Royal HaskoningDHV
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York Potash Project Harbour Facility Water Framework Directive Compliance Assessment

Appendix 4.3

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1 INTRODUCTION

1.1 The Water Framework Directive

1.1.1 The Water Framework Directive (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) (WFD) was adopted by the European Commission in December 2000.

1.1.2 The WFD requires that all EU Member States must prevent deterioration and protect and enhance the status of aquatic ecosystems. This means that Member States must ensure that new schemes do not adversely impact upon the status of aquatic ecosystems, and that historical modifications that are already impacting it need to be addressed.

1.1.3 The Directive was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003, which mean that the requirements of the WFD need to be considered at all stages of the planning and development process.

1.1.4 Unlike the EU Birds and Habitats Directives (EC Directive on the Conservation of Wild Birds (2009/147/EC) and EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC), respectively), which apply only to designated sites, the WFD applies to all water bodies, including those that are man-made. The consideration of the proposals under the WFD will, therefore, apply to all surface and groundwater bodies that have the potential to be impacted.

Purpose of this report

1.1.5 This report determines the compliance of the harbour facilities with the requirements of the WFD. The method used to make this assessment and the baseline data used to assess potential impacts on water body status resulting from the scheme is presented. A preliminary assessment of compliance is then made in order to identify potential effects and the likely impacts on water body status for the individual compliance parameters. This is followed by a detailed assessment of compliance for those water bodies whose status is likely to be impacted by scheme activities.

1.1.6 The potential cumulative impacts on WFD compliance of the wider York Potash Project (Mine, MTS, MHF and harbour facilities) are discussed in the cumulative impact assessment (see Document 6.6).

1.2 Method for assessment

1.2.1 The approach to assessing whether the harbour facilities is compliant with the requirements of the WFD was set out in detail in the YPP WFD Compliance Assessment Strategy (Royal HaskoningDHV, May 2014a). This strategy was reviewed and accepted by the Environment Agency in July 2014. This section provides a summary of the compliance assessment method.

Approach to the WFD compliance assessment

1.2.2 The way in which WFD impacts are assessed is quite different to the approach conventionally used within the Environmental Impact Assessment (EIA) process. The standard EIA approach assesses whether an impact is minor, moderate or major, and whether it is beneficial or adverse. This is not compatible with the requirements of the WFD, which requires an assessment of whether a scheme (or

element of a scheme) is compliant or non-compliant with the environmental objectives outlined in **Table 1**.

Table 1 Environmental objectives in the WFD

Objectives (taken from Article 4 of the WFD)	Reference Article
Surface water	
Member States shall implement the necessary measures to prevent deterioration of the status of all bodies of surface water.	4.1(a)(i)
Member States shall protect, enhance and restore all bodies of surface water, subject to the application of subparagraph (iii) for artificial and heavily modified bodies of water, with the aim of achieving good surface water status by 2015.	4.1(a)(ii)
Heavily Modified and Artificial Water Bodies	
Member States shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status by 2015.	4.1(a)(iii)
Progressively reduce pollution from priority substances and cease or phase out emissions, discharges and losses of priority hazardous substances.	4.1(a)(iv)
Groundwater	
Prevent Deterioration in status and prevent or limit input of pollutants to groundwater (Daughter Directive).	4.1(b)(i)

1.2.3 Following the recommendations made by the Environment Agency's National Environment Assessment Service (Murphy *et al*., 2012), which has become recognised as national standard practice, the approach adopted in this assessment is to determine whether the scheme has:

- potential to cause deterioration in surface water body status by adversely affecting biological, hydromorphological and/or physico-chemical quality elements.
- potential to cause deterioration in groundwater body status by adversely affecting quantitative and chemical quality elements.
- potential to prevent achieving WFD status objectives by impacting upon proposed mitigation measures already identified for water bodies in the area.
- potential to incorporate mitigation measures included in the appropriate River Basin Management Plan(s).

1.2.4 This guidance is supplemented by the use of the *Clearing the Waters: A user guide for marine dredging activities* produced by the Environment Agency (2012) in order to undertake WFD compliance assessments on projects requiring dredging and disposal. Where the assessment suggests that deterioration in water body status is likely to occur as a result of the scheme, measures to mitigate the likely impacts and, therefore, avoid deterioration in status are recommended.

1.2.5 The WFD compliance assessment is undertaken in four stages which are outlined in more detail in the subsequent sections.

Stage 1: Collation of baseline information

Identification of water bodies: Selection rationale

1.2.6 Water bodies that could potentially be affected by the scheme were identified using the Environment Agency's water body shape files and online WFD mapping system (part of the "What's in your backyard?" tool). Additionally, updates included in the draft River Basin Management Planning Round 2 consultation exercise (including the Catchment Data Explorer, http://environment.data.gov.uk/catchment-planning/) have also been consulted in order to ensure the latest water body outlines and status objectives have been considered. Water bodies were selected for inclusion in the initial stages of the compliance assessment using the following criteria:

- All surface water bodies that could potentially be directly impacted by the scheme (i.e. those within the scheme footprint).
- Any surface water bodies further upstream that have direct connectivity and could potentially be affected by the proposed works.
- Any surface water bodies downstream that have direct connectivity and could potentially be affected by the proposed works.
- Any groundwater bodies that underlie the proposed scheme.

1.2.7 To facilitate this identification process and in particular to inform the decision on whether connectivity might lead to impacts, a hydromorphological assessment of the potential impacts of the scheme and potential extent of upstream and downstream propagation should be made, using the Joint Defra/Environment Agency Flood and Coastal Erosion Risk Management R&D Programme (2009) Expert Assessment Framework as a basis.

Baseline data

1.2.8 To collate the baseline data that are required to inform the WFD compliance assessment, the following tasks are undertaken:

- Collection of water body baseline data, including on the type and status of each quality element and, if appropriate, reasons for failure and mitigation measures identified by the Environment Agency. These data have been collated from the Northumbria River Basin Management Plans (RBMP) (Environment Agency, 2009 and 2014).
- Collection of proposed scheme baseline data, broken down in sufficient detail so that the compliance of each main scheme component has been considered in the assessment.
- Identification of new or planned activities in the area that could also affect water body status.

Field surveys

1.2.9 The desk-based data collation exercise should be augmented by additional surveys/technical studies which provide more information on baseline conditions at the site of the proposed scheme. These surveys are usually also undertaken to support the wider EIA process. For this project they include:

- Ecological surveys undertaken to further characterise baseline conditions and habitats within the footprint of the development (see **Section 8** of the ES).

- Underwater noise modelling to inform the ES (see **Section 8** and **11** of the ES).
- Benthic ecological monitoring throughout the Tees estuary (downstream of the Tees Barrage) for a number of years by the Environment Agency (see **Section 8** of the ES).
- Hydrodynamic modelling to understand the potential effects on physical processes within the estuary (see **Section 5** of the ES).
- Collection of vibrocores and analysis of samples in order to inform sediment quality issues (see **Section 7** of the ES).
- Intrusive ground investigation to investigate the superficial and bedrock geology (see **Section 6** of the ES).

Stage 2: Preliminary compliance assessment

1.2.10 A preliminary assessment determines whether there is the potential for the scheme to cause deterioration in any of the water bodies identified during Stage 1, and whether there is the potential to cause deterioration or a failure to meet Good Ecological Status (GES) or Good Ecological Potential (GEP) targets for these water bodies (cf. **Table 1**). The preliminary assessment considers:

- The potential of the scheme to adversely impact on any of the quality elements sufficient to cause deterioration in the water body. This assessment is based on expert judgement, informed by available data and, in the case of hydromorphological impacts, using the guidance included in the Flood and Coastal Erosion Risk Management R&D Programme Expert Assessment Framework (DEFRA/EA, 2009). It is broken down into the potential impact of the various scheme components on each quality element so that any areas of potential impact can be clearly identified.
- The potential for the scheme to impact upon proposed WFD mitigation measures and improvements, and therefore prevent GES or GEP being achieved.
- The potential for cumulative impacts as a result of existing pressures, new or recent schemes in the area, and any planned schemes. These are discussed in the cumulative impact assessment.
- The potential for impacts on critical and sensitive habitats, including designated sites and habitats with particular ecological importance.
- At the end of the preliminary assessment, water bodies and quality elements to be assessed in more detail in the subsequent stages of the compliance assessment are then identified.

1.2.11 In the absence of any identifiable impact pathway, some water bodies can be screened out at the end of Stage 2. Where there is uncertainty over the potential for a water body to be impacted, a precautionary approach is taken and the water body is screened in for further assessment. .

Stage 3: Detailed compliance assessment

1.2.12 The end result of Stage 2 is a list of water bodies and scheme components to be carried forward for further assessment. Stage 3 then considers the potential for non-temporary impacts associated with each relevant scheme component (and the scheme as a whole) on the relevant quality elements of each relevant water body.

1.2.13 The assessment therefore establishes whether the scheme will:

- Cause deterioration in water body status.
- Prevent WFD status objectives being achieved.

- Prevent status objectives being achieved in any other water bodies.

