Tidal Lagoon Swansea Bay

Addendum to the Updated Water Framework Directive Assessment Report (Tidal Lagoon Swansea Bay (TLSB), October 2014):

Western Wales River Basin Management Plan (RBMP) Cycle 2 Review

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1 Tidal Lagoon Swansea Bay (TLSB) and the Western Wales RBMP Cycle 2 – review of objectives

1.1 Introduction

1.1.1 Tidal Lagoon Swansea Bay (TLSB) will be the world's first purpose built tidal energy lagoon. The generating station will have an installed capacity of 320 Mega Watts (MW) and will enclose part of Swansea Bay, from the eastern side of the River Tawe to the eastern edge of the new Swansea University Bay-Campus. In total the lagoon will be formed from an approximately 9.5km-long, U-shaped breakwater which will encompass approximately 11.5km^2 of the seabed, foreshore and intertidal area of Swansea Bay.

1.1.2 TLSB made an application to the Planning Inspectorate on 7 February 2014 for a Development Consent Order (DCO) for a tidal lagoon (the Project) in Swansea Bay, South Wales. Examination of the application closed on 10 December 2014 and development consent was awarded by the Secretary of State (SoS) on 9 June 2015.

1.1.3 As part of the DCO application, an Updated Water Framework Directive (WFD) Assessment Report (Tidal Lagoon Swansea Bay (TLSB), October 2014) was submitted in accordance with the provisions of the WFD. Further information was also provided to NRW in support of the determination by the SoS of the Project under the provisions of the WFD in relation to the potential deterioration of the status of the Swansea Bay coastal water body.

1.1.4 This addendum to the updated WFD Assessment Report (TLSB, 2014) for the Project has been provided to Natural Resources Wales (NRW) as part of the Marine Licence application. As the Western Wales River Basin Management Plan (RBMP) has recently been updated (December 2015), further consideration was required in relation to any changes in classification status of waterbodies in the revised RBMP. This addendum presents a summary of the changes in the classification status of quality elements between Cycle 1 of the RBMP process (2009-2015) and Cycle 2 of the process (2015-2021), that were reported in the 1st Cycle RBMP in 2009 and 2nd Cycle RBMP in 2015. Changes are reported between cycles 1 and 2 for coastal, transitional and groundwater water bodies within Table 1 in the format agreed between NRW and TLSB. The implication of these changes in classification status in comparison to the original assessment, as reported in the updated WFD Assessment Report (TLSB, 2014) undertaken for the Project are then discussed within the Table.

1.1.5 Following Table 1, there is a consideration of the Project in relation to the fish quality element of transitional and river waterbodies.

1.1.6 It should be recognised that the catchment summary for the Western Wales RBMP has yet to be published and no data are currently available on Water Watch Wales for Cycle 2 (which it is understood will provide local information on classification, projects and measures). As such the assessment has been based on spreadsheet

supplied by NRW following requests from TLSB. TLSB has collated the information and undertaken the assessment to the best of its understanding based on the information provided.

1.1.7 The DCO Requirement 42 requires the preparation of a Water Framework Directive Strategy (WFDS) and the content of this document is being reviewed by TLSB in consideration with NRW. DCO Requirement 42 stipulates:

1.1.8 "***42.***—*(1) The authorised development must not commence until a monitoring and management strategy document has been submitted to and approved by Natural Resources Wales, the purpose of such strategy document being to ensure that the authorised development is carried out in compliance with the Water Framework Directive, including any necessary derogation from that Directive. (2) The "Water Framework Directive" means Directive 2000/60/EC of the European Parliament and of the Council of 23rd October 2010 establishing a framework for Community action in the field of water policy."*

1.1.9 It is envisaged that this WFDS will relate to monitoring that will be undertaken through the provisions of Requirement 6 of the DCO, the Adaptive Environmental Management Plan (AEMP). The AEMP, which is currently the subject of consultation with NRW and the local authorities as part of the pre-application process, describes monitoring that will be implemented through the life of the Project and encompasses monitoring required for the WFD. Any new data available through Cycle 2 of the RBMP will be incorporated into the baseline and pre-construction surveys as appropriate and then subsequently within the construction and operational phases of the Project. As such, the effects of the Project on WFD quality elements will be further considered through the AEMP process and any mitigation will be implemented as required in discussion with NRW and the relevant planning authorities.

Table 1: Review and comparison of Western Wales RBMP Cycle 1 and Cycle 2 WFD classification data and implications for TLSB

Cycle 2 water body ID	Cycle 2 water body Name	Quality element new classification or amended classification (Cycle 1 compared to Cycle 2)	Requirement for further assessment at Cycle 2 due to new quality elements assessed or amended quality element classification?
Coastal water bodies			
GB611008590001	Bristol Channel Outer North	**Classification status:** **Cycle 1:** **2013 status: good** **Overall status objective: good by 2027** **Specific status objective: good ecological status by 2027; good chemical status by 2015** **Cycle 2:** **Overall status: moderate** **Overall status objective: good by 2021** **Specific status objective: good ecological status by 2021; good chemical status by 2015**	
		Biological quality elements:	
		Phytoplankton: Cycle 1: 2013 status: high Predicted status: high 2015 Cycle 2: good status	No. Updated WFD Assessment (October 2014) conclusion on Phytoplankton quality element in this water body: *No project effect – existing licenced disposal ground – disposal of material will be in accordance with the marine licence – Screened out*
		Hydromorphological supporting elements: No changes to classifications between cycle 1 and 2, therefore no further assessment required for hydromorphological supporting elements.	
		Flow: Cycle 1: not assessed Cycle 2: pass	No. Updated WFD Assessment (October 2014) conclusion on flow in this water body: *Freshwater flow is not considered within WFD as a quality element for coastal waters and was therefore screened out.* Further review of new quality element of 'flow' within Cycle 2 for coastal waterbodies, has been undertaken assuming it to be linked to hydromorphological supporting conditions. The Updated WFD Assessment (October 2014) did not predict a deterioration in status for hydromorphological supporting conditions (covering coastal processes generally) within this water body and thus, no further assessment is considered to be required.

