York Potash Project Port and Materials Handling Facilities

Environmental Scoping Report

York Potash Limited

November 2013
Final Report
9Y0989

Royal HaskoningDHV
Enhancing Society Together

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CONTENTS

ABBREVIATIONS AND ACRONYMS

AADF	Annual Average Daily Flow
AQMA	Air Quality Management Area
BAP	Biodiversity Action Plan
BCD	Below Chart Datum
BGS	British Geological Society
BPM	Best Practicable Means
BTO	British Trust for Ornithology
CD	Chart Datum
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CLR	Contaminated Land Report
CO	Carbon Monoxide
CRTN	Calculation of Road Traffic Noise
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
DPD	Development Plan Document
DWT	Dead Weight Tonnage
EC	European Community
EIA	Environmental Impact Assessment
EMS	European Marine Site
EQO	Environmental Quality Objective
ES	Environmental Statement
EU	European Union
FRA	Flood Risk Assessment
GCN	Great Crested Newt
ha	Hectare
HGV	Heavy Goods Vehicle
HMWB	Heavily Modified Water Body
HRA	Habitats Regulations Assessment
HRGN	Habitats Regulations Guidance Note
HRO	Harbour Revision Order
Hs	Significant wave height
IAQM	Institute of Air Quality Management
IEMA	Institute of Environmental Management and Assessment
IFCA	Inshore Fisheries and Conservation Authorities
INCA	Industry Nature Conservation Association
JNCC	Joint Nature Conservation Committee
LDF	Local Development Framework
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MTPA	Million Tonnes Per Annum
NEIFCA	North Eastern Inshore Fisheries and Conservation Authorities
NGCT	Northern Gateway Container Terminal
nm	Nautical mile
NNR	National Nature Reserve
NO_2	Nitrogen Dioxide
NRMM	Non-Road Mobile Machinery
NSIP	Nationally Significant Infrastructure Project

NWL	Northumbrian Water Limited
NYMNP	North York Moors National Park
OD(N)	Ordnance Datum (Newlyn)
ODPM	Office of the Deputy Prime Minister
PAH	Polyaromatic Hydrocarbons
PINS	Planning Inspectorate
PM_{10}	Particulate Matter
PPE	Personal Protective Equipment
PRoW	Public Right of Way
QEII	Queen Elizabeth II
Ramsar	Ramsar Convention on Wetlands
RCBC	Redcar and Cleveland Borough Council
Ro-Ro	Roll-on Roll-off
RSPB	Royal Society for the Protection of Birds
RSTC	Regional Sludge Treatment Centre
SAC	Special Area of Conservation
SAP	Salmon Action Plan
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
TBT	Tributyltin
TEU	Twenty foot Equivalent Units
TSS	Total Suspended Solids
VTS	Vessel Traffic System
WeBS	Wetland Bird Survey
WFD	Water Framework Directive
WSI	Written Scheme of Investigation
YPL	York Potash Limited

1 INTRODUCTION

1.1 Background

York Potash Limited (YPL) (a subsidiary of Sirius Minerals Ltd) proposes to develop a port facility on Teesside for the export of polyhalite bulk fertilizer (the product). The proposed port facility, to be designed to export up to 12 million tonnes per annum (mtpa) of product, would comprise a marine terminal at Bran Sands on the Tees estuary, storage facilities and a conveyor system to transfer the product to the marine terminal from a materials handling facility. The options currently being considered for the materials handling facility include either locating this facility in Wilton or locating it in close proximity to the marine terminal. The latter options are considered within this report.

The proposed volumes of product for export (in due course) exceed the threshold stated within the *Planning Act 2008* (the 2008 Act) for the export of bulk material from harbour facilities (5mtpa). This means that the marine terminal constitutes a Nationally Significant Infrastructure Project (NSIP), requiring a Development Consent Order (DCO) (see Section 2). The regulatory authority for a DCO is the Planning Inspectorate (PINS).

There are three options currently under consideration for the location of the materials handling facility (two of which are adjacent to the Bran Sands Lagoon, with the third option located at Wilton) (see Section 1.3). For the first two options, the materials handling facility would be included within the scope of the DCO application. The latter option is subject to a separate environmental scoping study (Royal HaskoningDHV, 2013) and is not considered within the scope of this report. If the Wilton site emerges as the preferred option for the location of the materials handling facility, YPL would make an application for planning permission to the local planning authority (Redcar and Cleveland Borough Council (RCBC)) for this facility. However, the infrastructure (conveyor system) required for the transfer of product from the materials handling facility at Wilton to the marine terminal, and the associated operational implications, would be included within the scope of the DCO application and is therefore considered in this report.

