporary, short-term, adverse residual effect which is considered to be **Minor**.

Significance

13.130 This effect is considered to be **Not Significant**.

Operation Stage

Water abstraction affecting water flow and volume within the water body

13.131 During the operation stage of the Proposed Scheme, water abstraction, required as process water, will take place (see **Chapter 4: Development Specification** for more details). The exact design of the intake(s) involved with water abstraction is yet to be confirmed, preliminarily it is expected that the water flow velocity at the intake(s) will be low, at approximately 0.042 m³/s (150 m³/h) (as per **Chapter 4: Development Specification**) and will occur frequently.

13.132 Foul water will be discharged directly into the local sewer network. Process water will be treated and returned to the dock via a new outfall, appropriately spaced from the abstraction point.

13.133 The sensitivity of the receptors (surface waters, groundwaters, and fish) is determined by their physico-chemical attributes and their ability to tolerate and recover from the effects of water abstraction. Taking into consideration the attributes of the Marine Ecology Study Area, the receptor sensitivity is determined as **Low** for Sediment Quality and **Medium** for Water Quality. This is due to their tolerance but inability to quickly recover if such an event were to happen.

13.134 Abstracting water from semi-enclosed bodies of water could have an effect on water flow and the total volume of water, affecting water levels and the overall environment. With reduced water volume, the concentration of pollutants (chemicals and nutrients) in the remaining water could also increase. However, the presence of a weir, allowing freshwater input from the river Afan into the area, aids in maintaining the Dock's volume of water within normal levels. The magnitude of change is categorised as **Small**.

13.135 Overall, the sensitivity of the receptors to the impacts associated with water abstraction during operations has been assessed as Low for Sediment Quality and Medium for Water Quality. The magnitude of changes is considered Small. Therefore, there is considered to be a direct, temporary, short-term adverse effect which is considered to be **Negligible to Minor**.

Secondary Mitigation or Enhancement

13.136 No additional mitigation measures are required.

Residual Effect

13.137 In the absence of secondary mitigation, the residual effect is the same as that reported in the pre-mitigation scenario.

Significance

13.138 The effects is considered to be **Not Significant**.

Removal of biofouling from the subsea structures and leeching of antifouling, anticorrosive agents from coated infrastructure

13.139 During the operation stage of the Proposed Scheme, scheduled maintenance of the submerged infrastructure will occur, aiming at extending the jetty lifetime and maximising performance. Cleaning of the submerged infrastructure includes the removal of biofouling organisms, litter and debris fouling the piles and the jetty's foundations. The frequency of the cleaning will be informed upon inspection.

13.140 The biofouling material will likely be removed from the structures using high pressure jetting tools. This will lead to the release of biofouling debris into the water column causing temporary water column disturbance in the form of increased SSC and scattering of discarded material with subsequent deposition on the bottom.

13.141 Additionally, submerged structures are subject to corrosion processes in brackish waters due to oxidation processes enhanced by salt; however the non-tidal and predominantly freshwater nature of the Marine Ecology Study Area is unlikely to accelerate this process to levels consistent with brackish estuaries. Corrosion protection measures are often employed to prevent the rapid degradation of steel structures. Sheet piles and other components of the jetty are likely going to be treated with antifouling and anticorrosive agents to protect the assets which could potentially leech into the water column.

13.142 The sensitivity of the receptors is determined by their physico-chemical attributes and their ability to tolerate and recover from the effects of accidental release of litter and construction debris. Taking into consideration the attributes of the Marine Ecology Study Area, with little to no tidal flushing effects, nor active sediment transport, the receptor sensitivity is determined as **Low** for Sediment Quality and **Low** for Water Quality. This is due to their tolerance and ability to recover if such an event were to happen.

13.143 Removal of biofouling will only occur when required and unlikely to occur on a yearly basis. The increased turbidity would only be temporary and localised, limited to the area surrounding the structures to be cleaned. The discarded material sinking to the bottom would primarily be composed of organic debris, local flora and fauna species; items of litter and inorganic debris would be disposed of on land. The effects of leaching of antifouling and anticorrosive agents will be long-term, albeit localised, and on a small scale. Low-toxicity paints will be selected throughout. The magnitude of change is therefore categorised as **Small**.

13.144 Overall, the sensitivity of the receptors to the impacts associated with the removal of biofouling has been assessed as Low for Sediment Quality and Low for Water Quality. The

magnitude of change is considered to be Small. Therefore, there is considered to be a direct, temporary, long-term adverse effect which is **Negligible**.