		Physico-chemical quality elements:	
		Dissolved inorganic nitrogen (DIN): Cycle 1: 2013 status: good Predicted status: moderate 2015 Cycle 2: moderate status	Sections 3.6.5.4 and 3.6.5.5 of the Updated WFD Assessment (October 2014) summarises the predicted effect of the Project on DIN within this water body. As the project would result in a slight reduction in nitrogen at the boundary of the water body with the Swansea Bay coastal water body, and the assessment considered the predicted reductions of the status of this quality element from good to moderate in Cycle 2, no further update to the assessment is considered to be required.
		Specific pollutants: Specific pollutants were not assessed in Cycle 1 Cycle 2: Zinc status: Good	It is considered that no further assessment is required for Specific Pollutants. Section 3.6.2.120 of the updated WFD Assessment (October 2014) also states: *The results of offshore ground investigation works (Chapter 4, Project description and Chapter 6 Coastal Processes, Sediment Transport and Contamination) demonstrated that the levels of contaminants with sediments proposed for use are generally low when compared to CEFAS Action levels. Of the 67 sub-samples collected (at a range of depth), the majority (approximately 73.5%) had determinands all below Action Level 1. The remaining samples had slightly elevated levels of a few determinands, above Action Level 1 but below Action Level 2 (approximately 26.5%) and none (0%) had values above Action Level 2 for any specific determinand (dredged material with contaminant levels above Action Level 2 is generally considered unsuitable for sea disposal). Chapter 6 concludes that, no analysed sample exceeds Cefas Action Level 2 for any specific contaminant. Furthermore, there is clear evidence of lessening contamination levels with depth, suggesting that the deeper sediments found across the Bay have not been subject to historic anthropogenic activities. As a result, the sediments that will be dredged and then subsequently used/ disposed in the construction of the Lagoon are not considered to be contaminated with respect to using/ disposing the sediments within the marine environment.*
		Chemical status: No further assessment of chemical status required. Updated WFD Assessment (October 2014) conclusion on Chemical status and all encompassed quality elements in this water body: *No project effect - no discharge of priority substances as a result of the Project - Screened out*	
GB641008260000	Swansea Bay	**Heavily modified water body (HMWB) (for flood defence and navigation purposes, due to the presence of extensive artificial shoreline structures and the occurrence of dredging related activities within the water body)** **Cycle 1** **2013 status: moderate or worse (mitigation measures not in place)** **Overall status objective: Good potential by 2027** **Specific status objective: Good ecological potential by 2027; Good chemical status by 2015**	

		Cycle 2: **Overall status: moderate potential** **Overall status objective: good potential by 2027** **Specific status objective: good ecological potential by 2021; good chemical potential by 2027**	
		Biological quality elements:	
		Benthic invertebrates Cycle 1: Not assessed Cycle 2: Good status	Benthic invertebrates were not assessed in Cycle 1. Sections 3.6.2.29 to 3.6.2.84 of the Updated WFD Assessment (October 2014), however, presented an assessment of the effect of the Project on the benthic invertebrate quality element within the Swansea Bay coastal water body. This assessment was based upon benthic invertebrate data collected within 2013 by TLSB and an assumed 'good' status. Subsequently, the water body has been classified as 'good' for benthic invertebrates by NRW in Cycle 2 using data from surveys undertaken in 2014. The Updated WFD Assessment (October 2014) considered that the potential changes to the intertidal and subtidal habitats (and supported species) as a result of the Project, presented a risk to the status of the benthic invertebrate quality element that could not be fully quantified. As such, the assessment recognised that the construction and operation of the Project may affect the assumed 'good' status of the Swansea Bay coastal water body. An Article 4.7 assessment of the potential effects of the Project on benthic invertebrates was undertaken by NRW. As the assessment has already considered the potential effects on an assumed 'good' status, no further assessment is considered to be required. Monitoring of the intertidal and subtidal environment will be undertaken through the AEMP.
		Hydromorphological supporting elements: No changes to classifications between cycle 1 and 2, therefore no further assessment required for hydromorphological supporting elements.	
		Flow: Cycle 1: not assessed Cycle 2: pass	No. Updated WFD Assessment (October 2014) conclusion on flow in this water body: *Freshwater flow is not considered within WFD as a quality element for coastal waters and was therefore screened out.* Further review of the new quality element of 'flow' within Cycle 2 for coastal waterbodies, has been undertaken assuming it to be linked to hydromorphological supporting conditions. The Updated WFD Assessment (October 2014) considered that there was a potential for deterioration of status for hydromorphological supporting conditions (covering coastal processes

