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. Within this Chapter, marine ecology includes the following receptor groups: fish and shellfish species.

13.2 The Chapter describes 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 (**Appendix 2.1**) and iterative scoping process where applicable.

13.4 This Chapter, and its associated **Figure 13.1** and **Appendix 13.1**, 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.

Summary of Consultation

13.7 **Table 13.1** provides an overview 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	Contact	Date and Form of Consultation	Summary
Natural Resources Wales (NRW)	Louise Edwards	Email, 20th July 2023	Requirement for the inclusion of baseline information for marine mammals before determining the scope of assessment.
NRW	Louise Edwards	Email, 20th July 2023	Agreement on the scoping out of ornithological receptors.
NRW	Louise Edwards	Email, 20th July 2023	Confirmation on the use of Popper *et al*., 2014 to determine sensitivity thresholds for marine fish.

Scope of the Assessment

13.8 As set out in **Chapter 2: Approach to EIA**, the scoping of the EIA and ES has utilised a combination of informal consultation with Neath Port Talbot County Borough Council (NPTCBC), culminating in a formal request for an EIA Scoping Opinion in June 2023, supported by an EIA Scoping Report (**Appendix 2.1**). At the point of submission of PAC, an EIA Scoping Opinion from NPTCBC was pending.

13.9 Although the EIA Scoping Report looked to establish the overall framework of the EIA and ES, an iterative scoping process has been adopted in order to respond to the evolving engineering design of the Proposed Scheme. In a similar manner, a number of changes have occurred to the Proposed Scheme since the preparation and submission of the EIA Scoping Report, as set out within **Chapter 1: Introduction** and **Chapter 2: Approach to EIA**. As a result, it has been necessary to review the scope of assessment proposed.

13.10 As such, this section provides a review, validation, and update, where necessary, on the scope of the assessment presented within this Chapter.

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, are considered to remain unchanged and therefore not considered further in this Chapter (with detailed justification provided within the EIA Scoping Report):

- Loss or damage of habitats from changes in physical processes;

- Impacts on habitats and species from a deterioration in water quality from seabed disturbance;
- 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 The following effects were considered unlikely to be significant in the EIA Scoping Report (**Appendix 2.1**). However, the previously provided evidence base has been updated to take account of the changes that have occurred to the Proposed Scheme. The updated evidence base for each effect is set out below:

Direct or indirect loss of habitats and benthic species

13.13 As identified with **Chapter 4**: **Development Specification**, a new wharf/jetty will be constructed for the proposed operation of the Proposed Scheme, as well as a construction specific wharf/jetty for the purposes of offloading plant/equipment during the construction stage. The 'operational' wharf/jetty is expected to be piled (tubular piles) and banks/dock walls subject to a degree of strengthened/reinforcement works. Whilst the 'construction' wharf/jetty is anticipated to be constructed via driven sheet piles backfilled up to the dock wall with aggregate and concrete as necessary.

13.14 To facilitate the construction of both proposed wharfs/jetties there will be the need to demolish and remove only where required the remnant of the derelict wooden quay present adjacent to the dock wall, to the north of the PDZ. This may result in the direct and indirect disturbance of habitats and benthic species present within the footprint of the derelict wharf. The proposed piling and backfilling during construction of the 'construction' and 'operational' wharves/jetties, and associated mooring dolphins, may also cause the direct and indirect loss of habitats and benthic species present as a result of disturbance from construction activities. Once constructed, the operational wharf/jetty will result in a permanent change in habitat on the seabed beneath the piles and potentially a change in the estuary bank (although it is noted that much of the bank already comprises man-made structures). Overall, 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. Furthermore, based on the Drop-Down Video (DDV) baseline survey undertaken[a], the footprint of the derelict wharf is likely to support a relatively impoverished benthic community. It is also considered unlikely that the habitat is important in supporting the wider ecological community or as a prey resource, given the general homogeneity of habitat identified within Port Talbot Docks. If works are carried out from the water, e.g. from a jack-up barge, the footprint of plant on the seabed would be temporary. Given the extent of loss and the habitat quality, this effect is considered unlikely to be significant.

13.15 The piling works will result in highly localised mobilisation of sediment which will resettle on the seabed; however, the volume of suspended sediment is unlikely to result in smothering of benthic species or to result in any indirect habitat loss or change due to the relatively impoverished nature of the benthic community. Therefore, direct and indirect loss of

[a] Submitted as **Appendix 13.1** of the EIA Scoping Report.

habitats and species is not considered to be significant and will not be considered further in this Chapter.