1.2.14 Following the broad principles of the WFD, the scheme is considered to be non-compliant if any of the scheme components will cause WFD failure for any of the quality elements, individually or cumulatively.

1.2.15 Impacts of the scheme on other European legislation, including the Habitats Directive, Birds Directive and Freshwater Fish Directive (2006/44/EC) are also considered in line with Articles 4.8 and 4.9 of the WFD.

1.2.16 If the assessment process identifies any impacts that are sufficient to cause WFD non-compliance, suitable mitigation measures must be identified, with reference to appropriate guidance (such as the online “Healthy Catchments” guidance (EU RESTORE, 2013) and “Estuary Edges: Ecological Design Guidance” (Thames Estuary Partnership and Environment Agency, undated)).

Stage 4: Summary of assessment and further recommendations

1.2.17 This stage summarises the results of the assessment and any mitigation measures that are required to ensure compliance with the WFD.

2 STAGE 1: BASELINE INFORMATION

Purpose of this section

2.1.1 The purpose of this section is to describe the baseline characteristics of the site of the proposed harbour facilities against which potential impacts on WFD compliance can be assessed. The section includes a description of the proposed activities involved in the construction, operational and decommissioning phases of the harbour facilities and provides a summary of the main characteristics of the water bodies that could be impacted by development activities at the development site. A full description of the construction, operational and decommissioning phases of the harbour facilities proposals is provided in **Section 3** of the ES and should be read in conjunction with this WFD compliance assessment.

Scheme description: Overview of key activities

Construction phase

2.1.2 The construction phase would include the following key activities with potential effects on water body receptors:

- Capital dredging to create a berthing pocket and dredging of a section of the adjacent approach channel.
- Excavation and re-grading of proposed port terminal area.
- Construction of the new quay and surge bins (piling).
- Run-off/discharge of surface water during construction (surface water, reclamation water (for the solid quay option) and wastewater).
- Construction of conveyor system (piling and ground preparation).
- Construction of temporary working compounds (surface preparation).
- Movement of construction traffic.

Operational phase

2.1.3 The operational phase would include the following key activities with potential effects on water body receptors:

- Maintenance dredging of the berthing pocket.
- Discharge of surface water from the new quay.

Decommissioning phase

2.1.4 Activities during the decommissioning of the conveyor which have potential for effects on water body receptors include the following

- Removal of the conveyor system.

2.2 Water bodies screened in for assessment

2.2.1 **Figure 1.1** shows the extent of works boundary at the harbour site and the WFD water bodies that could potentially be impacted by the proposals. The water bodies that are considered in this assessment have been selected on the basis of the criteria set out in **Paragraph 1.2.6**.

Surface water bodies

2.2.2 The following water bodies (**Table 2**) have been identified as relevant in geographical and hydrological terms to take through the WFD compliance assessment process (illustrated in **Figure 1.1**). WFD classification details are provided in **Tables 3** to **6**). Note that the information presented below is based on the revised Northumbria RBMP (Environment Agency, 2014) which is out for consultation and, therefore, may be subject to change when the final version of the second RBMP is published in January 2015. Where information was not available, data from the published RBMPs (Environment Agency, 2009) have been used instead, and this is indicated by a *.

Table 2 Summary of water bodies considered in the WFD compliance assessment

Waterbody	Description
Surface water bodies	
Yorkshire North GB650301500003 (coastal water body)	This is the coastal water body which stretches along the open coast, outside of the Tees estuary. It has been designated as Heavily Modified for coastal defence purposes, and is currently at GEP. This water body could, potentially, be impacted by sediment plumes created by capital dredging and the offshore disposal of dredged material. The coastal water body is located at the downstream end of the Tees estuarine (transitional) waterbody (GB510302509900).
Tees GB510302509900 (transitional water body).	This water body is designated as Heavily Modified as a result of modifications for flood protection, navigation and the quay line. It is currently at Moderate Ecological Potential due to pressures on various biological elements. There are also issues with dissolved inorganic nitrogen and several priority hazardous substances (see tables below). Both the construction of the port terminal and the capital dredging would be undertaken within this water body and, therefore, it is screened in to the assessment.
Bran Sands Lagoon	The Bran Sands lagoon is within the boundary of the Bran Sands landfill. Although no waste disposal has been disposed within the lagoon area, the lagoon is regulated by the Environment Agency (see Section 6 of the ES). The lagoon is the sole remaining area left un-reclaimed from a series of lagoons. It is approximately 700m x 500m in size, surrounded on all sides by bunds formed from locally derived slag fill and is constructed on the tidal flat deposits. The water level in the lagoon varies due to the presence of a concrete pipe which links the lagoon to the Tees estuary. It is also fed by two swales which discharge into the lagoon along the eastern boundary adjacent to the landfill. These swales drain surface water from the landfill cap (Amec, 2012). The lagoon is not in itself designated as a WFD water body, but it is in direct connectivity with the Tees transitional water body and, therefore, for the purposes of this assessment, it is considered to be part of the Tees transitional water body (GB510302509900). The lagoon is within the DCO boundary.

Waterbody	Description
Tees Estuary (S Bank) GB103025072320.	This water body is Moderate Ecological Status and has a number of failing specific pollutants and priority hazardous substances. This water body covers the Dabholm Gut and, therefore, could potentially be at risk in relation to construction and management of construction compounds and the installation of conveyor piles.
ICI Ecology Pond/drains upstream of Dabholm Gut	These water courses are not designated under WFD but there could potentially be connectivity between these drains and the Dabholm Gut. As a result, these watercourses are screened into the assessment in order to determine the potential for changes that could impact on the Tees Estuary (S Bank) water body.
Mill Race	Analysis of the drainage network at the development site indicates that this watercourse coincides with the DCO boundary. The Mill Race appears to be a largely artificial watercourse, although analysis of aerial photography and reports for field visits suggest that it has predominantly naturalised earth banks. Because this watercourse also has a catchment area of less than 10km^2, it has not been classified as a water body in its own right by the Environment Agency. For the purposes of this assessment it is, therefore, considered to be part of the water body immediately downstream (Tees Estuary (S Bank) river water body GB103025072320), because it forms part of the hydrological catchment.
Groundwater bodies	
Tees Mercia Mudstone & Redcar Mudstone (groundwater body GB40302G701300).	Although this water body is at Good Quantitative Status, it is at Poor Chemical Status due to the pressures that diffuse pollution from agriculture, contaminated land and mining place on ground water dependent surface water habitats. This water body underlies the area in which the harbour facility construction operations will take place. Piling could cause an increased potential for impacts to the status of the water body through increase in pollutant loadings or changes to groundwater levels and flow paths. The Tees Mercia Mudstone & Redcar Mudstone water body is therefore screened in for further assessment.

452000 454000 456000 458000 460000

528000 526000 524000 522000 520000

Tees
(GB510302509900)

Yorkshire North
(GB650301500003)

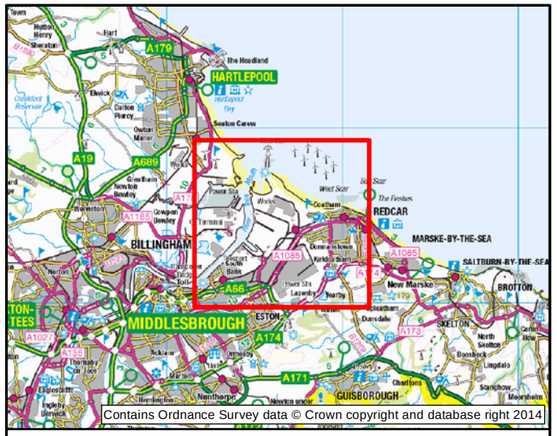
Tees Estuary (S Bank)
(GB103025072320)

Tees Mercia Mudstone and Redcar Mudstone
(GB40302G701300)

N

0 0.5 1 Kilometres

Source: Environment Agency



Legend:

- DCO Order Limits
- Estuarine waterbody
- Coastal waterbody
- Tees Mercia Mudstone & Redcar Mudstone
- Fluvial waterbody

DCO Order Limits as of 24/02/15

Client:	Project:
York Potash Limited	York Potash Project Harbour Facilities

Title: York Potash Harbour Facility WFD Compliance Assessment

Part:	Figure:	Drawing No:
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Table 3 Characteristics of water body GB103025072320 Tees Estuary (S Bank)

Water body details (from Northumbria RBMP)			
Water body name	Tees Estuary (S Bank)		
Water body ID	GB103025072320		
Management catchment	Tees (Operational Catchment: Tees Lower and Estuary)		
Hydromorphological designation (and reason)	Not Designated A/HMWB		
Current Overall Status	Moderate		
Status Objective	Good Status by 2027*		
Justification if not good by 2015	Disproportionately expensive, Technically infeasible		
Sensitive habitats	Bathing Water Directive, Freshwater Fish Directive*		
Element	**Current Status (and confidence)**	**Predicted Status by 2015**	**Reason for Failure**
Biological quality elements			
Fish	-	-	-
Invertebrates	-	-	-
Macrophytes	-	-	-
Phytobenthos	-	-	-
Hydromorphological quality elements			
Hydrological Regime	Supports Good	Supports Good	N/A
Morphology	Supports Good	-	-
Specific pollutants			
Copper, Zinc	Moderate	High	Technically infeasible: Cause of adverse impact unknown
Triclosan	Moderate	High	Disproportionately expensive: Unfavourable balance of costs and benefits
Priority hazardous substances			
Cadmium and Its Compounds, Tributyltin Compounds, Nonylphenol	Fail	Good	Technically infeasible: Cause of adverse impact unknown
Di(2-ethylhexyl)phthalate	Fail	Good	Disproportionately expensive: Unfavourable balance of costs and benefits
Nickel and Its Compounds, Lead and Its Compounds	Good	Good	N/A

NB: Blank cells indicate that no data is included for these quality elements in the Northumbria RBMP.