			generally) within this water body and this aspect would as such, be encompassed within this assessment.
		Physico-chemical quality elements:	
		DIN Cycle 1: Not assessed Cycle 2: Moderate status	Section 3.6.2.106 to 3.6.2.117 of the Updated WFD Assessment (October 2014) assessed the effect of the Project on DIN and concluded that the Project would not cause deterioration in the status of this quality element. As the assessment assumed a Moderate status based on analysis of available data, it is considered that no further assessment is required.
		Specific pollutants Arsenic status: Cycle 1: not assessed Cycle 2: Good Zinc status: Cycle 1: Not assessed Cycle 2: good	It is considered that no further assessment is required for specific pollutants. Section 3.6.2.120 of the updated WFD Assessment (October 2014) also states: *The results of offshore ground investigation works (Chapter 4, Project description and Chapter 6 Coastal Processes, Sediment Transport and Contamination) demonstrated that the levels of contaminants with sediments proposed for use are generally low when compared to CEFAS Action levels. Of the 67 sub-samples collected (at a range of depth), the majority (approximately 73.5%) had determinands all below Action Level 1. The remaining samples had slightly elevated levels of a few determinands, above Action Level 1 but below Action Level 2 (approximately 26.5%) and none (0%) had values above Action Level 2 for any specific determinand (dredged material with contaminant levels above Action Level 2 is generally considered unsuitable for sea disposal). Chapter 6 concludes that, no analysed sample exceeds Cefas Action Level 2 for any specific contaminant. Furthermore, there is clear evidence of lessening contamination levels with depth, suggesting that the deeper sediments found across the Bay have not been subject to historic anthropogenic activities. As a result, the sediments that will be dredged and then subsequently used/ disposed in the construction of the Lagoon are not considered to be contaminated with respect to using/ disposing the sediments within the marine environment.*
		Chemical status: No further assessment of chemical status required. Updated WFD Assessment (October 2014) conclusion on Chemical status and all encompassed quality elements in this water body: *No project effect - no discharge of priority substances as a result of the Project - Screened out*	
		Mitigation measures	Cycle 1: a series of mitigation measures were identified for Swansea Bay coastal water body and the Updated WFD Assessment identified the following measures could potentially be affected by the Project, either positively or negatively: • Alter timing of dredging / disposal (potential partial incompatibility) • Reduce sediment re-suspension (potential incompatibility);

			• Reduce impact of dredging (potential incompatibility); • Prepare a dredging / disposal strategy (potentially compatible); • Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works) (potential incompatibility); • Operational and structural changes to locks, sluices, weirs, beach control etc (potential incompatibility) • Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone (potential partial incompatibility) • Bank rehabilitation / reprofiling (potential compatibility) • Preserve and, where possible, restore historic aquatic habitats (potential partial incompatibility) • Removal of hard bank reinforcement or replacement with soft engineering solution (potential incompatibility) • Remove obsolete structure (potential compatibility) As the Project was considered to be potentially incompatible with a number of mitigation measures, an Article 4.7 assessment of the potential effects of the Project on the mitigation measures was undertaken by NRW for the purposes for the Development Consent Order. Cycle 2 mitigation measures are presented below, with consideration of whether they fit with the mitigation measures identified in the water body for Cycle 1: • Realign flood defence (not in place) – considered to be assessed under *Removal of hard bank reinforcement or replacement with soft engineering solution (potential incompatibility)* • Enhance ecology (not in place) – considered to be assessed under *Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone (potential partial incompatibility)* • Avoid the need to dredge (not in place) – considered to be assessed under *Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works) (potential incompatibility)* • Dredging disposal strategy (not in place) – considered to be assessed under *Prepare a dredging / disposal strategy (potentially compatible);* • Reduce impact of dredging (not in place) – considered to be assessed under *Reduce impact of dredging (potential incompatibility)*

			• Reduce sediment resuspension (not in place) – considered to be assessed under *Reduce sediment re-suspension (potential incompatibility)* • Retime dredging or disposal (not in place) – considered to be assessed under *Alter timing of dredging / disposal (potential partial incompatibility)* • Sediment management (not in place) – considered to be assessed under a variety of Cycle 1 mitigation measures; *Reduce sediment re-suspension (potential incompatibility); Alter timing of dredging / disposal (potential partial incompatibility); Reduce impact of dredging (potential incompatibility); Alter timing of dredging / disposal (potential partial incompatibility); Prepare a dredging / disposal strategy (potentially compatible); Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works) (potential incompatibility);* • Dredge disposal site selection (not in place) – considered to be assessed under *Prepare a dredging / disposal strategy (potentially compatible);* • Manage disturbance (not in place) – considered to be assessed under a variety of Cycle 1 mitigation measures; *Reduce sediment re-suspension (potential incompatibility); Alter timing of dredging / disposal (potential partial incompatibility); Reduce impact of dredging (potential incompatibility); Alter timing of dredging / disposal (potential partial incompatibility); Prepare a dredging / disposal strategy (potentially compatible); Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works) (potential incompatibility);* • Indirect mitigation (not in place) – this mitigation measure involves consideration of offsetting measures for impacts. These will be considered for the Project for impacts on migratory fish and *sabellaria alveolata*. The Project will not affect the implementation of future offsetting within the water body for impacts on other WFD quality elements. • Preserve or restore habitats (not in place) – considered to be assessed under *Preserve and, where possible, restore historic aquatic habitats (potential partial incompatibility)*