13.16 Following the EIA Scoping Process, the following additional effect(s) are now not considered significant and the evidence to support this determination is outlined below. The determination of the effects below which are not significant are not linked to the changes that occurred to the Proposed Scheme, rather because of on-going technical evaluation following submission of the EIA Scoping Report (**Appendix 2.1**).

Entrapment of fish during abstraction of water during construction

13.17 Within the EIA Scoping Report (**Appendix 2.1**) this effect had been scoped in for the construction and operational stages. However, the Applicant has confirmed that there will be no form of abstraction activities required during the construction stage and, therefore, the construction stage of this effect has been scoped out of further assessment and will not be considered further within this Chapter. Entrapment of fish during abstraction of water remains scoped in for the operational stage of the Proposed Scheme and assessed within this Chapter.

Direct or indirect impacts upon marine mammals

13.18 In response to NRW's request, the following evidence has been assessed to identify the potential for marine mammal presence within the Marine Ecology Study Area (defined as Port Talbot Docks – see '*Defining the Study Area*' for more details). The marine waters surrounding Port Talbot and the wider Swansea Bay are known to be frequented by harbour porpoise *Phocoena phocoena* and grey seal *Halichoerus grypus* (Tidal Lagoon (Swansea Bay) PLC, 2015[1]; Evans and Waggit, 2023[2]). However, there are no publicly available records of either species, or any additional marine mammal species, within Port Talbot Docks.

13.19 Port Talbot Docks are isolated from the wider marine environment via a series of lock gates, and consequently any marine mammal presence within the Marine Ecology Study Area is highly unlikely. The Proposed Scheme is not expected to result in measurable effects beyond the outer lock gate of Port Talbot Docks, therefore marine mammals are not considered present within the Maine Ecology Study Area or likely to experience direct effects from the Proposed Scheme. Furthermore, due to the existing level of vessel/ship traffic associated with the Port Talbot Harbour and Swansea Bay, when considering the additional ship movements generated by the Proposed Scheme (approximately 2 two-way movements a week) marine mammals will not be exposed to a significant elevation above current background levels of vessel traffic, or potential indirect effects associated with shipping movements arising from the operation of the Proposed Scheme. Therefore no significant effects are considered likely. Therefore, effects on marine mammals will not be considered further in this Chapter.

Effects Considered Likely to be Significant

13.20 The following effects (**Table 13.2**) were considered likely to be significant at the EIA Scoping stage and remain unaffected by the changes to the Proposed Scheme since submission of the EIA Scoping Report, and therefore have been assessed and reported within this Chapter.

Table 13.2: Effects Considered Likely to be Significant

Likely Significant Effect	Receptors	Applicable Development Stage
Disturbance through underwater noise and vibration	Fish	Construction
Entrapment of fish during abstraction of water	Fish	Operation

13.21 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

13.22 The following legislation and policy have 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;
- 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; and
- OSPAR Convention.

13.23 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[3]).

Defining the Study Area

13.24 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**). 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.

13.25 The Marine Ecology Study Area has been defined to accommodate the maximum extent of potential underwater noise impacts 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.

Background Studies to Inform the ES / Establishing the Baseline

13.26 **Table 13.3** summarises all surveys and reviews undertaken to inform the assessment presented within this Chapter.

Table 13.3: Background surveys and literature

Survey / Study	Overview	Date of Completion
P&C Project Dragon - Marine Ecology Benthic Survey Report (APBmer, 2022[4])	This survey consists of 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.	June, 2023

Assessment Process

13.27 The first stage necessary in the assessment of the effects identified in **Table 13.2** 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 13.2**.

13.28 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.

13.29 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

13.30 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:

$$\mathrm{TL} = -\mathrm{N}\log_{10}\left(\frac{\mathrm{R}}{\mathrm{R}_0}\right) - \mathrm{aR}$$

where 'TL' is the transmission loss, 'N' is the underwater noise spreading term, 'R' is the distance from the source in metres, 'R_0' 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.

13.31 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[5]). 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).

13.32 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.

13.33 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.

13.34 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

13.35 Further information regarding the underwater noise assessment methodology and results is described in full in **Appendix 13.1**.

Reporting of the Environmental Effect and Significance Criteria

13.36 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

13.37 The sensitivity of affected receptors has been considered on a scale of **high**, **medium**, **low** or **negligible**.

13.38 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 13.4**.

Table 13.4: Categories for Assessing the Sensitivity of 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 regionally[b] 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

13.39 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

[b] For example, the Bristol Channel and northeast Celtic Sea

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

13.40 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[6]).