This Environmental Scoping Report identifies the potential environmental impacts associated with the construction and operation of three configurations for the port facility (discussed in Section 1.3). It also makes recommendations as to the further studies required as part of the Environmental Impact Assessment (EIA) process. In this document, the port (comprising the marine terminal, conveyor system, storage facility and materials handling facility) is referred to as 'the proposed scheme' (this term is used regardless of the materials handling facility and associated conveyor option being described).

Further detail of the relevant legislation and regulatory regime for this application is provided in Section 2.

1.2 Purpose of this document

The specific objectives of the environmental scoping study are to:

- Define and describe the study area (i.e. physical, biological, human and built environment) and the options under consideration for the proposed scheme.
- Identify key potential environmental impacts associated with the proposed scheme options (as well as possible mitigation measures).
- Define the approach to the impact assessment, particularly relating to issues of potential significance.
- Define other projects and plans that may need to be considered as part of an assessment of cumulative impacts.
- Identify where data gaps exist and what further data collection may be necessary to inform the impact assessment (i.e. field surveys or modelling).

The principal purpose of this Environmental Scoping Report is to inform consultees about the proposed scheme, to identify additional information to inform the EIA and to identify issues of concern. It will be submitted to PINS together with a request for a Scoping Opinion (on the options being considered) regarding the information to be supplied within the Environmental Statement (ES) that will accompany the DCO application. This request for a Scoping Opinion will be accompanied by:

- a plan sufficient to identify the site of the options being considered; and,
- a brief description of the nature and purpose of the proposed scheme options and their potential impacts on the environment.

This Environmental Scoping Report has been produced in accordance with the *Advice Note 7* released by PINS on screening and scoping under the EIA Regulations (Planning Inspectorate, 2012).

1.3 Options under consideration for the proposed scheme

As noted in Section 1.1, YPL is currently considering three options for the location of the materials handling facility, each of which would be linked to the proposed marine terminal at Bran Sands by a conveyor system. In the context of this Environmental Scoping Report, therefore, there are three options for the proposed scheme, namely:

- Option 1 – Construction of a marine terminal at Bran Sands, a storage area on Bran Sands Lagoon, a materials handling facility to the immediate north of Bran Sands Lagoon and a short conveyor system to transport product to the marine terminal. An additional length of pipeline (approximately 4km) would be required in order to transport the slurry to the materials handling facility (in comparison with Option 3); however the pipeline is outside the scope of this report (see Section 1.4 below).

- Option 2 – Construction of a new marine terminal at Bran Sands, a storage area on Bran Sands Lagoon, a material handling facility to the north-east of the Bran Sands Lagoon and an approximately 1km long conveyor system to transport product to the marine terminal. An additional length of pipeline (approximately 2.5km) would be required in order to transport the slurry to the materials handling facility (in comparison with Option 3); however the pipeline is outside the scope of this report.

- Option 3 – Construction of a marine terminal at Bran Sands, a storage area on Bran Sands Lagoon and an approximately 3.2km long conveyor system from the materials handling facility at Wilton to the marine terminal at Bran Sands (with two sub-options for the route of the conveyor system, located either side of the Dabholm Gut). The materials handling facility at Wilton is not, however, included within the scope of this Environmental Scoping Report.

All three options would require capital dredging of an approach channel to the marine terminal and a berth pocket immediately adjacent to the marine terminal. The location of the above three options (including the two sub-options for the route of the conveyor system associated with Option 3), as well as the proposed capital dredge areas for the berth pocket and approach channel, are presented in Figures 1.1 to 1.3. Further details of the works involved to construct and operate each option are provided in Section 3. It should be noted that, ultimately, it is intended that the ES will only assess one of the options presented in this report.

1.4 Outline of the overall project

The proposed scheme forms part of a wider project being undertaken by YPL which has four main projects elements, comprising:

- a minehead in the North York Moors National Park (NYMNP);
- an approximately 44.5km long pipeline from the minehead to a materials handling facility on Teesside;
- a materials handling facility;
- an export facility within the Tees estuary.

These four elements of the wider project are subject to their own environmental assessment and consent applications. However, the potential cumulative environmental impacts of the whole York potash Project will also be assessed and this assessment will accompany each application.

1.5 The study area

The study area for the proposed scheme under consideration here includes the Tees estuary and the adjacent land on the south bank of the Tees estuary. The Tees estuary is located on the north-east coast of England and lies between the towns of Stockton-on-Tees, Hartlepool, Redcar, Middlesbrough and Billingham. The Tees Valley has a long standing industrial heritage and remains one of the UK's main manufacturing regions.