* Indicates data is taken from cycle 1 RBMPs and more up-to-date information is not currently available.

Table 4 Characteristics of transitional water body GB510302509900 – Tees

Water body details (from Northumbria RBMP)			
Water body name	Tees		
Water body ID	GB510302509900		
Management catchment	Tees (Operational Catchment: Tees Lower and Estuary)		
Hydromorphological designation (and reason)	Heavily Modified (Flood Protection, Navigation, Quayline)		
Current Overall Status	Moderate		
Status Objective	Good Status by 2027*		
Justification if not good by 2015	Technically infeasible		
Sensitive habitats	Freshwater Fish Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Urban Waste Water Treatment Directive*		
Element	**Current Status (and confidence)**	**Predicted Status by 2015**	**Reason for Failure**
Biological quality elements			
Fish	Good	Good	N/A
Invertebrates	Moderate	Good	Technically infeasible: Cause of adverse impact unknown
Macroalgae	Moderate	Good	Technically infeasible: No known technical solution is available
Phytoplankton blooms	High	High	N/A
Angiosperms	Moderate	Good	Technically infeasible: Cause of adverse impact unknown
Physico-chemical quality elements			
Dissolved Inorganic Nitrogen	Moderate	Moderate	Technically infeasible: No known technical solution is available
Dissolved oxygen	High	High	N/A
Specific pollutants			
Fenitrothion, Phenol, Toluene, Un-ionised ammonia, Zinc, 1-1-1-trichloroethane, Chloronitrotoluenes CALC, Permethrin, Malathion, Xylene, 1-1-2-trichloroethane, Arsenic, Copper, Iron	High	High	N/A

Priority substances			
DDT Total, Trichloroethylene, para - para DDT, Carbon Tetrachloride, Aldrin, Dieldrin, Endrin & Isodrin, Tetrachloroethylene	Good	Good	N/A
Priority hazardous substances			
Tributyltin Compounds	Fail	Fail	Technically infeasible: No known technical solution is available
Brominated diphenylether (BDPE) Calc, Fluoranthene, Benzo(a)pyrene, Mercury and Its Compounds	Fail	Good	Technically infeasible: Cause of adverse impact unknown
1,2-dichloroethane, Lead and Its Compounds, Hexachlorocyclohexane, Hexachlorobutadiene, Hexachlorobenzene, Endosulfan, Dichloromethane, Cadmium and Its Compounds, Atrazine, Nickel and Its Compounds, Benzene, Napthalene, Trifluralin, Trichloromethane, Trichlorobenzenes, Simazine, Pentachlorophenol, Nonylphenol	Good	Good	N/A
Hydromorphological quality elements			
Hydrological Regime	Supports Good	Supports Good	N/A
Mitigation measures assessment	Moderate or less	Good	Technically infeasible: Cause of adverse impact unknown
Mitigation measures in place*			
Reduce impact of dredging Managed realignment of flood defence Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works Modify channel Prepare a dredging / disposal strategy Vessel Management Reduce sediment resuspension Alter timing of dredging / disposal			

Mitigation measures not in place*
Sediment management
Site selection (dredged material disposal) (e.g. avoid sensitive sites)
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone
Manage disturbance
Retain marginal aquatic and riparian habitats (channel alteration)
Bank rehabilitation / reprofiling
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution
Operational and structural changes to locks, sluices, weirs, beach control, etc

According to the latest "reasons for not achieving good status" database, failure to pass the mitigation measures assessment is associated with physical modifications due to urban development.

NB Blank cells indicate that these data are not available in the RBMP* Indicates data is taken from cycle 1 RBMPs and more up-to-date information is not currently available.

Table 5Characteristics of coastal water body GB650301500003 – Yorkshire North (note that this water body is part of the Humber RBD in the revised plans but information is still available in the Northumbria RBMP)

Water body details (from Northumbria RBMP)			
Water body name	Yorkshire North		
Water body ID	GB650301500003		
Management catchment	Esk and Coast (Operational Catchment: Esk)		
Hydromorphological designation (and reason)	Heavily Modified (coastal protection)		
Current Overall Potential	Moderate		
Status Objective	Good Ecological Potential by 2015 *		
Justification if not good by 2015	Technically infeasible		
Sensitive habitats	Bathing Water Directive, Freshwater Fish Directive Natura 2000 (Habitats and/or Birds Directive) *		
Element	**Current Status (and confidence)**	**Predicted Status by 2015**	**Reason for Failure**
Biological quality elements			
Invertebrates	Good	Good	N/A
Macroalgae	-	-	-

Phytoplankton	High	High	N/A
Physico-chemical quality elements			
Dissolved Inorganic Nitrogen	Good*	Good*	N/A
Dissolved Oxygen	High	High	N/A
Specific pollutants			
Arsenic	High	High	N/A
Copper	High	High	N/A
Iron	High	High	N/A
Zinc	High	High	N/A
Priority hazardous substances			
Benzo(a)pyrene, Mercury and Its Compounds	Fail	Good	Technically infeasible: Cause of adverse impact unknown
Hexachlorobutadiene, Tributyltin Compounds, Nickel and Its Compounds, Lead and Its Compounds, Hexachlorobenzene, Fluoranthene, Cadmium and Its Compounds	Good	Good	N/A

NB: Blank cells indicate that no data is included for these quality elements in the Humber RBMP.

* Indicates data is taken from cycle 1 RBMPs and more up-to-date information is not currently available.

Table 6 **Characteristics of groundwater water body GB40302G701300 – Tees Mercia Mudstone & Redcar Mudstone**

Water body details (from Northumbria RBMP)			
Water body name	Tees Mercia Mudstone & Redcar Mudstone		
Water body ID	GB40302G701300		
Current Overall Status	Poor		
Quantitative Status	Good (objective of Good)		
Chemical Status	Poor (objective of Poor; Disproportionately expensive)		
Status Objective	Good Quantitative and Chemical Status by 2021*		
Element	**Current Status (and confidence*)**	**Predicted Status by 2015**	**Reason for Failure**
Quantitative quality elements			
Impact on wetlands	Good (Low)	Good	N/A
Impact on surface waters	Good (High)	Good	N/A
Saline intrusion	Good (Low)	Good	N/A
Water balance	Good (High)	Good	N/A
Chemical quality elements			
Drinking Water Protected Area	Good (Low)	Good	N/A
General chemical test	Good (Low)	Good	N/A
Impact on wetlands	Good (Low)	Good	N/A
Impact on surface waters	Poor (Low)	Poor	Disproportionately expensive: Unfavourable balance of costs and benefits
Saline intrusion	Good (Low)	Good	N/A

According to the latest “reasons for not achieving good status” database, poor status for the impact on surface waters element is associated with point sources pollution from an abandoned mine.

* Indicates data is taken from cycle 1 RBMPs and more up-to-date information is not currently available.

3 STAGE 2: PRELIMINARY COMPLIANCE ASSESSMENT

Purpose of this section

3.1.1 The aim of this section is to consider the water bodies that could potentially be impacted by the proposed scheme and to highlight the quality elements within each water body that could be impacted. This assessment, therefore, determines the scope for the detailed compliance assessment.

Initial assessment of water bodies

3.1.2 This assessment considers the construction, operational and decommissioning phases of the scheme and highlights potential impact mechanisms based on water body type (in this case, surface and groundwater). The potential mechanisms for impact described in **Table 7** have been used to undertake a preliminary assessment of the potential impacts of the scheme on the quality elements of each water body (biological, hydromorphological and physico-chemical quality elements for surface waters, and quantitative and chemical quality elements for groundwater). The results of the preliminary assessment are shown in **Tables 8** to **11**.

Additional assessment requirements

3.1.3 **Tables 8** to **11** have considered all activities associated with the construction, operational and decommissioning phases of the project that potentially could impact on water bodies and concluded that there are a variety of potential mechanisms that could either cause deterioration in water body status or threaten the ability of the water body to meet its objectives.

3.1.4 The preliminary compliance assessment has demonstrated that the proposed project has the potential to cause deterioration in the status of:

- GB510302509900 Tees Estuary (S Bank) Area water body for all compliance parameters.
- GB510302509900 Tees water body for all compliance parameters.
- GB40302G701300 Tees Mercia Mudstone & Redcar Mudstone groundwater body for potential impacts on chemical parameters.