13.41 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[7] in Popper *et al.*, 2014).

13.42 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

13.43 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**.

13.44 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 13.5**.

Table 13.5: Categories for Assessing the Magnitude of Change

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

Magnitude	Description
	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

13.45 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 13.6** has been a tool which has assisted with this process.

13.46 Whilst **Table 13.6** 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*'.

Table 13.6: Matrix to Support Determining the Level of Effect

		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

13.47 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.

13.48 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

13.49 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.

13.50 Significance has only been concluded for residual effects (i.e., following the identification of secondary mitigation).

Baseline Conditions

13.51 The Marine Ecology Study Area has been characterised using the best available data at the time of writing, including information collected during the bespoke Marine Ecology Benthic Survey and reported in the P&C Project Dragon – Marine Ecology Benthic Survey Report (ABPmer, 2022)[c], and information gathered during a review of primary and grey literature outlined in this section and presented in **Table 13.7**. The full list of references used to inform this chapter are presented in the '*References*' section of this chapter.

13.52 It is noted that the sampling stations collected during the Marine Ecology Survey (ABPmer, 2022) are limited to 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

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

Area. The baseline fish assemblage has, therefore, been supplemented by undertaking the following desk-based review.

13.53 Due to significant previous infrastructure works, such as the dredging within Port Talbot Docks to increase depths by 2m, which was conducted in 1996 to accommodate modern cargo vessels (Swansea Docks, 2023[8]), the habitats within the Marine Ecology Study Area are not well established. Furthermore, Port Talbot Docks is primarily a freshwater environment, fed via a channel from the Green Park Weir on the river Afan, with an influx of salt/brackish water once the lock gates are open at high tide to facilitate vessel movement.

13.54 The fish species identified within the Marine Ecology Study Area therefore include freshwater game species, hardy marine species, and diadromous species (Angling Trust, 2023[9]). 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 13.7**.

13.55 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, 2023[10]), 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, 2023[11]).

13.56 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.

13.57 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.

13.58 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, 2023[12]); 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.*, 2020[13]).

13.59 Additional species, such as Allis shad *Alosa alosa*, twaite shad *Alosa fallax*, river lamprey *Lampetra fluviatalis*, and sea lamprey *Petromyzon marinus* are present within the wider Swansea Bay area (Tidal Lagoon (Swansea Bay) PLC, 2017[14]; Lowe *et al.*, 2022[15]; Countryside Council for Wales, 2009[16]). 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.

13.60 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 13.8** 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 13.8**. 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 13.7: Fish species identified within the Marine Ecology Study Area

Species	Receptor group	Description	Reference
Bass *Dicentrarchus labrax*	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 *et al.*, 2020[17]; Kastelein *et al.*, 2017[18]; Popper *et al.*, 2014; Reeve, 2007[19].
Mullet spp. *Chelon* spp.	Fish with swim bladders not involved in hearing.	A diadromous fish. Grey thick-lipped mullet (*Chelon labrosus*) 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 (*C. ramada*) 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 *et al.*, 2020; Barnes, 2008[20]; Thompson, 1990[21].
Brown/sea trout *Salmo trutta*	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 *et al.*, 2016[22]; Nash, 2021[23].
Atlantic salmon *Salmo salar*	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	APBmer, 2022; Cefas, 2022[24]; Harding *et al.*, 2016; Jensen *et al.*, 2012[25]; Mawle *et al.*, 2003[26].

Species	Receptor group	Description	Reference
		lock gates. There is also 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 *Abramis brama*	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, 2017[27].
Pike *Esox lucius*	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 *et al.*, 2020; Forsman *et al.*, 2015[28]; Mann *et al.*, 2007[29].
Perch *Perca fluviatilis*	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 *et al.*, 2020; Amoser *et al.*, 2004[30].
Roach	Fish with a swim bladder-inner ear	A freshwater fish.	Angling Trust, 2023;

Species	Receptor group	Description	Reference
Rutilus rutilus.	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[31]; APBmer, 2022; Wierniki *et al.*, 2020; Amoser *et al.*, 2004; Laming and Morrow, 1981.
Rudd *Scardinius erythrophthalmus*	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 *et al.*, 2019[32]; Wolnicki *et al.*, 2009[33].
Tench *Tinca tinca*	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 *Anguilla anguilla*	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.	Angling Trust, 2023; APBmer, 2022; Piper *et al.*, 2019[34]; Pelster, 2017[35].

Species	Receptor group	Description	Reference
		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.	