Secondary Mitigation or Enhancement

13.145 No additional mitigation measures are required.

Residual Effect

13.146 In the absence of secondary mitigation, the residual effect is the same as that reported in the pre-mitigation scenario.

Significance

13.147 The effects is considered to be **Not Significant**.

Accidental release of pollutants and sewage waste and into the water column from vessels during transit and operations

13.148 During the lifetime of the Proposed Scheme, a number of vessels will be expected to transit to and from the wharf/jetty introducing the risk of accidental release of pollutants and sewage waste into the water column. An estimated additional 110 x 2-way vessel movements per year are likely to occur as a result of the Proposed Scheme.

13.149 Overall, each vessel movement will occur at different times and, therefore, any receptor sensitivity and impact magnitude will be no greater than that identified for the impact assessed during the construction phase. Classification and description of this impact and its mitigation measures, if applicable, are the same as in the construction stage, detailed in the relevant section above. The sensitivity of the receptors to the impacts associated with the accidental release of pollutants and sewage from barges/ships during operation has been assessed as Medium for Sediment Quality and Medium for Water Quality. The impact magnitude was assessed as Small, therefore resulting in **Minor** adverse effect.

Secondary Mitigation or Enhancement

13.150 No additional mitigation measures are required.

Residual Effect

13.151 In the absence of secondary mitigation, the residual effect is the same as that reported in the pre-mitigation scenario.

Significance

13.152 The effects is considered to be **Not Significant**.

Accidental release of litter and debris into the water column from vessels during transit and operations

13.153 During the lifetime of the Proposed Scheme, a number of vessels will be expected to transit to and from the wharf/jetty introducing the risk of accidental release of litter and debris into the water column. An estimated additional 110 x 2-way vessel movement per year are likely to occur as a result of the Proposed Scheme.

13.154 Overall, each vessel movement will occur at different times and, therefore, any receptor sensitivity and impact magnitude will be no greater than that identified for the impact assessed during the construction phase. Classification and description of this impact and its mitigation measures, if applicable, are the same as in the construction stage, detailed in the relevant section above. The sensitivity of the receptors to the impacts associated with the

accidental release of litter and debris from barges/ships during operation has been assessed as Medium for Sediment Quality and Medium for Water Quality. The magnitude of change is assessed as Small. Therefore, there is considered to be a direct, temporary, short-term adverse effect which is considered to be **Minor**.

Secondary Mitigation or Enhancement

13.155 No additional mitigation measures are required.

Residual Effect

13.156 In the absence of secondary mitigation, the residual effect is the same as that reported in the pre-mitigation scenario.

Significance

13.157 The effects is considered to be **Not Significant**.

Increased salinity caused by Dock's gates more frequent usage due to increased vessel traffic

13.158 During the operation of the Proposed Scheme, a number of vessels will be expected to transit to and from the marine loading/unloading facility causing the gates of the Dock to be opened more frequently than at present, introducing saline waters into the Dock and potentially causing an increase in salinity within the water body. An estimated additional 110 x 2-way vessel movement per year are likely to occur as a result of the Proposed Scheme. Saltwater intrusion therefore may increase, but this unlikely to be substantial and will be limited to the immediate vicinity of the lock gates.

13.159 The water level within the dock is maintained, and the dual lock gates are only opened to allow passage of vessels at high tide, and never opened simultaneously. There will, therefore, be extremely limited inflow of water into the dock; however, some saline water from within the lock is likely to be exchanged for less saline water from the dock basin, by density driven circulation.

13.160 The volume of saline water within the lock is very small when compared within the overall volume of water within the dock. Water that is lost from the dock through operation of locks, or during prolonged periods of dry weather, is replaced by freshwater from feeder channels from the river Afan and from the river Ffrwdwyllt, and not through flooding the dock with marine waters at high tides. The freshwater feed, compared with the extremely limited volume, density driven, circulation of water from the lock, means that there will be a negligible effect on the salinity within the dock over time.

13.161 The sensitivity of the receptors is determined by their physico-chemical attributes and their ability to tolerate and recover from the effects of accidental release of litter and construction debris. Taking into consideration the attributes of the Marine Ecology Study Area, with little to no tidal flushing effects, nor active sediment transport, the receptor sensitivity is determined as **Low** for Sediment Quality and **Medium** for Water Quality. This is due to their tolerance but inability for water, to quickly recover if such an event were to happen.