3.1.5 These issues will therefore be carried forward for further assessment.

3.1.6 The preliminary assessment has also demonstrated that there are no mechanisms by which there could be impacts upon the Yorkshire North coastal water body (GB650301500003). This water body has therefore been excluded from further assessment.

Table 7 Mechanisms for potential impact on water body status associated with the Harbour facilities

Type of water body	Project Phase	Potential mechanisms for impact
Surface water bodies	Construction	• Increase in sediment supply to surface water bodies associated ground preparation as well as changes in surface water run off associated with the temporary compounds. • Direct disturbance to bed associated with piling works, with the potential for increased sediment supply to downstream water bodies. • Changes to water quality (including physico-chemical changes) associated with dredging and disposal. • Increase of contaminants in surface runoff associated with the presence of storage of fuels and oils for construction vehicles, accidental spillage during refuelling and on the surrounding road network. • Potential for introduction of Invasive Non-Native Species to the site and the watercourses which drain it through the transfer of seeds or plant fragments on construction vehicles. • Changes to estuarine water quality associated with surface water drainage and any reclamation discharges should the solid quay design be the preferred option. • Temporary loss of subtidal habitats associated with dredging/disposal.
	Operation	• Impacts on water bodies associated with discharge from the site drainage system. • Changes to hydromorphology associated with the presence of new quay structure and increase in dredge depth. • Permanent loss of intertidal habitat.
	Decommissioning	• Potential increase of contaminants in surface runoff associated with demolition of foundations of the overland conveyor.
Groundwater bodies	Construction	• Decrease in chemical quality of groundwater body due to the ingress of contaminants into the aquifer through piling and foundation installation.
	Operation	• Changes in groundwater flows due to changes to surface water drainage associated with new facility.
	Decommissioning	• Decrease in chemical quality of groundwater body due to demolition of foundations (accidental spillage).

Table 8 Preliminary assessment of potential impacts on Tees Estuary (S Bank) Area water body (GB103025072320)

Quality element	Potential for impacts on status (grouped according to quality element)	Potential for impacts on mitigation measures	Potential for impacts on critical habitats	Include in detailed assessment?
Biological	**Phytoplankton; Macrophytes; Fish fauna and phytobenthos; Benthic invertebrate fauna** • Potential for indirect impacts resulting from deterioration of in-channel habitats as a result of increased fine sediment supply and disturbance of channel bed and banks during construction and operation of the temporary construction compounds. • Potential for direct impacts through the increase of contaminants in surface runoff.	N/A	N/A	**Yes**
Hydromorphological	**Quantity and dynamics of flow** • Potential for indirect impacts as a result of increased fine sediment supply and disturbance of channel bed and banks during construction and operation of the temporary construction compounds. River continuity • Potential for presence of piles to impact on river continuity. River depth and width variation; Structure and substrate of the river bed • Potential for indirect impacts as a result of increased fine sediment supply and disturbance of channel bed and banks during construction and operation of the temporary construction compound.	N/A	N/A	**Yes**
Physico-chemical	**Thermal conditions; Oxygenation conditions; Salinity; Acidification status; Nutrient conditions** • Impacts to these quality elements have been identified through potential increases in sediment supply and pollutant presence in surface runoff in association with construction activities.	N/A	N/A	**Yes**

Table 9a **Preliminary assessment of potential impacts on the Tees transitional water body (GB510302509900) associated with dredging– using Clearing the Waters Guidance (Environment Agency, 2012).** Note that the screening and scoping triggers have been combined in order to provide the preliminary assessment.

WFD parameter	Classification	Dredging triggers for potential effects on WFD parameters at water body level	
		Screening trigger	**Include in detailed assessment?**
Biological elements			
Phytoplankton	Composition, abundance and biomass	In EA guidance this element is screened out as dredging is generally considered to only have very transient effects on this parameter	No
Other aquatic flora (angiosperms, saltmarsh, seagrass, macroalgae, seaweed) Benthic invertebrate fauna Fish Fauna		In the Clearing the Waters guidance triggers are split into three categories: a. Will the dredging directly remove intertidal area or is it within 10m of MLWS (if yes, further assessment is triggered)? **Response: Yes** b. Proportion of water body impacted by dredging activity will be >5% (formula to be applied 1.5 x dredge footprint) – if yes, further assessment is triggered. **Response: The dredge area is located within the water body but is not >5%.** c. High level assessment (made up of a number of elements, need to score 2 or more to trigger scoping) - Is the dredging dispersive or non-dispersive? **Response: The dredge is non-dispersive technique (Score 0).** - When will the dredge occur (score 1 if March to October, score 0 if November to February). **Response: Dredging will occur over a period of 6 months (Score 1)** TOTAL SCORE: 1	Yes
Hydromorphological elements			
Depth variation	-	The triggers in the clearing the waters guidance refer to the proportion of water body impacted. If greater than 5% then further assessment is required. **Response: Less than 5% of the water body will be impacted.**	No
Bed	Quantity (transitional only), structure and substrate		

WFD parameter	Classification	Dredging triggers for potential effects on WFD parameters at water body level	
		Screening trigger	Include in detailed assessment?
Inter-tidal zone structure		Will the dredging directly remove intertidal or is it within 10m of MLWS? **Response: Yes**	Yes
Dominant Currents	Direction	Is the dredge a significant change to a maintenance dredge? **Response: Yes, this is a capital project and the channel area of the dredge will be deepened beyond normal maintenance activity.**	Yes
Freshwater flow (transitional only)	-	In the Environment Agency guidance this element is screened out as dredging is not generally considered to have an effect on this parameter.	No
Wave exposure	-	Will the dredge take place in shallow water? **Response: Yes**	Yes
Chemical and physical-chemical elements			
Transparency		Triggers relate to the percentage of water body to be impacted (i.e. is it >5%), time of year to be dredged and whether dredging is dispersive. **Response: Duration of the activity will be greater than 25% of the year and, therefore, a Score of 1 is allocated for this trigger.** TOTAL SCORE: 1 (scoping is required if score is over 1.5).	No
Thermal conditions		Screened out as dredging will not impact on thermal conditions.	No
Oxygenation conditions		Triggers relate to the percentage of water body to be impacted (i.e. is it >5%), time of year to be dredged and whether dredging is dispersive. **Response: As above, score would be 1 in relation to the potential time of year in which the dredging would be undertaken.** Additional points should be allocated where sediment chemical oxygen demand is an issue, if dredging is near to raw sewage inputs and where oxygen issues have been identified within the water body. Further assessment is required where 4 points or more are scored. **Response: In relation to these additional issues, dredging will not occur in the vicinity of raw sewage discharges and oxygenation issues within the River Tees have improved over the years (currently at high status for dissolved oxygen). Significant impacts on the dissolved oxygen concentrations on the water body associated with dredging are therefore not anticipated.** TOTAL SCORE remains at 2.	No
Salinity		Screened out in Clearing the Waters Guidance (Environment Agency, 2012)	No

WFD parameter	Classification	Dredging triggers for potential effects on WFD parameters at water body level	
		Screening trigger	**Include in detailed assessment?**
Nutrient conditions		Is the dredge a capital or new dredge? **Response: Yes**	Yes
Specific pollutants			
Sediment quality	Cefas Action Levels	There is the potential for Cefas Action Levels to be exceeded.	Yes
Protected Areas			
Freshwater Fish Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Urban Waste Water Treatment Directive.	Relevant legislation associated with each protected area	Due to the scale, nature and location of the proposed dredging in relation to these protected areas there is the potential to impact on these protected areas. Potential impacts on European designated sites are considered in the HRA (Document 6.3 of the DCO application) and therefore are not considered further in this WFD compliance assessment. However impacts related to the Urban Waste Water Treatment and Nitrates Directive are screened in.	Yes

Table 9b **Preliminary assessment of potential impacts on the Tees transitional water body (GB510302509900) associated with other aspects of the development**.

Quality element	Potential for impacts on status (grouped according to quality element)	Potential for impacts on mitigation measures	Potential for impacts on critical habitats	Include in detailed assessment?
Biological	**Phytoplankton; Other aquatic flora; Benthic invertebrate fauna; and Fish fauna** • Permanent loss of habitat associated with reclamation for the solid structure option and revetment for the open structure. • Potential for temporary noise impacts associated with piling for the quay wall on fish fauna.	There is the possibility that some of the mitigation measures in place could be impacted and therefore these will be considered in the detailed assessment	N/A	**Yes**
Hydromorphological	**Quantity, structure and substrate of the river bed, depth variation; structure of the intertidal zone and freshwater flow** • There is the potential for the presence of the new quay to impact on these parameters. Wave exposure • There is the potential for the presence of the new quay wall to impact on wave exposure.			**Yes**
Physico-chemical	**Thermal conditions, acidification status and salinity** • No pathways to impact these parameters. **Oxygenation conditions and transparency** • No other pathways to impact on these parameters. **Nutrient conditions** • No other pathways identified that will impact on nutrient levels (dredging already assessed against clearing the waters triggers). **Chemical parameters/specific pollutants.** • There is a possibility that an increase in suspended solids in the water column associated with surface water discharges could occur. • There is the possibility that accidental spills and leaks during construction could impact on water quality.			**Yes**

Table 10a **Preliminary assessment of potential impacts on the Yorkshire North coastal water body (GB650301500003) associated with disposal– using Clearing the Waters Guidance (Environment Agency, 2012).** Note that the screening and scoping triggers have been combined in order to provide the preliminary assessment.