Transitional water bodies			
GB541005900900 (amended water body from Cycle 1)	Tawe Estuary below barrage and including dock	**heavily modified water body (Flood Protection, Navigation, Quayline, Structure)** **Cycle 1 for previous Tawe Estuary water body** **2013 status: good potential** **Overall status objective: good potential by 2027** **Specific status objective: good ecological potential by 2015** **Cycle 2:** **Overall status: moderate potential** **Overall status objective: good potential by 2027** **Specific status objective: good ecological potential by 2027; good chemical potential by 2015**	
		Biological quality elements: No changes to classifications between cycle 1 and 2, therefore no further assessment required for biological supporting elements.	
		Hydromorphological supporting elements:	
		Hydrological regime Cycle 1: not assessed Cycle 2: Good status	Sections 3.6.3.104 to 3.6.3.109 of the Updated WFD Assessment (October 2014) assessed the effect of the Project on the hydromorphological quality elements on the Tawe estuary water body as a whole and concluded that the Project would not compromise the future achievement of the objective or cause a reduction in status. The updated WFD Assessment Report (TLSB, 2014) considered the potential effects on hydromorphological supporting elements which it is considered would encompass 'hydrological regime'. However, TLSB would welcome further clarification of the new quality element 'hydrological regime'.
		Flow Cycle 1: Supports good Cycle 2: Pass	No. Updated WFD Assessment (October 2014) conclusion on Freshwater flow quality element in this water body: *No potential effect on freshwater flow – no works within the water body that would affect flow of water down the river – Screened out*
		Physico-chemical quality elements:	
		Specific pollutants: No specific pollutants were assessed in Cycle 1. Cycle 2: Arsenic status:– good Copper status:– good Zinc status:- fail	It is considered that no further assessment is required for specific pollutants. Section 3.6.2.120 of the updated WFD Assessment (October 2014) also states: *The results of offshore ground investigation works (Chapter 4, Project description and Chapter 6 Coastal Processes, Sediment Transport and Contamination) demonstrated that the levels of contaminants with sediments proposed for use are generally low when compared to CEFAS Action levels. Of the 67 sub-samples collected (at a range of depth), the majority (approximately 73.5%) had determinands all below Action Level 1. The remaining samples had slightly*

			elevated levels of a few determinands, above Action Level 1 but below Action Level 2 (approximately 26.5%) and none (0%) had values above Action Level 2 for any specific determinand (dredged material with contaminant levels above Action Level 2 is generally considered unsuitable for sea disposal). Chapter 6 concludes that, no analysed sample exceeds Cefas Action Level 2 for any specific contaminant. Furthermore, there is clear evidence of lessening contamination levels with depth, suggesting that the deeper sediments found across the Bay have not been subject to historic anthropogenic activities. As a result, the sediments that will be dredged and then subsequently used/ disposed in the construction of the Lagoon are not considered to be contaminated with respect to using/ disposing the sediments within the marine environment. In addition to this, there will be no construction works within the Tawe Estuary water body (For the Updated WFD Assessment Report (TLSB, 2014), it was identified that works associated with the removal of the Port of Swansea eastern breakwater would occur within the original Tawe transitional water body and thus, the revised water body extent. Since production of the WFD Assessment Report, it has been confirmed that the breakwater will not be removed. As such, there will now be no works associated with the Project in this water body.)
		Chemical status: No further assessment of chemical status required. Updated WFD Assessment (October 2014) conclusion on Chemical status and all encompassed quality elements in this water body: *No project effect - no discharge of priority substances as a result of the Project - Screened out*	
		Mitigation measures	No mitigation measures were reported in Cycle 1 as the water body was at good potential and so none were required. At Cycle 2 the water body is at moderate potential and so mitigation measures have been proposed to improve the status of the water body: For the Updated WFD Assessment Report (TLSB, 2014), it was identified that works associated with the removal of the Port of Swansea eastern breakwater would occur within the original Tawe transitional water body and thus, the revised water body extent. Since production of the WFD Assessment Report, it has been confirmed that the breakwater will not be removed. As such, there will now be no works associated with the Project in this water body. A review of the mitigation measures in relation to the Project has however, been carried out as set out below. It is considered that the assessment carried out for indirect effects associated with the Project (reported in the Updated WFD Assessment Report (TLSB, 2014)), i.e. on quality elements under

			hydromorphological supporting conditions, physico-chemical and biological (see Section 1.2 below for migratory fish), where it was identified that no deterioration of status for any quality element was predicted, confirms that the Project would not be incompatible with the Cycle 2 mitigation measures. **<u>Navigation, ports and harbours use</u>** • Modify structure (not in place) - the Project will not inhibit the future implementation of modifications to the Tawe Barrage or port structures within this water body for the purposes of enhancing fish passage or riparian habitats. • Flow manipulation (not in place) – the Project will not inhibit the future implementation of flow control through the Tawe Barrage. • Dredging disposal strategy (in place) – The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Reduce impact of dredging (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Reduce sediment resuspension (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Retime dredging or disposal (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Sediment management (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Dredge disposal site selection (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Manage disturbance (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Vessel management (not in place) - The Project will not inhibit the future implementation of use of different vessels in future to avoid the need to dredge.