13.162 The Docks are composed primarily by freshwater with seasonal increases in salinity making the waters slightly brackish in nature at peak times of the year (see 'Baseline'). A potential salinity increase as a result of increased vessel traffic, could alter the physical properties of the water body. However, the presence of a weir, allowing freshwater input from the river Afan into the area, promotes dilution of any saline intrusion and controls the accumulation

of salt over time. The salinity concentrations of the Dock, although potentially increasing, are therefore expected to remain with the natural fluctuations of brackish waters which range anywhere between 0.5-30 ppt, with no substantial alteration to the freshwater/saltwater balance. The magnitude of change is therefore categorised as **Small**.

- 13.163 Overall, the sensitivity of the receptors to the impacts associated increase salinity due to increased vessels traffic during operations has been assessed as Low for Sediment Quality and Medium for Water Quality. The magnitude of change is considered to be Small. Therefore, there is considered to be a direct, permanent, long-term, adverse effect which is considered to be **Negligible to Minor**.

Secondary Mitigation or Enhancement

- 13.164 No additional mitigation measures are required.

Residual Effect

- 13.165 In the absence of secondary mitigation, the residual effect is the same as that reported in the pre-mitigation scenario.

Significance

- 13.166 The effects is considered to be **Not Significant**.

Entrapment of fish during abstraction of water

- 13.167 Entrapment of fish may occur during the operational stage of the Proposed Scheme via the removal of water from Port Talbot Docks that is required as process water (see **Chapter 4: Development Specification** for more details). Entrapment is considered to include:

- Entrainment – the passage of individuals within infrastructure (such as pipe networks) used during water abstraction activities; and
- Impingement – the trapping or pinning of fish against screens and intake apertures, as a result of water velocities that cannot be exceeded by fish movements.

- 13.168 Entrainment of species with moderate-large body size will be prevented through the implementation of meshed screens on pipe apertures (see '*Primary and Tertiary Mitigation*'); with the 1mm screen mesh grade proposed as primary mitigation. This mitigation measure will also reduce the potential for entrainment of smaller bodied fish, larvae, and eggs. All species present within the Marine Ecology Study Area are considered to be moderate-large bodied as adults; however, juveniles of all species have the potential to be present within the Marine Ecology Study Area and are, consequently, at greater risk of entrainment than adults. Conversely, impingement is less selective of body size and may occur for smaller bodied fish, juveniles, larvae, and eggs; dependent on the water velocity surrounding intakes.

- 13.169 Diadromous fish species present within the Marine Ecology Study Area, in particular European eel and Atlantic salmon, have a high conservation value, whereas freshwater and marine species have a low conservation value within the Marine Ecology Study Area. All fish species have no commercial value within the Marine Ecology Study Area.

- 13.170 All fish species are unlikely to vary in their tolerance, adaptability, or recoverability to entrainment and/or impingement, due to the high likelihood of mortality associated with the effect. A precautionary 100% mortality rate has been assumed to occur for all adults,

juveniles, larvae, and eggs of all species that are entrained and/or impinged. Therefore, the sensitivity of all fish receptors (at all life stages) is considered high.