WFD parameter	Classification	Disposal triggers for potential effects on WFD parameters at water body level	
		Screening trigger	**Include in detailed assessment?**
Biological elements			
Phytoplankton	Composition, abundance and biomass	In EA guidance this element is screened out as disposal is generally considered to only have very transient effects on this parameter	No
Other aquatic flora (angiosperms, saltmarsh, seagrass, macroalgae, seaweed)		In the Clearing the Waters guidance triggers are split into three categories: **a.** Will the disposal directly occur in the intertidal area or is it within 10m of MLWS (if yes, further assessment is triggered)? **Response: No** **b.** Proportion of water body impacted by disposal activity? **Response: Disposal will not occur within the water body.**	No
Benthic invertebrate fauna			
Fish Fauna			
Hydromorphological elements			
Depth variation	-	The triggers in the clearing the waters guidance refer to the proportion of water body impacted. If greater than 5% then further assessment is required. **Response: Less than 5% of the water body will be impacted. Disposal will not occur within the water body and plume effects from the disposal are not anticipated to enter the water body.**	No
Bed	Quantity (transitional only), structure and substrate		
Inter-tidal zone structure		Is disposal site on the intertidal areas or is it within 10m of MLWS? **Response: No**	No
Dominant Currents	Direction	Is the disposal site in a coastal water body of a significant change to existing disposal operations at a site in a coastal water body? **Response: No**	No
Freshwater flow (relevant to transitional waters)	-	In the Environment Agency guidance this element is screened out as disposal is not generally considered to have an effect on this parameter.	No
Wave exposure	-	Will the activity take place in shallow water? **Response: No**	No

WFD parameter	Classification	Disposal triggers for potential effects on WFD parameters at water body level	
		Screening trigger	**Include in detailed assessment?**
Chemical and physical-chemical elements			
Transparency	-	Screened out in Environment Agency guidance.	No
Thermal conditions	-		
Oxygenation conditions	-		
Salinity	-		
Nutrient conditions	-		
Specific pollutants			
Sediment quality	Cefas Action Levels	Only sediments acceptable to CEFAS will be disposed of to the site.	No
Protected Areas			
Freshwater Fish Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Urban Waste Water Treatment Directive.	Relevant legislation associated with each protected area	There are no designated sites located close to the disposal grounds.	No

Table 10b **Preliminary assessment of potential impacts on the Yorkshire North coastal water body (GB650301500003) associated with other activities.**

Quality element	Potential for impacts on status	Potential for impacts on mitigation measures	Potential for impacts on critical habitats	Include in detailed assessment?
Biological	**Phytoplankton; Benthic invertebrates; Other aquatic flora** • The dredging plume is not predicted to enter into this water body.	N/A	N/A	**No**
Hydromorphological	**Morphological conditions; Tidal regime** • No impact anticipated.			
Physico-chemical	**Transparency; Thermal conditions; Oxygenation conditions; Salinity; Nutrient conditions** • The dredging plume is not predicted to enter into this water body.			

Table 11 **Preliminary assessment of potential impacts on Tees Mercia Mudstone & Redcar Mudstone groundwater body (GB40302G701300)**

Quality element	Potential for impacts on status (grouped according to quality element)	Potential for impacts on mitigation measures	Potential for impacts on critical habitats	Include in further assessment?
Quantitative	**Impact on wetlands: Impact on surface waters; Water balance** • No impacts are anticipated.	N/A	N/A	**No**
Chemical	**Drinking Water Protected Area, General Chemical Test, Impact on surface waters; Saline intrusion** • The unintended spillage of fuels and drilling fluids is considered to have the potential to impact on the chemical quality should a pathway exist for contaminants to move into the groundwater • Piling or excavation during installation could introduce a pathway for contaminants to enter the groundwater.	N/A		**Yes**

4 STAGE 3: DETAILED COMPLIANCE ASSESSMENT

Purpose of this section

4.1.1 This section presents the results of the detailed compliance assessment that has been undertaken for the surface and groundwater bodies that were scoped in for further assessment at the end of the previous stage. It considers potential impacts on water body status in more detail, recommends measures to mitigate any predicted impacts, and makes a clear statement about whether deterioration in water body status would occur.

Tees Estuary (S Bank) water body (GB103025072320) (including the Mill Race)

Impacts on quality elements

4.1.2 The likely impacts of the proposed development on the hydromorphological, physico-chemical and biological quality elements are assessed in **Tables 12** to **14** respectively. For the purposes of this assessment, the quality element classification included in the Northumbria RBMP (2014) has been used. Note that the length of this water body has been updated under the draft RBMP Cycle 2 dataset (Environment Agency, 2014) to include The Fleet river, the West Dyke culvert and Roger Dyke (up to Longbeck Lane in New Marske).

4.1.3 The main unmitigated impacts of the scheme during the construction and operational phases for this water body are:

- Potential for indirect impacts associated with poor management of surface water run-off (sediments and contaminants from spills).
- Presence of piles associated with the conveyor in the water body (for southern route only).

Barriers to achieving good status / potential

4.1.4 The water body is not designated artificial or heavily modified, and therefore no mitigation measures have been identified in the RBMP. However, the low potential for increase in the supply of sediment and pollutants may still compromise the status of the quality elements of the Tees Estuary (S Bank) Area. If unmitigated, this may prevent it from achieving GES in the future. There is also the potential for the introduction of Non-Native Species via construction vehicles.

4.1.5 It is considered unlikely that the potential installation of conveyor piles within the water body would have any hydromorphological impacts as the pile structures are relatively minor in comparison to the size and nature of the water body. As a result, deterioration in any of the compliance parameters supporting ecological status is considered unlikely.

Impacts on other water bodies

4.1.6 Without mitigation, there is the potential to cause the deterioration of status in the Tees transitional water body. However, given the large area of the downstream transitional water body (11.43km^2) and the dynamic sediment and flow regime that characterise the Tees Estuary, it is considered highly

unlikely that this deterioration would be of sufficient magnitude to propagate downstream and cause detrimental impacts to this estuarine water body.

Impacts on critical or sensitive habitats

4.1.7 There are no critical or sensitive habitats (i.e. designated habitats) within this water body.

Proposed mitigation measures

4.1.8 The following mitigation measures are recommended in order to ensure that the impacts described in **Paragraph 4.1.3** do not cause permanent deterioration in the status of the water body:

- Ensure that the final designs for the site drainage system minimise any increase in surface water flows and reduce the potential for surface run off to contain sediments or contaminants.
- Install suitable bed and bank protection adjacent to water courses to minimise the chance of geomorphological adjustment if it is shown that the potential to impact on these parameters exists during detailed design.
- Ensure that the working methodology adheres to the Environment Agency's Pollution Prevention Guidance notes (including PPG01, PPG05, PPG08 and PPG21) and construction industry good practice guidance recommended in CIRIA (2001).
- The wheels of all vehicles should be washed before leaving site. Note that it is assumed that the wheels of all vehicles delivering materials to site will be washed on departure from their point of origin.
- Concrete and cement mixing and washing areas should be situated at least 10 m away from the nearest watercourse. These should incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment should be undertaken in a contained area, and all water should be collected for off-site disposal.
- All fuels, oils, lubricants and other chemicals should be stored in an impermeable bund with at least 110% of the stored capacity. Spill kits should be available at all times, and damaged containers should be removed from site. All refuelling should take place in a dedicated impermeable area, using a bunded bowser. Biodegradable oils should be used where possible.

Likelihood of deterioration in water body status

4.1.9 Without mitigation, the proposed development activities at the harbour facilities could cause impacts to the quality elements of the Tees Estuary (S Bank) water body. The implementation of mitigation measures recommended in **Paragraph 4.1.8** is expected to result in a significant decrease in magnitude of potential impacts, which will limit the likelihood of adverse effects on the biological, hydromorphological and physico-chemical quality elements in the water body. Deterioration in the status of the Tees Estuary (S Bank) water body will therefore not occur as a result of the proposed scheme.