			Flood protection use • Fish passes (not in place) - the Project will not inhibit the future implementation of modifications to the Tawe Barrage or port structures within this water body for the purposes of enhancing fish passage. • Enhance ecology (not in place) the Project will not inhibit the future implementation of modifications to the Tawe Barrage, port structures or other flood protection infrastructure within this water body for the purposes of enhancing riparian habitats. • Changes to locks etc (not in place) - the Project will not inhibit the future implementation of modifications to the Tawe Barrage or other lock structures. • Dredging disposal strategy (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Reduce impact of dredging (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Reduce sediment resuspension (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Retime dredging or disposal (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Sediment management (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Dredge disposal site selection (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Manage disturbance (in place) - The Project will not require an alteration of the dredging or disposal programme of Swansea Port within this water body. • Retain habitats (not in place) – the Project will not inhibit the retention of habitats within this water body.

			• Preserve or restore habitats (not in place) - the Project will not inhibit the preservation or restoration of habitats within this water body.
GB541005900901 (amended water body from Cycle 1)	Tawe Estuary Beaufort Weir to Barrage	**heavily modified water body (Flood Protection, Navigation, Quayline, Structure)** **Cycle 1 for previous Tawe Estuary water body:** **2013 status: good potential** **Overall status objective: good potential by 2027** **Specific status objective: good ecological potential by 2015** **Cycle 2:** **Overall status: moderate potential** **Overall status objective: good potential by 2021** **Specific status objective: good ecological potential by 2021; good chemical potential by 2015**	
		Biological quality elements No changes to classifications between cycle 1 and 2, therefore no further assessment required for biological elements.	
		Hydromorphological supporting elements:	
		Hydrological regime Cycle 1: not assessed Cycle 2: Good status	Sections 3.6.3.104 to 3.6.3.109 of the Updated WFD Assessment (October 2014) assessed the effect of the Project on the hydromorphological quality elements on the Tawe estuary water body as a whole and concluded that the Project would not compromise the future achievement of the objective or cause a reduction in status. The updated WFD Assessment Report (TLSB, 2014) considered the potential effects on hydromorphological supporting elements which it is considered would encompass 'hydrological regime'. However, TLSB would welcome further clarification of the new quality element 'hydrological regime'.
		Flow Cycle 1: Supports good Cycle 2: Pass	No. Updated WFD Assessment (October 2014) conclusion on Freshwater flow quality element in this water body: *No potential effect on freshwater flow – no works within the water body that would affect flow of water down the river – Screened out.*
		Chemical status: No further assessment of chemical status required. Updated WFD Assessment (October 2014) conclusion on Chemical status and all encompassed quality elements in this water body: *No project effect - no discharge of priority substances as a result of the Project - Screened out*	
		Mitigation measures	No mitigation measures were reported in Cycle 1 as the water body was at good potential and so none were required. At Cycle 2 the water body is at moderate potential and so mitigation measures would be necessary for the water body to achieve good

			potential. No data is present on any mitigation measures proposed, so no further assessment can be undertaken.
GB541005800700	Neath Estuary	**heavily modified water body (Quayline)** **Cycle 1:** **2013 status: good potential** **Overall status objective: good potential by 2027** **Specific status objective: good ecological potential by 2027, good chemical status by 2015** **Cycle 2:** **Overall status: moderate potential** **Overall status objective: good potential by 2021** **Specific status objective: good ecological potential by 2021; good chemical potential by 2015**	
		Biological quality elements: Not assessed individually in Cycle 1: 2013 status: high Predicted status: not available	
		Angiosperms Cycle 1: Not assessed individually Cycle 2: High status	Angiosperms were not classified individually in Cycle 1, although the biological quality element was classified as high overall. Sections 3.6.4.8 to 3.6.4.13 of the Updated WFD Assessment (October 2014), however, assessed the effect of the Project on angiosperms and saltmarsh quality elements. The findings of the assessment predicted that the Project will not result in deterioration in status for angiosperms within the Neath Estuary water body, or compromise the future achievement of the objectives. As the Project is not predicted to result in the deterioration of the saltmarsh habitat or the tidal flooding of the Crymlyn Burrows saltmarsh, it is considered that the existing assessment does not require amendment.
		Macroalgae Cycle 1: Not assessed individually Cycle 2: High status	Macroalgae were not classified individually in Cycle 1, although the biological quality element was classified as high overall. Sections 3.6.4.4 to 3.6.4.7 of the Updated WFD Assessment (October 2014), however, assessed the effect of the Project on the macroalgae quality element in this water body. The existing mobile sand habitat within the water body and the predicted accretion and development of the dune system in Crymlyn Burrows are considered to be unfavourable habitats for macroalgal colonisation. As such, it was considered that the Project will not result in deterioration in status for macroalgae within this water body, or compromise the future achievement of the objectives. The presence of macroalgae will be monitored during the intertidal surveys as detailed in the AEMP. It is therefore considered that the Updated WFD Assessment (October 2014) does not require amendment.