- 13.171 Whilst a 100% mortality rate of entrained and/or impinged adult fish of all species is expected, the density of adult fish within the EIA Study Area is expected to be low. This is based upon the lack of identification of fish receptors within the Marine Ecology Benthic Survey Report (APBmer, 2022), and the ability of adults to avoid discrete areas of elevated water velocity. Therefore, the potential exposure of adult fish receptors is considered low on a precautionary basis. For juveniles of all species, limited mobility is likely to result in an increased rate of entrainment and/or impingement compared with adults. However the density of juveniles within Port Talbot Docks is also expected to be low as a result of low adult density and the presence of smolt screens on the dock feeder channel and, therefore, the potential exposure of juvenile fish receptors is considered low. It is noted that the presence of an Atlantic salmon smolt screen, implemented as part of the Green Par Weir supplying water from the river Afan to Port Talbot Docks, is likely to prevent Atlantic salmon and brown/sea trout smolts from being present within the Marine Ecology Study Area.
- 13.172 The existing screen at the Green Park Weir will not, however, prevent entry of juvenile European eel (glass eel and/or elvers) into Port Talbot Docks and, by virtue of the presence of adult European eel within the Marine Ecology Study Area, it is expected that European eel juveniles will also be present.
- 13.173 Larvae and eggs present within the Marine Ecology Study Area are considered to be limited to freshwater fish species that are not diadromous, as marine and diadromous fish spawn in marine or upper course riverine environments. Freshwater fish species are typically demersal spawners, adhering eggs to surfaces such as the gravelly substrate, vegetation, rock, and timber (Angling Trust, 2021⁴²). In the absence of these key spawning habitats, and the size of the abstraction point in relation to the available hard substrate within Port Talbot Docks, it is unlikely that a significant proportion of eggs and larvae will be present close to the water abstraction point, in an area where water velocities are strong enough to cause entrainment and/or impingement.
- 13.174 As stated within **Chapter 4: Development Specification**, the exact design of the intake(s) involved with water abstraction is yet to be decided, however it is expected that the water flow velocity at the intake(s) will be low, at approximately $0.042\text{m}^3/\text{s}$ ($150\text{m}^3/\text{h}$), and will occur frequently during the operation stage of the Proposed Scheme. The swimming rates of adult and juvenile fish identified within the Marine Ecology Study Area are $>20\text{cm}/\text{s}$ (Turnpenny and O’Keeffe, 2005⁴³). To achieve an intake rate of $20\text{ cm}/\text{s}$, the intake aperture must be a radius of approximately 38.2cm , with an effective intake surface area of 0.458m^2 (assuming a circular intake pipe). An intake size of $<38.2\text{cm}$ radius/ 0.458m^2 area would result in an intake velocity that exceeds the sustained or burst swimming rates of adult and juvenile fish (Turnpenny and O’Keeffe, 2005) identified within the Marine Ecology Study Area.
- 13.175 As an example, assuming an intake aperture of approximately 40cm radius, with an effective surface area of 0.5m^2 , the equivalent intake velocity of the Proposed Scheme would be $0.168\text{m}/\text{s}$, or $16.8\text{cm}/\text{s}$; therefore an intake size $>38.2\text{cm}$ radius/ 0.458m^2 area will decrease the intake velocity below $20\text{cm}/\text{s}$ and reduce the risk of entrapment during abstraction activities.

13.176 In addition, the proposed primary mitigation of including 1 mm grade screen mesh on intake(s) will reduce the likelihood of adults, juveniles, larvae and eggs from entering the water abstraction structure, and, therefore, reduce potential entrainment. There is potential for low levels of impingement of larvae and eggs on the screen mesh, owing to their inherent immobility. However, the low rate of water flow within Port Talbot Docks, coupled with the (precautionary) low potential of Port Talbot Docks as a spawning ground for freshwater, marine, and/or diadromous fish, results in the exposure of entrapment of fish during abstraction of water (through entrainment and/or impingement) being considered low for all life stages of all fish species.

13.177 Due to the unique environment that characterises Port Talbot Docks, and the limited facilitation of fish movements in and out of the docks, entrainment and/or impingement of multiple individuals is unlikely to be noticeable above natural variation at a local scale, i.e. within Swansea Bay and/or the river Afan and associate tributaries. At the local scale, the Port Talbot Docks population is already exposed to water abstraction activity associated with the existing steelworks (permitted at 0.473 m³/s; Eyre, 2015⁴⁴). There is evidence to suggest that this existing abstraction is not having a significant environmental impact upon fish populations within the docks, due to the continued presence of a small-scale recreational fishery (Angling Trust, 2023). It is expected that the likelihood of mass entrainment and/or impingement of fish associated with existing water abstraction activity within Port Talbot Docks is negligible, and the effective 10% increase in abstraction activity associated with the Proposed Scheme is unlikely to result in a significantly greater risk to the local population. Therefore, with consideration of the potential exposure of freshwater fish larvae and eggs, the magnitude of change above baseline conditions is not expected to exceed natural variation and is therefore considered **Small**.

13.178 To summarise, the sensitivity of all fish receptors (at all life stages) is considered to be high. The magnitude of change is considered to be small. Therefore, there is likely to be a direct, permanent, long-term, adverse effect which is considered to be **Minor**.

Secondary Mitigation or Enhancement

13.179 No secondary mitigation or enhancement is required/has been identified.

Residual Effect

13.180 In the absence of secondary mitigation the residual effects for all fish receptors (at all life stages) is that same as that reported in the pre-mitigation scenario.