Table 12 Potential impacts on hydromorphological quality elements Tees Estuary (S Bank) water body (GB103025072320)

Project activities	Potential hydromorphological consequences	Impacts on hydromorphological quality elements	Potential impacts on biological quality elements	Assessment of compliance
Surface water management (ground disturbance during construction/decommissioning)	The construction of the small individual compounds will require some surface preparation and then placement of crushed rock. Surface water will percolate through the surface. The removal of various structures may impact temporarily on sediment loads to the water courses.	The potential increase of sediments to the water body is unlikely to be of sufficient scale to cause a deterioration in the water body due to the very small areas required for the construction compounds.	None.	Implementation of mitigation measures described in **Paragraph 4.1.8** is recommended to ensure compliance.
Presence of conveyor piles	The installation of the conveyor piles could potentially create a temporary decrease in water quality due to bed disturbance but this will be short lived and will return to baseline conditions following cessation of the activities.	The piles are relatively small compared to the size of the water body in this area and therefore hydromorphological impacts are not anticipated.	None.	Given that potential changes are unlikely to be of sufficient significance to cause deterioration, the proposed development is therefore considered to be compliant with the WFD requirements.

Table 13 Potential impacts on physico-chemical quality elements in Tees Estuary (S Bank) water body (GB103025072320)

Project activities	Potential physico-chemical consequences	Impacts on physico-chemical quality elements	Potential impacts on biological quality elements	Assessment of compliance
Surface water management (accidental spills)	The construction of the temporary compounds have the potential to impact upon the physico-chemistry of the water body through the accidental release of construction materials, fuel oils and lubricants from construction vehicles. The decommissioning stage is likely to have similar impacts as construction.	The accidental release of potentially contaminating materials during the construction and decommission has the potential to cause deterioration to the physico-chemical status of the water body.	Any deterioration in the physico-chemical status of the water body has the potential to cause a corresponding impact on the status of the biological quality elements. However, because of the small impacts on physic-chemical quality elements, biological impacts are not anticipated.	Implementation of mitigation measures described in **Paragraph 4.1.8** to prevent the ingress of contaminants into the watercourse is recommended. Given that potential changes are unlikely to be of sufficient significance to cause deterioration, the proposed development is therefore considered to be compliant with the WFD requirements.
Surface water management (sediment release into the water body)	The construction and surface water management of the construction compounds could impact on transparency of the water body in addition to causing in direct impacts such as dissolved oxygen concentration changes.	The release of sediments into the water body during the construction and decommission has the potential to cause deterioration to the physico-chemical status of the water body. However, the compounds will cover relatively small areas and the percolation of water through the crushed rock will reduce the potential for a significant impact on water quality of the surface water body.	Any deterioration in the physico-chemical status of the water body has the potential to cause a corresponding impact on the status of the biological quality elements. However, because of the small impacts on physic-chemical quality elements, biological impacts are not anticipated.	Implementation of mitigation measures described in **Paragraph 4.1.8** to prevent the ingress of contaminants into the watercourse is required to ensure compliance. Given that potential changes are unlikely to be of sufficient significance to cause deterioration, the proposed development is therefore considered to be compliant with the WFD requirements.

Table 14 Potential impacts on biological quality elements in Tees Estuary (S Bank) Area water body (GB103025072320)

Project activities	Potential biological consequences	Potential impacts on biological quality elements	Assessment of compliance
Surface water management	Changes to in-channel habitats as a result of the release of sediment and the accidental release of contaminants from construction machinery and materials and the introduction of INNS have the potential to adversely impact upon the biological quality elements.	Increased fine sedimentation on the channel bed could smother existing substrates, and adversely impact upon macrophytes, aquatic invertebrates and any fish populations present. However due to the relatively small area over which the compounds will be constructed and the covering of crushed rock allowing water to percolate into the ground, significant flows to this waterbody are not anticipated.	Given that potential changes are unlikely to be of sufficient significance to cause deterioration, the proposed development is therefore considered to be compliant with the WFD requirements. Mitigation measures relating to wheel washing will reduce the risk of introduction INNS (see **Paragraph 4.1.8**).

Tees Mercia Mudstone & Redcar Mudstone (GB40302G701300)

4.1.10 The mechanisms for potential impact of the proposed development on the quantitative and chemical quality elements are identified in **Table 7**. The main potential impacts of the scheme without mitigation identified in this assessment are:

- Deterioration of the chemical quality of the groundwater body as a result of the ingress of contaminants from the piling installation process, excavation required or spillage of vehicle fuels and oils during the construction stage.

Potential barriers to achieving good chemical / quantitative status

4.1.11 The water body is at Poor overall status, because the chemical quality of the water body has been assessed by the Environment Agency as having an adverse impact upon surface waters. Any impacts or additional pressures on the quality elements of this water body may compromise the effectiveness of future initiatives to improve water body status. However, the assessment presented in **Table 15** has considered it unlikely for long term detrimental impacts to be experienced in the Tees Mercia Mudstone and Redcar Mudstone groundwater body as a result of the project.

Potential impacts on other water bodies

4.1.12 The proposed scheme is unlikely to have any additional impacts on connected groundwater bodies. Impacts on connected surface waters are assessed in the previous sections, and are not considered to be significant.

Likelihood of deterioration in water body status

4.1.13 **Table 15** details the assessment of potential impacts to the chemical quality elements in this water body. Given the scope of the proposed activities and the physical characteristics of the superficial deposits and bedrock at the harbour site, it is considered unlikely that these would result in long-term deterioration of the quality elements in this water body. In addition, the groundwater sensitivity beneath the site has been classified as low or very low (see **Section 6** of the ES). The project will not therefore cause deterioration in the status of the groundwater body.

Table 15 Potential impacts on quality elements in Tees Mercia Mudstone & Redcar Mudstone (GB40302G701300)

Project activities	Potential consequences for groundwater quality	Potential impacts on quality elements	Assessment of compliance
Excavation and piling works	During the construction phase of the project, activities such as excavation and piling have the potential to create pathways for ingress of contaminants in to the groundwater body through cross contamination between shallow and deep aquifers as well as exposure to pollutants in construction materials. In addition, the accidental spillage of vehicle fuels and oils associated with construction activities and vehicular movements represents an additional potential impact to the quality elements of the Tees Mercia Mudstone & Redcar Mudstone groundwater body. Decommissioning impacts are likely to be similar to construction impacts.	Excavations would not extend into the underlying bedrock aquifer, with the possible exception of piling for the port terminal and surge bin foundations. As a consequence of the construction works the ground level across the proposed construction area would be levelled and potentially raised through the use of dredged materials (for the solid quay structure only). The ground level would remain above the groundwater table and it is unlikely that groundwater would be encountered as part of these works (with the exception of piling). With regard to the piling, the bedrock aquifer is described as an aquifer with limited groundwater and/ or limited flow via fissures or fractures consequently the aquifer is not used as a resource. The effect of piling on flow is likely to be localised in terms of the Tees Mercia Mudstone and Redcar Mudstone groundwater body.	Given the current proposed project activities and baseline conditions at the site, potential changes are unlikely to be of sufficient significance to cause deterioration in WFD status at the Tees Mercia Mudstone & Redcar Mudstone . The proposed development therefore considered to be compliant with the WFD requirements.

Tees transitional water body (GB510302509900)

4.1.14 The impacts of the proposed development on the quantitative and chemical quality elements are assessed in **Tables 16** to **18** respectively. The main potential impacts of the scheme without mitigation identified in this assessment are:

- Potential impacts on biological elements associated with dredging (phytoplankton however, is screened out).
- Potential impacts on hydromorphological parameters associated with dredging; specifically intertidal zone, dominant currents and wave exposure.
- Potential impacts associated with changes in nutrient levels.
- Potential impacts on chemical concentrations of the water column associated with re-suspending contaminants within sediments to be dredged.
- Potential impacts on protected areas associated with dredging (designated European sites have been screened out on the basis that the HRA will address potential impacts on designated sites).
- Potential impacts on hydromorphological parameters associated with the presence of the new quay wall (includes changes in water exchange with Bran Sands Lagoon).
- Potential impacts on water quality associated with surface water drainage (both during construction and operation).
- Potential impacts on fish fauna associated with noise generated by piling.
- Permanent loss of subtidal/intertidal habitat associated with presence of new quay.
- Temporary loss of subtidal habitat associated with dredging (16ha).
- Potential impacts on mitigation measures in place (related to Heavily Modified designation).

Potential barriers to achieving good chemical / quantitative status

4.1.15 The water body is at moderate overall status, due to “moderate” classification for a number of biological elements, concentrations of dissolved inorganic nitrogen and the overall mitigation measures assessment defining ecological potential. The water body also fails chemical status. Any impacts or additional pressures on the quality elements of this water body may therefore compromise the effectiveness of future initiatives to improve water body status. However, the assessment presented in **Tables 16** to **18** has considered it unlikely for long term detrimental impacts to be experienced in the water body as a result of the project.

Potential impacts on other water bodies

4.1.16 The proposed scheme is unlikely to have any additional impacts on downstream water bodies.

Impacts on critical or sensitive habitats

4.1.17 Greatham Creek flows into the Seaton Channel which discharges into the Tees at Seal Sands on the west side of Teesmouth. There are saltmarsh habitats present in this location. However, no impacts are anticipated within Seal Sands as hydrodynamic modelling indicates that the extent of the dredging plume does not reached Seal Sands (see **Section 5** of the ES) and therefore no impacts on the saltmarsh are predicted.