		Opportunistic macroalgae Cycle 1: not assessed individually Cycle 2: High status	Opportunistic macroalgae were not classified in Cycle 1, although the biological quality element was classified as high overall. Section 3.6.3.7 of the Updated WFD Assessment (October 2014), however, assessed the effect of the Project on the opportunistic macroalgae quality element and did not predict the potential for increase in opportunistic macroalgae as a result of the Project. The existing mobile sand habitat within the water body and the predicted accretion and development of the dune system in Crymlyn Burrows are considered to be unfavourable habitats for opportunistic macroalgal colonisation. As such, it was considered that the Project will not result in deterioration in status for opportunistic macroalgae within this water body, or compromise the future achievement of the objectives. The presence of opportunistic macroalgae will be monitored during the intertidal surveys as detailed in the AEMP. It is therefore considered that the Updated WFD Assessment (October 2014) does not require amendment.
		Benthic Invertebrates Cycle 1: Not assessed individually Cycle 2: Good status	Benthic invertebrates were not classified individually in Cycle 1, although the biological quality element was classified as high overall. Sections 3.6.4.14 to 3.6.4.16 of the Updated WFD Assessment (October 2014), however, assessed the effect of the Project on benthic invertebrates. This assessment was based upon benthic invertebrate data collected within 2013 by TLSB and an assumed 'good' status. Subsequently, the water body has been classified as 'good' for benthic invertebrates by NRW in Cycle 2 using data from surveys undertaken in 2014. The Updated WFD Assessment (October 2014) considered that the potential changes to the intertidal and subtidal habitats (and supported species) as a result of the Project, presented a risk to the status of the benthic invertebrate quality element that could not be fully quantified. As such, the assessment recognised that the construction and operation of the Project may affect the assumed 'good' status of the Neath Estuary water body. As the assessment has already considered the potential effects on an assumed 'good' status, no further assessment is considered to be required. Monitoring of the intertidal and subtidal environment will be undertaken through the AEMP.
		Hydromorphological supporting elements: not considered individually in Cycle 1: 2013 status: supports good current status; supports good predicted 2015 status	
		Hydrological regime	Sections 3.6.4.68 to 3.6.4.78 of the Updated WFD Assessment (October 2014) assessed the effect of the Project on the hydromorphological quality elements on

		Cycle 1: Not assessed individually Cycle 2: supports good	the Neath estuary water body, against the baseline status that the hydromorphological conditions were at 'supports good' status and concluded that the Project would not compromise the future achievement of the objective or cause a reduction in status. The updated WFD Assessment Report (TLSB, 2014) considered the potential effects on hydromorphological supporting elements which it is considered would encompass 'hydrological regime'. However, TLSB would welcome further clarification of the new quality element 'hydrological regime'.
		Flow Cycle 1: Not assessed individually Cycle 2: Pass	No. Updated WFD Assessment (October 2014) conclusion on Freshwater flow quality element in this water body: *No potential effect on freshwater flow – no works within the water body that would affect flow of water down the river – Screened out.*
		Chemical status: No further assessment of chemical status required. Updated WFD Assessment (October 2014) conclusion on Chemical status and all encompassed quality elements in this water body: *No project effect - no discharge of priority substances as a result of the Project - Screened out*	
		Mitigation measures	No mitigation measures were reported in Cycle 1 as the water body was at good potential and so none were required. At Cycle 2 the water body is at moderate potential and so mitigation measures would be necessary for the water body to achieve good potential: **<u>Navigation, ports and harbours use</u>** • Modify channel (not in place) - the Project will not inhibit the future implementation of modifications to the channel within this water body. • Modify structure (not in place) - the Project will not inhibit the future implementation of modifications to any structures within this water body. • Flow manipulation (not in place) - the Project will not inhibit the future implementation of measures to control flow within this water body. • Remove obsolete structure (in place) – the Project will not require the addition of structures within this water body. • Dredging disposal strategy (in place) – the Project will not require the alteration of any dredging or disposal programme within this water body.

			• Reduce impact of dredging (in place) - the Project will not require the alteration of any dredging or disposal programme within this water body. • Reduce sediment resuspension (in place) - the Project will not require the alteration of any dredging or disposal programme within this water body. • Retime dredging or disposal (in place) - the Project will not require the alteration of any dredging or disposal programme within this water body. • Sediment management (in place) - the Project will not require the alteration of any dredging or disposal programme within this water body. • Dredge disposal site selection (in place) - the Project will not require the alteration of any dredging or disposal programme within this water body. • Manage disturbance (in place) - the Project will not require the alteration of any dredging or disposal programme within this water body. • Modify vessel design (in place) - the Project will not require the alteration of any dredging or disposal programme within this water body and so access for modified vessels will be maintained. Vessel management (in place) – the Project will not require the alteration of the timing or frequency of vessel movements within this water body.
GB541005800600	Afan Estuary Including Docks	**heavily modified water body** **Cycle 1:** **Overall status: good potential** **Overall status objective: good potential by 2021** **Specific status objective: good ecological potential by 2021;** **Cycle 2:** **Overall status: moderate potential** **Overall status objective: good potential by 2021** **Specific status objective: good ecological potential by 2021; good chemical potential by 2015** The Afan Estuary water body is included in Table 3.1 of the updated WFD Assessment (October 2014). As stated in Section 3.3, paragraph 3.3.0.3, "*For all the other waterbodies listed in Table 3.1 it has been determined and agreed with NRW that the only quality element that the Project has the potential to affect is the 'fish' quality element, and within this element, only the migratory fish component should be assessed.*" As such no further assessment is considered to be required for this water body, other than for migratory fish. There are no elements of the Project located within the Afan Estuary water body.	
Groundwater water bodies			