Table 13.8: 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. *Chelon* spp.	Listed as Least Concern on the IUCN Red List of Threatened Species (Freyhof, 2010[36]).	None
Brown/sea trout *S. trutta*	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)).
Atlantic salmon *S. salar*	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 within the OSPAR List of Threatened and/or Declining Species and Habitats
European eel *A. anguilla*	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)). Protected under the England and Wales Eel Management Plan.

Future Baseline

13.61 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.

13.62 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

13.63 The following primary mitigation, which has been evaluated as part of the construction stage assessment, is outlined below.

- The steel lock gates at the entrance of Port Talbot Docks will be closed during any piling activities within the marine 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.

Operational Stage

13.64 The following primary mitigation, which has been evaluated as part of the operational stage, is outlined below:

- Intake screen mesh grade of 1mm 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.

Assessment of Effects, Secondary Mitigation and Residual Effects

Construction Stage

Disturbance through underwater noise and vibration

13.65 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).

13.66 The output distances of the underwater noise modelling (i.e. to non-recoverable injury, recoverable injury, and TTS) are shown in **Table 13.9** and **Table 13.10** below, and presented within **Appendix 13.1**.

Table 13.9: 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)	SELcum	2	3	134
	SPL(Peak)	4	4	N/A
Fish: swim bladder not involved in hearing (particle motion)	SELcum	5	12	134
	SPL(Peak)	8	8	N/A
Fish: swim bladder involved in hearing (primary pressure detection)	SELcum	8	12	134
	SPL(Peak)	8	8	N/A
Fish: Eggs and Larvae	SELcum	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 13.10: 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)	SELcum	2	2	153
	SPL(Peak)	6	6	NA
Fish: swim bladder not involved in hearing (particle motion)	SELcum	5	11	153
	SPL(Peak)	14	14	NA
Fish: swim bladder involved in hearing (primary pressure detection)	SELcum	7	11	153
	SPL(Peak)	14	14	NA
Fish: Eggs and Larvae	SELcum	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

13.67 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 13.9** and **Table 13.10**, 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 153m 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.

13.68 It should be noted that the Proposed Scheme will include a combination of tubular and sheet piling activities, 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 (153m). 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, with no concurrent piling activity for the tubular and sheet pile types.

13.69 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

13.70 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.

13.71 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.

13.72 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. 153m) 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.

13.73 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

13.74 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.

13.75 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.

13.76 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.

13.77 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.

13.78 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

13.79 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 14m distance to recoverable injury, and potentially the 153m distance to TTS threshold.

13.80 Despite the limited distance to recoverable injury and mortality from the source of underwater noise and vibration associated with piling activity (<14m), 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

13.81 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.

13.82 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

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

Operational Stage

Entrapment of fish during abstraction of water

13.84 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.

13.85 Entrainment of species with moderate-large body size will be prevented through the implementation of meshed screens on pipe apertures; 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.

13.86 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.

13.87 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.

13.88 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.

13.89 The 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.

13.90 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, 2021[42]). 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.

13.91 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 0.042m³/s (150m³/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 >20cm/s (Turnpenny and O'Keeffe, 2005[43]). To achieve an intake rate of 20 cm/s, the intake aperture must be a radius of approximately 38.2cm, with an effective intake surface area of 0.458m² (assuming a circular intake pipe). An intake size of <38.2cm radius/0.458m² 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.

13.92 As an example, assuming an intake aperture of approximately 40cm radius, with an effective surface area of 0.5m², the equivalent intake velocity of the Proposed Scheme would be 0.168m/s, or 16.8cm/s; therefore an intake size >38.2cm radius/0.458m² area will decrease the intake velocity below 20cm/s and reduce the risk of entrapment during abstraction activities. Water velocity in relation to the swimming rates of fish will be considered during refinement of the Development Specification regarding intake design prior to the submission of the Marine Licence Application.

13.93 In addition, the proposed primary mitigation of including 1mm 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.

13.94 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, 2015[44]). 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.

13.95 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

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

Residual Effect

13.97 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

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

Limitations and Assumptions

13.99 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);
- 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 4.1**). 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. 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 pilling 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

13.100 **Table 13.11** provides a summary of the effects, receptors, residual effects and conclusions of significance considered within the Chapter.

13.101 The table 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 13.11: Summary of Residual and Significant Effects

Effect	Receptor	Residual Effect	Is the Effect Significant?
Construction Stage			
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			
Entrapment of fish during abstraction of water	All fish species	Minor adverse	NO

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