Impacts on mitigation measures that are in place (associated with the water body being heavily modified

4.1.18 There are a number of mitigation measures in place which relate to dredging and disposal within the Tees water body. In order to ensure that these measures are not compromised, it is proposed that the existing dredging strategy is updated to ensure that the capital and maintenance dredging proposed for this project are included and do not threaten compliance with the measures.

Impacts on protected areas

4.1.19 Impacts on protected areas are not anticipated in relation to designated bathing waters as the plume is not anticipated to extend this far (see **Section 5** of the ES). Additionally, sensitive area designations relate to the designation of Seal Sands under this directive (see **Section 7** of the ES). The dredging plume will not extend onto Seal Sands and therefore impacts on nutrient concentrations within Seal Sands are not anticipated. As a result, WFD compliance in relation to protected areas will therefore not be compromised.

Proposed mitigation measures

4.1.20 The following mitigation measures are proposed to protect the Tees estuary water body:

- To reduce the potential for adverse impacts to fish, there would be a minimum of eight hours continuous break in every 24 hour period where no impact piling is carried out. Additionally, no piling would be undertaken for three hours following low water and during May, no piling is to take place to allow migration of juvenile salmon and sea trout.
- Use of soft start techniques to allow any fish time to leave the area of greatest disturbance.
- Develop a dredging strategy to ensure that capital and maintenance dredging are undertaken in accordance with mitigation measures identified by the Environment Agency for this water body

Likelihood of deterioration in water body status

4.1.21 **Tables 16** to **18** details the assessment of potential impacts to the elements in this water body. Given the scope of the proposed activities, it is considered likely that these would result in deterioration of a number of the elements which contribute to ecological potential. However, impacts associated with dredging for example are anticipated to be short-term (months) and will cease following cessation of the activities and are unlikely to impact on biological parameters. The exception is the potential impacts on fish which may experience a temporary deterioration in water quality due to re-suspension of sediment during dredging. As discussed with **Section 11** of the ES, sediment plumes induced by dredging are considered to pose only a limited risk to water quality as the affected water has capacity to accommodate the change. The tidal exchange within the estuary would be unrestricted during dredging, resulting in rapid dispersion of suspended sediment. The installation of the new quay will have small localised changes but these are unlikely to change the status of any supporting quality elements. There will also be a permanent loss of intertidal habitat (up to 3.6ha in size), however the area to be lost is of low value. The project will not therefore cause deterioration in the status of the water body.

Table 16 Potential impacts on hydromorphological quality elements Tees water body (GB510302509900)

Project activities	Potential hydromorphological consequences	Impacts on hydromorphological quality elements	Potential impacts on biological quality elements	Assessment of compliance
Dredging/presence of new quay (currents)	There is a possibility that the dredging could impact on hydromorphological parameters that contribute to improved ecological potential. This could be by changing dominant currents which could in turn impact on biological habitats.	A TELEMAC-3D flow model was established to simulate currents in the Tees estuary (see **Section 5** of the ES for more detail). It is concluded that the majority of the effects are a function of the capital dredging, with currents predicted to be reduced within the deepened areas. Some increases in current velocity are predicted on the shoreline adjacent to the works, suggesting that the dredging is predicted to draw some of the flow to the south side of the estuary; although such effects are shown to be relatively localised to the proposed works. Some increases in current velocity are shown between the open quay structure and the bank, most likely linked to the re-profiling of the estuary bed in this area. Away from the immediate area of the proposed scheme, the modelling work has predicted that the effect of the works is insensitive to the form of the port terminal (i.e. open quay or solid quay structure). As a result, only very localised impacts are predicted.	Since significant changes are not anticipated, no impacts on biological elements are predicted.	Given that potential changes are unlikely to be of sufficient significance to cause deterioration, the proposed development is therefore considered to be compliant with the WFD requirements.

Project activities	Potential hydromorphological consequences	Impacts on hydromorphological quality elements	Potential impacts on biological quality elements	Assessment of compliance
Dredging/presence of new quay (waves)	There is a possibility that the dredging could impact on hydromorphological parameters that contribute to improved ecological potential. This could be by changing wave exposure which could in turn impact on biological habitats.	Given that no capital dredging of the approach channel is proposed between the location of the proposed scheme and the mouth of the Tees, no effect on the penetration of waves into the Tees estuary is anticipated. The primary focus of the wave modelling study was, therefore, to predict changes in wind generated wave conditions due to the change of the form of the coastline associated with the two options for the proposed port terminal. An open quay structure would have little effect on waves, although the proposed dredged slope and new revetment to the rear of the structure may have an effect. A solid quay structure would change the wave conditions locally due to increased wave reflections. In order to model the wave transformation within the Tees estuary, a local SWAN (Simulating WAves Nearshore) numerical wave model was used (see **Section 5** of the ES for further details). The results indicate a relatively localised effect with regard to effect on existing wave heights. For return period winds less than 5 years, no effect of the open quay structure was shown. The effect of the solid quay structure in reflecting wave energy towards the north provides increases in significant wave height in the range 0.05m to 0.1m. As a result, significant changes to wave exposure are not anticipated.	Since significant changes are not anticipated, no impacts on biological elements are predicted.	Given that potential changes are unlikely to be of sufficient significance to cause deterioration, the proposed development is therefore considered to be compliant with the WFD requirements.

Project activities	Potential hydromorphological consequences	Impacts on hydromorphological quality elements	Potential impacts on biological quality elements	Assessment of compliance
Changes to water exchange between the estuary and Bran Sands Lagoon	Changes to inflow and outflow could alter hydromorphological elements by reducing exchange or by having localised changes on flows.	The existing invert level of the pipe would be maintained and the pipe would be retained.	None	Given that deterioration is not anticipated, the proposed development is therefore considered to be compliant with the WFD requirements.
Presence of conveyor piles in Bran Sands (for northern route)	Potential to impact on hydromorphological parameters of the Tees Estuary by changing flows from the lagoon.	The piles are of a scale that will not alter any connection between the lagoon and the estuary. As a result no changes are predicted.	None as no hydromorphological changes are predicted.	Given that potential changes are unlikely to be of sufficient significance to cause deterioration, the proposed development is therefore considered to be compliant with the WFD requirements.

Table 17 Potential impacts on physico-chemical/specific pollutants quality elements in Tees water body (GB510302509900)

Project activities	Potential physico-chemical consequences	Impacts on physico-chemical quality elements	Potential impacts on biological quality elements	Assessment of compliance
Surface water management (accidental spills)	The construction and operation of the quay has the potential to impact upon the physico-chemistry of the water body through the accidental release of construction materials, fuel oils and lubricants from construction vehicles which are subsequently washed into the estuary. The decommissioning stage is likely to have the same impacts as construction.	The accidental release of potentially contaminating materials during the construction and decommission has the potential to cause deterioration to the physico-chemical status of the water body.	Any deterioration in the physico-chemical status of the water body has the potential to cause a corresponding impact on the status of the biological quality elements.	Implementation of mitigation measures described in **Paragraph 4.1.8** to prevent the ingress of contaminants into the watercourse is required to ensure compliance.
Surface water management (release of nutrients from dredging)	There is the possibility that dredging could release suspended solids which contain high levels of nutrients. This could impact on water quality. The remaining material is geological material which does not carry a risk of contamination. As a result the risk is only applicable to the dredging of the softer surficial material.	The soft muddy sediments will be dredged using a back hoe dredging fitted with an enclosed grab. As a result, sediment release into the water column will be mitigated as far as practicable.	Any deterioration in the physico-chemical status of the water body has the potential to cause a corresponding impact on the status of the biological quality elements.	Since control measures are already built into the scheme design thus reducing sediment plumes associated with dredging the more contaminated softer material, no deterioration to nutrient levels in the water is anticipated. The proposed development is therefore considered to be compliant with the WFD requirements.

Project activities	Potential physico-chemical consequences	Impacts on physico-chemical quality elements	Potential impacts on biological quality elements	Assessment of compliance
Release of contamination during dredging	There is the possibility that dredging could release significant levels of specific pollutants into the water column thus potentially causing Environmental Quality Standard (EQS) failures.	The soft muddy sediments will be dredged using a back hoe dredging fitted with an enclosed grab. As a result, sediment release into the water column will be mitigated as far as practicable.	The potential for EQS failure has the potential to impact on biological communities	Since control measures are already built into the scheme design and therefore sediment plumes associated with dredging the more contaminated softer material, no deterioration in specific pollutant levels in the water is anticipated. The proposed development is therefore considered to be compliant with the WFD requirements.