GB41002G201000	Swansea Carboniferous Coal Measures	**Cycle 1:** **2013 status: Poor – poor chemical status (general chemical test and impact on surface waters)** **Overall status objective – good by 2027** **Specific status objective - Good Quantitative Status by 2015, Good Chemical Status by 2027** **Cycle 2:** **Overall status: poor** **Overall status objective: poor by 2015** **Specific status objective: poor chemical status by 2015**	
		General Chemical Test (chemical) Cycle 1: Poor status Cycle 2: Good status	The conclusion of the Updated WFD Assessment (October 2014) (paragraph 3.6.6.7 and 3.3.6.8) was that it is considered that the Project will not have a significant non-temporary effect on the status of one or more WFD parameters at water body level and will not cause deterioration in the status of the Swansea Carboniferous Coal Measures water body, or compromise the future achievement of the objectives in relation to saline intrusion. No further assessment is therefore required.

1.2 Fish Quality Element Assessment

1.2.1 The direct impacts of the Project on migratory fish will occur in the Swansea Bay coastal water body as set out in the ES and the WFD Assessment Report (TLSB, October 2014). The fish quality element is not considered under the WFD in coastal water bodies. The fish quality element requires consideration for transitional and river water bodies and a methodology was set out in Section 3.6.1. (3.6.1.17 – 3.6.1.22) of the WFD Assessment Report (TLSB, October 2014) for consideration of migratory fish. This methodology is as follows:

"Fish quality element assessment approach

3.6.1.17 *The Swansea Bay region is known to support a number of diadromous (migratory) fish species. These species are all priority species of conservation importance under European legislation and of relevance to this WFD assessment.*

3.6.1.18 *Spawning populations of Atlantic salmon (Salmo salar), sea trout (Salmo trutta) and European eel (Anguilla anguilla) are regularly recorded in Swansea Bay and connected waterbodies. Twaite shad (Alosa fallax), though caught in the Bay, are not known to have any local spawning populations.*

3.6.1.19 *There is no evidence to indicate the extent of sea lamprey (Petromyzon marinus) or river lamprey (Lampetra fluviatilis) spawning in any of the rivers flowing into Swansea Bay. Fishery surveys by NRW (previously Environment Agency) undertaken between 2001 and 2012 indicate that ammocoetes (juvenile lamprey) were found within all rivers at low densities, with exception of the River Afan. Spawning of river lamprey is observed by the Environment Agency on an annual basis on most rivers entering Swansea Bay (Evans, H., pers. comm., 15th February 2013). Sea lamprey have also been seen spawning in low numbers at the mouth of the River Neath (2 pairs seen in 2011).*

3.6.1.20 *Anadromous fish populations experience significant natural inter-annual variation, dominated by super-regional influences (Harris & Milner, 2004; Tesch, 2003). Marine mortality is often significant, and is thought to represent an important determinant of low adult return rates (Aas et al., 2011). The population of anadromous fish (migrate to freshwater to spawn) within the River Tawe is prone to natural fluctuation, this is reflected in the number of fish declared by rod fishermen during yearly catch return data (Environment Agency, n.d.); numbers of anadromous fish returning to the Rivers Neath and Afan also fluctuate yearly.*

3.6.1.21 *Chapter 9: Fish, including Recreational and Commercial Fisheries of the Environmental Statement concludes that the key rivers of interest for the impact of the project on migratory fish are the Rivers Tawe and Neath. The rivers enter the Bay just outside the western and eastern*

landfalls of the Lagoon seawalls respectively. A detailed assessment of the potential effects of the Project on the Tawe and Neath has been undertaken for the Tawe Estuary and Neath Estuary waterbodies respectively. It follows that any impacts identified for these waterbodies would be relevant for the upstream waterbodies of each river identified in Table 3.1.

3.6.1.22 *The likely effect of the Project on the populations of migratory species of salmon, eel and lamprey within Swansea Bay, such as the Kenfig and the Afan and other waterbodies entering the Bay as defined in Table 3.1 has been assessed as minimal within Chapter 9 of the ES. However, all waterbodies have been incorporated within the Stage 5 assessment for completeness. It should be noted, that the limited hydrological connectivity between Swansea Bay and the Neath and Tennant canal (and thus Crymlyn Brook) and information available for fish species present suggest that these watercourses are not important for migratory fish."*

1.2.2 Following a recommendation from NRW that TLSB should consider the effects of the Project on individual river and transitional waterbodies specifically, as opposed to the methods set out above within the WFD Assessment Report (TLSB, 2014) for which the Secretary of State determined the DCO, discussions have been ongoing between TLSB and NRW in relation to identifying a suitable methodology. At the time of this submission, NRW have advised that no formal guidance is currently available and have requested further discussion with TLSB based on an initial outline of possible approaches (including consideration of current performance in relation to classification boundaries, past performance at site/species level, and other potential pressures within the water body) (e-mail of 8 June 2016 from Martyn Evans (NRW) to Tim Carter (TLP)).

1.2.3 Until agreement of any suitable method can be reached, the only approach available to TLSB to consider the potential effects of the Project on fish within WFD water bodies is to review the results from the recently updated IBM and alternative impact assessment work that has been carried out and apply expert judgement in the light of the over-riding aims of the WFD.