Significance

13.181 This effect is considered to be **Not Significant**.

Limitations and Assumptions

13.182 To ensure transparency within the EIA process, the following limitations and assumptions have been identified:

- The impacts associated with the Proposed Scheme that have been scoped into the EIA and reported in this Chapter have a radius of effect that does not exceed the boundary of Port Talbot Docks (the Marine Ecology Study Area);

- While every effort has been made to ensure a wide range of literature has been used throughout this assessment, the data used to produce this literature will only provide a snapshot of the time of data collection;
- Due to the lack of site specific data within the Marine Ecology Study Area, a number of assumptions have been made regarding the topic of sediment chemistry. These include speculations on spatial distribution and concentration of chemical compounds. The likely scenario of metals concentration above Cefas AL2 and hydrocarbons concentrations above CCME PEL has been assumed for the purpose of assessment;
- The presence of marine fish within the Marine Ecology Study Area is determined by the frequency of opening of the lock gates at high tide. It has been assumed that only hardy estuarine-adapted species such as bass will tolerate the freshwater environment within the majority of the Marine Ecology Study Area, and that intolerant species will not be present/will not survive;
- The Marine Ecology Survey (ABPmer, 2022) is spatially limited in its survey area, which is restricted to the dock walls within the Site (**Figure 13.1**). Whilst this provides a degree of certainty in the underlying conditions within the immediate area of the Proposed Scheme, limited data regarding the presence of fish species were identified. Therefore, the baseline conditions are reliant on data sourced from numerous sources of grey literature, and a precautionary approach was applied for commercially/ecologically valuable species with the potential to be present in the context of the proposed operations within a working Port. This was deemed sufficient for baseline characterisation of the Marine Ecology Study Area.
- Underwater noise modelling has been based on a series of assumptions regarding potential piling activities, as set out within the 'Assessment Methodology'. These have been set in the absence of detailed specification of piling for the proposed construction and operational wharves/jetties, and associated mooring dolphins, and considered to be reasonable worst case assumptions.
- Underwater noise modelling assumed all fish receptors to be stationary as opposed to fleeing, as a result of the spatially restricted nature of the Marine Ecology Study Area and, therefore, for there to be restricted habitat available in which to shelter from underwater noise.

Summary

13.183 **Table 13.15** provides a summary of the effects, receptors, residual effects and conclusions of significance considered within the Chapter.

13.184 **Table 13.15** only provides a summary of the residual effects identified within the assessment. Details of all primary, secondary and tertiary mitigation that has been taken into account is set out in detail within the Chapter and summarised within the Environmental Management Plan included within **Volume 3: Environmental Management Plan**.

Table 13.15: Summary of Residual and Significant Effects

Effect	Receptor	Residual Effect	Significant?
Construction Stage			
Remobilisation of sediments causing increased suspended solids concentration in the water column	Sediment Quality	Negligible	NO
	Water Quality	Minor Adverse	NO
Remobilisation of sediments causing potential resuspension of contaminated sediments into the water column	Sediment Quality	Minor Adverse	NO
	Water Quality	Minor Adverse	NO
Accidental release of pollutants and sewage waste and into the water column from vessels during transit and construction operations	Sediment Quality	Minor Adverse	NO
	Water Quality	Minor Adverse	NO
Accidental release of litter and debris into the water column from vessels during transit and construction operations	Sediment Quality	Minor Adverse	NO
	Water Quality	Minor Adverse	NO
Disturbance through underwater noise and vibration	Fish with a swim bladder-inner ear connection used in hearing	Minor Adverse	NO
	Fish without a swim bladder-inner ear connection used in hearing	Minor Adverse	NO
Operational Stage			
Water abstraction affecting water flow and volume within the water body	Sediment Quality	Negligible	NO
	Water Quality	Minor Adverse	NO
Removal of biofouling from the subsea structures and leeching of antifouling, anticorrosive agents from coated infrastructure	Sediment Quality	Negligible	NO
	Water Quality	Negligible	NO
	Sediment Quality	Minor adverse	NO

Effect	Receptor	Residual Effect	Significant?
Accidental release of pollutants and sewage waste and into the water column from vessels during transit and operations	Water Quality	Minor adverse	NO
Accidental release of litter and debris into the water column from vessels during transit	Sediment Quality	Minor adverse	NO
	Water Quality	Minor adverse	NO
Increased salinity caused by Dock's gates more frequent usage due to increased vessel traffic	Sediment Quality	Negligible	NO
	Water Quality	Minor adverse	NO
Entrapment of fish during abstraction of water	All fish species	Minor adverse	NO

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