Table 18 Potential impacts on biological quality elements in the Tees water body (GB510302509900)

Project activities	Potential biological consequences	Potential impacts on biological quality elements	Assessment of compliance
Reclamation of intertidal habitat	The new quay (solid option) will require reclamation of intertidal and subtidal habitat which will be a permanent loss.	**Section 8** of the ES describes the nature of the intertidal area. The intertidal consists of road planings, bricks and other debris, with some mud present. It is considered to be of low value.	Given the nature of the habitat present, the proposed development is therefore considered to be compliant with the WFD requirements. There are however, proposals to enhance habitat through creating new shallow water areas and islands within Bran Sands Lagoon (see **Section 8** of ES). This would provide feeding, nesting and roosting habitat.
Temporary loss of habitat associated with dredging	Whilst the habitat will not be permanently lost, there will be a disturbance during dredging.	The dredging required for the proposed scheme would result in the direct loss of benthic community within the footprint of the dredge. However, this does not constitute a long term habitat loss but in the short term, the benthic community would be removed within the capital dredged area. The infaunal benthic community in and immediately adjacent to the dredged approach channel was found to be similar throughout the surveyed area. Within the location of the proposed berth pocket, polychaetes and oligochaetes characterise the benthic community. The sensitivity of the infaunal community within the subtidal zone is considered to be low, and there would not be an irreversible loss of habitat. There would be a permanent loss of intertidal as a result of the proposed scheme, however this habitat is considered to be of low value and is not considered to represent 'significant harm' as referred to in the National Planning Policy Framework (NPPF).	Since the loss of subtidal habitat is only temporary and recovery will occur, deterioration is only predicted to be on a small scale and only for a limited period of time. As a result, the proposed development is therefore considered to be compliant with the WFD requirements.

Project activities	Potential biological consequences	Potential impacts on biological quality elements	Assessment of compliance
Temporary impact of piling noise on fisheries	The noise and vibration generated during piling operations for the proposed port terminal could lead to temporary behavioural disturbance of resident and migratory fish species.	Underwater noise modelling was undertaken in order to inform the EIA (see **Section 11** of the ES for further detail). The modelling results predicted that the source noise levels would not result in a lethal effect on fish, however, traumatic injury could arise if fish are located within very close proximity to the source of the impact piling noise. However, piling activities would not present a constant noise source and those periods between pile driving (e.g. when repositioning the piling barge) would provide opportunity for unimpeded movement of fish species within the estuary. The noise disturbance to fish due to piling would be reversible once such operations are completed. Additionally, the existing noise levels generated by shipping and industrial activity on the banks of the Tees estuary are already likely to influence the fish distribution within the estuary.	Given that potential changes are unlikely to be of sufficient significance to cause deterioration, the proposed development is therefore considered to be compliant with the WFD requirements.

Project activities	Potential biological consequences	Potential impacts on biological quality elements	Assessment of compliance
Potential impact of releasing suspended solids into the water column and impacts on biological elements	The potential release of suspended solids could reduce water quality which could in turn impact on biological quality elements and/or present a barrier to migratory fish.	In general, sediment plumes induced by dredging are considered to pose only a limited risk to water quality and subsequently fish since the affected water usually has the capacity to accommodate an increased oxygen demand. The tidal exchange within the Tees estuary would remain unrestricted during construction and operation, and peaks in suspended sediment are only expected on a short term basis during Phase 1 and Phase 2. During dredging, silts and clays would rapidly disperse away from the dredge area due to high current speeds. In general, estuarine fish have a degree of tolerance to conditions of high suspended sediment, as concentrations can vary significantly in response to tidal conditions and other events such as storms, high rainfall and ongoing maintenance dredging.	Given that the potential changes are unlikely to be of sufficient significance to cause deterioration, the proposed development is therefore considered to be compliant with the WFD requirements.

5 STAGE 4: SUMMARY OF ASSESSMENT

Purpose of this section

5.1.1 This section provides a concise summary of the main findings of the WFD compliance assessment presented in the previous sections. The main impacts are identified and the potential for deterioration in water body status is clearly stated. Mitigation measures to prevent deterioration in water body status are also recommended.

Impacts of the scheme on WFD compliance

5.1.2 The previous sections have demonstrated that the proposed scheme has the potential to impact upon several of the surface and groundwater bodies in the area. The main impacts of the Harbour facilities are described below:

- The construction of the conveyor and temporary construction compound have the potential to impact on WFD compliance parameters via release of sediment laden surface water or surface water contaminated with accidental spills from vehicles. However, the magnitude of these impacts is likely to be significantly reduced by the implementation of the mitigation measures described in **Paragraph 4.1.8**. The residual impact is therefore unlikely to be sufficient to cause deterioration in the hydromorphological and associated biological quality elements of the Tees Estuary (S Bank) (GB103025072320) river water body.
- The proposed development is not likely to result in any significant groundwater impacts and will not cause deterioration in the status of the Tees Mercia Mudstone & Redcar Mudstone (GB40302G701300) groundwater body.
- The proposed development does have the potential to alter a number of WFD compliance parameters within the Tees water body (GB510302509900). Whilst it is acknowledged that a temporary deterioration in some parameters such as physico-chemical, the main potential impacts will be controlled by design. As a result, these impacts are unlikely to be significant in the long term. Additionally, the new quay wall is not predicted to alter hydromorphological parameters. As a result, the proposals are considered to be compliant.

Mitigation measures

5.1.3 In order to prevent deterioration in the status of the surface and groundwater bodies, and ensure that the proposed scheme is compliant with the WFD, the following mitigation measures are recommended:

- Ensure that the final designs for the site drainage system minimise any increase in surface water flows. In particular, the system should ensure that there is no rapid release of large volumes of water from the site in order to minimise the potential for increased erosion.
- Ensure that the working methodology adheres to the Environment Agency's Pollution Prevention Guidance notes (including PPG01, PPG05, PPG08 and PPG21) and construction industry good practice guidance recommended in CIRIA (2001).
- The wheels of all vehicles should be washed before leaving site. Note that it is assumed that the wheels of all vehicles delivering materials to site will be washed on departure from their point of origin.

- Concrete and cement mixing and washing areas should be situated at least 10m away from the nearest watercourse. These should incorporate settlement and recirculation systems to allow water to be re-used. All washing out of equipment should be undertaken in a contained area, and all water should be collected for off-site disposal.
- All fuels, oils, lubricants and other chemicals should be stored in an impermeable bund with at least 110% of the stored capacity. Spill kits should be available at all times, and damaged containers should be removed from site. All refuelling should take place in a dedicated impermeable area, using a bunded bowser. Biodegradable oils should be used where possible.
- Soft start piling techniques and piling restrictions to be implemented in order to reduce the potential impacts on fish species in the estuary.
- Use of an enclosed grab to reduce sediment release during removal of contaminated sediments.

WFD compliance

5.1.4 The implementation of these mitigation measures is expected to significantly reduce the impact to the hydromorphology, physico-chemical characteristics and biology of the Tees Estuary (S Bank) river water body (GB103025072320) and the Tees water body (GB510302509900).

5.1.5 In addition, this assessment has also demonstrated that the proposed development will not impact upon the Tees Mercia Mudstone & Redcar Mudstone groundwater body (GB40302G701300) and the Yorkshire North coastal water body (GB650301500003).

5.1.6 The proposed works will not, therefore, cause deterioration in the status of any waterbody or prevent good status being achieved in these water bodies in the future.

6 REFERENCES

Amec. (November, 2012) York Potash Limited, Akzo Nobel, Bran Sands, Teeside. Phase 1 Environmental Liability Assessment

Environment Agency (2009 and 2014) Northumbria River Basin Management Plans (Rounds 1 and 2).

Environment Agency (2010) Assessing new modifications for compliance with WFD: Detailed supplementary guidance. NEAS Supplementary Guidance 488_10_SD01.

Environment Agency (2012). Clearing the waters. Marine Dredging and the Water Framework Directive. https://www.gov.uk/government/publications/complying-with-the-water-framework-directive-marine-dredging [Accessed 14/05/14]

Environment Agency (2014) http://maps.environment-agency.gov.uk/ [accessed 25/08/2014]

European Centre for River Restoration (undated) Healthy Catchments: Managing water for flood risk and the Water Framework Directive.

FWS (2014) Hydrogeological Baseline Report Of The Wilton Materials Handling Facility And Tunnel Portal, Teesside

http://www.restorerivers.eu/RiverRestoration/Floodriskmanagement/HealthyCatchmentsmanagingforfloodriskWFD/tabid/3098/Default.aspx [Accessed 14/05/14]

Joint Defra/ Environment Agency Flood and Coastal Erosion Risk Management R&D Programme (2009) WFD Expert Assessment of Flood Management Impacts. R&D Technical Report FD2609/TR.

Murphy, J., Cocker, A., Munro, B., Vetori, C. and Woodward, R. (2012) Integrating WFD in EIA: experience so far. IEMA EIA Quality Mark Article. http://www.iema.net/qmark/articles [Accessed 14/05/14]

River Restoration Centre (undated) Manual of River Restoration Techniques. http://www.therrc.co.uk/rrc_manual.php [Accessed 14/05/14]

Royal HaskoningDHV (2014a) York Potash Project: WFD Compliance Assessment Strategy. May 2014

Royal HaskoningDHV (2014b) York Potash Project Mine, MTS and MHF Environmental Statement: Part 4, Chapter 15 - Hydrology and Flood Risk

Royal HaskoningDHV (2014c) York Potash Project Mine, MTS and MHF Environmental Statement: Part 4, Chapter No.14 Geology, Hydrogeology and Land Quality