1.2.4 TLSB welcome the opportunity for further discussions, but it is noted that previous discussions with NRW regarding tools that might be available for assessing the fish quality element did not identify a robust method. Historical and contemporary data sets for the relevant waterbodies provide only subjective opportunities for assessment against any Ecological Quality Ratio (EQR) for the fish quality element within the individual waterbodies.

1.2.5 The conclusion to the WFD Assessment Report (TLSB, October 2014) was that the Project would not result in deterioration of the fish quality element (specifically migratory fish) status of any potentially affected waterbodies and of particular consideration the Rivers Tawe or Neath, their associated waterbodies or their transitional waters on a non-temporary basis.

1.2.6 TLSB consider that it is highly unlikely that any qualitative review of the conclusions of the original WFD Assessment Report (TLSB, 2014) will change the original evaluation that supported the Secretary of State's determination of the Project in relation to the provisions of the WFD. For this original assessment, good status of all waterbodies for the fish quality element was considered following guidance from NRW and thus the assessment considered the future objectives of the WFD for all waterbodies. This view is based on the results of the recently updated IBM and alternative impact assessments. The results obtained from the updated IBM modelling and alternative impact assessment methodologies that were developed were similar in range to the results originally reported. This confirms that impacts on migratory fish are expected to be low. It should also be noted that potential effects of the Project on fish will be reduced through the implementation of a range of proposed mitigation measures, including mitigation by offsetting. Details of the package of mitigation measures, including proposed offsetting will be set out in the final TLSB Mitigation, Monitoring and Offsetting Framework to be submitted in support of the Marine Licence application.

1.3 Conclusion

1.3.1 The construction of the Project will result in structures being placed within Swansea Bay coastal water body. For the Updated WFD Assessment Report (TLSB, 2014), it was identified that works associated with the removal of the Port of Swansea eastern breakwater would occur within the original Tawe transitional water body and thus, the revised water body extent. Since production of the WFD Assessment Report, it has been confirmed that the breakwater will not be removed. As such, there will now be no works associated with the Project in the Tawe transitional water body. Under the terms of the WFD, the assessment for the Cycle 2 objectives has been based upon the effect of the Project on the existing water body and not upon the water bodies that may exist after the creation of the Project.

1.3.2 Assessment has required examination of the condition of the quality elements for Cycle 2 which define the status of the WFD waterbodies and any deterioration of these elements at water body level as a result of the Project. This has involved a review of changes to the status of quality elements between Cycle 1 and Cycle 2 of the Western Wales RBMP. TLSB have considered the likely effect of predicted impacts on the status of the waterbodies based on guidance currently available.

1.3.3 The decision maker must establish whether the Project will result in conflict with the terms of the WFD. A member state of the European Union does not breach the Directive if the modifications (in this case, the Project) to the physical characteristics of a water body do not result in either "*failure to achieve…good ecological status or, where relevant, good ecological potential or to prevent deterioration in the status of the body of surface water*…"

1.3.4 The ecological potential of the water body is identified by reference to its chemical, biological and hydro-morphological components. If the effects are such that the potential status of the water body is unaffected, the WFD assessment need proceed no further.

1.3.5 However, where there is, will be or (on a precautionary basis) may be a “failure to achieve…good ecological status or, where relevant, good ecological potential or to prevent deterioration in the status of the body of surface water…” further assessment is required under Article 4.7 of the WFD.

1.3.6 When considering the assessment under Article 4.7 it is necessary to consider Article 4.8 as well. This provides that where works are proposed (here, the Project) they should not "*permanently exclude or compromise the achievement of the objectives of this Directive in other bodies of water within the same river basin district and [are] consistent with the implementation of other community environmental legislation*".

1.3.7 The Article 4.8 assessment requires the decision maker to be satisfied that the Project will not prevent other contiguous or connected waterbodies from achieving the environmental objectives as a result of the Project. The other community environmental legislation which must not be precluded includes the Habitats Directive, Birds Directive and other environmental directives such as the Environmental Impact Assessment Directive.

1.3.8 From the numerous, detailed technical assessments undertaken within the Updated WFD Assessment Report, the EIA and the HRA on the impact of the Project to the quality elements considered within the WFD, and the review of the changes between Cycle 1 and Cycle 2 of the Western Wales RBMP, it is considered that with the exception of the Swansea Bay coastal water body, the Project will not cause deterioration in the status of any other water body within the Western Wales RBMP (Environment Agency, 2009). Nor will the project compromise the future achievement or maintenance of “Good” chemical or ecological status. The Project will also be in compliance with Community Legislation with respect to these waterbodies. These other waterbodies are identified as waterbodies that are relevant to the provisions of Article 4.8. Monitoring of various parameters including coastal processes and fish will be undertaken as part of the Project and detailed within the AEMP to validate the findings of the WFD assessment with respect to these other waterbodies.

1.3.9 As for the Updated WFD Assessment Report (TLSB, 2014), this review of the RBMP Cycle 2 has also identified that in the case of Swansea Bay Coastal water body there is a potential risk of deterioration of the benthic invertebrate quality element and the biological quality element supporting hydromorphological conditions. The Project also has a potential effect on the mitigation measures proposed for the HMWB and thus may affect the potential of the water body to achieve ‘good ecological potential’ by 2027. Based on the information available, it is not considered likely that the Project is likely to result in the deterioration of any features in any other water bodies.