The proposed study area for the EIA is the area over which the direct and indirect potential impacts of the proposed scheme may be detected during the construction, operation and any decommissioning phases.

The study area for the landside elements of the scheme comprises land to the south of the Tees estuary, extending eastwards to Dormanstown, northwards to Bran Sands steel works and southwards to Tees Dock. This boundary covers the area which has potential to be directly affected by the three options for the proposed scheme, and is illustrated on Figure 1.4.

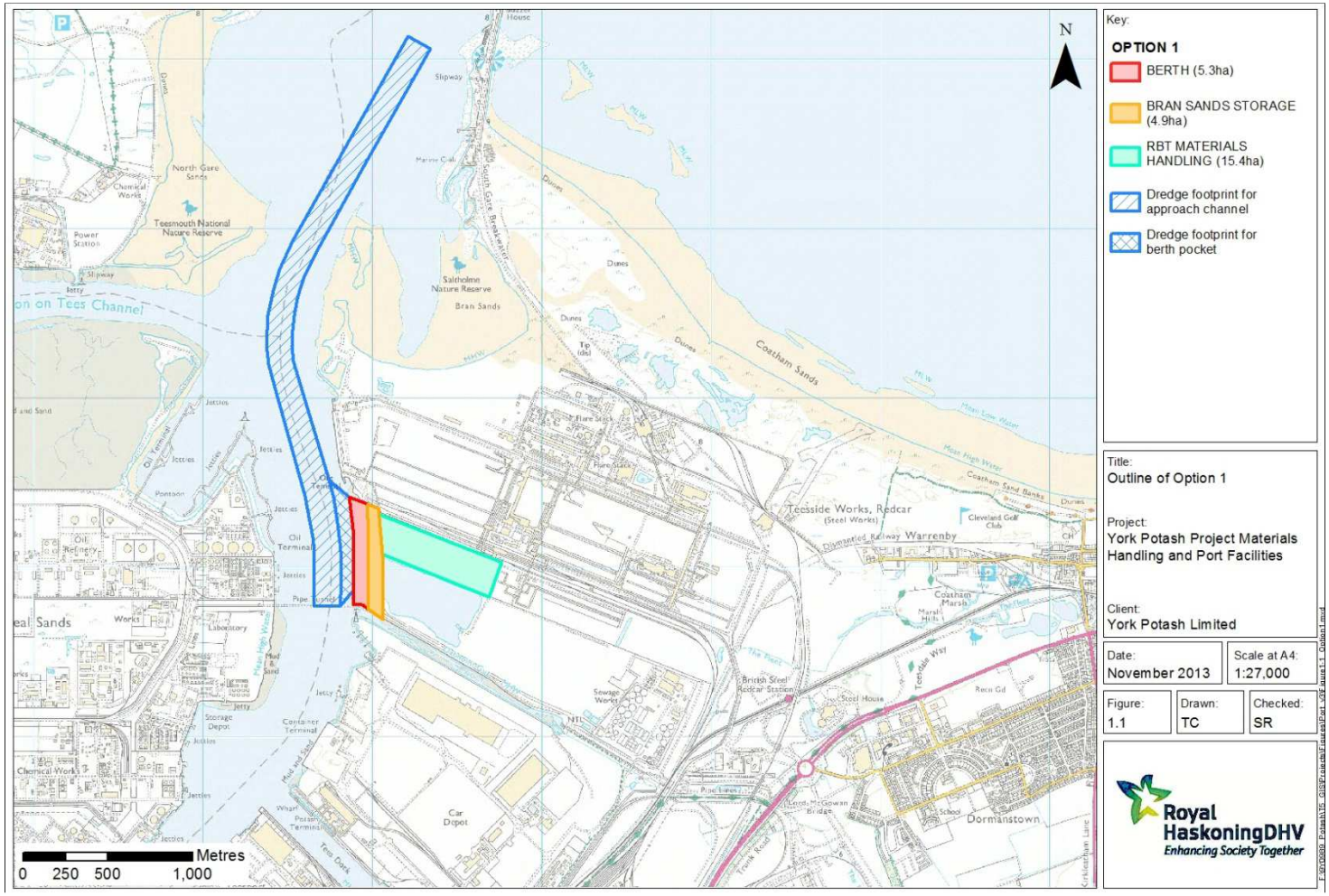


Figure 1.1 Location and layout – Option 1

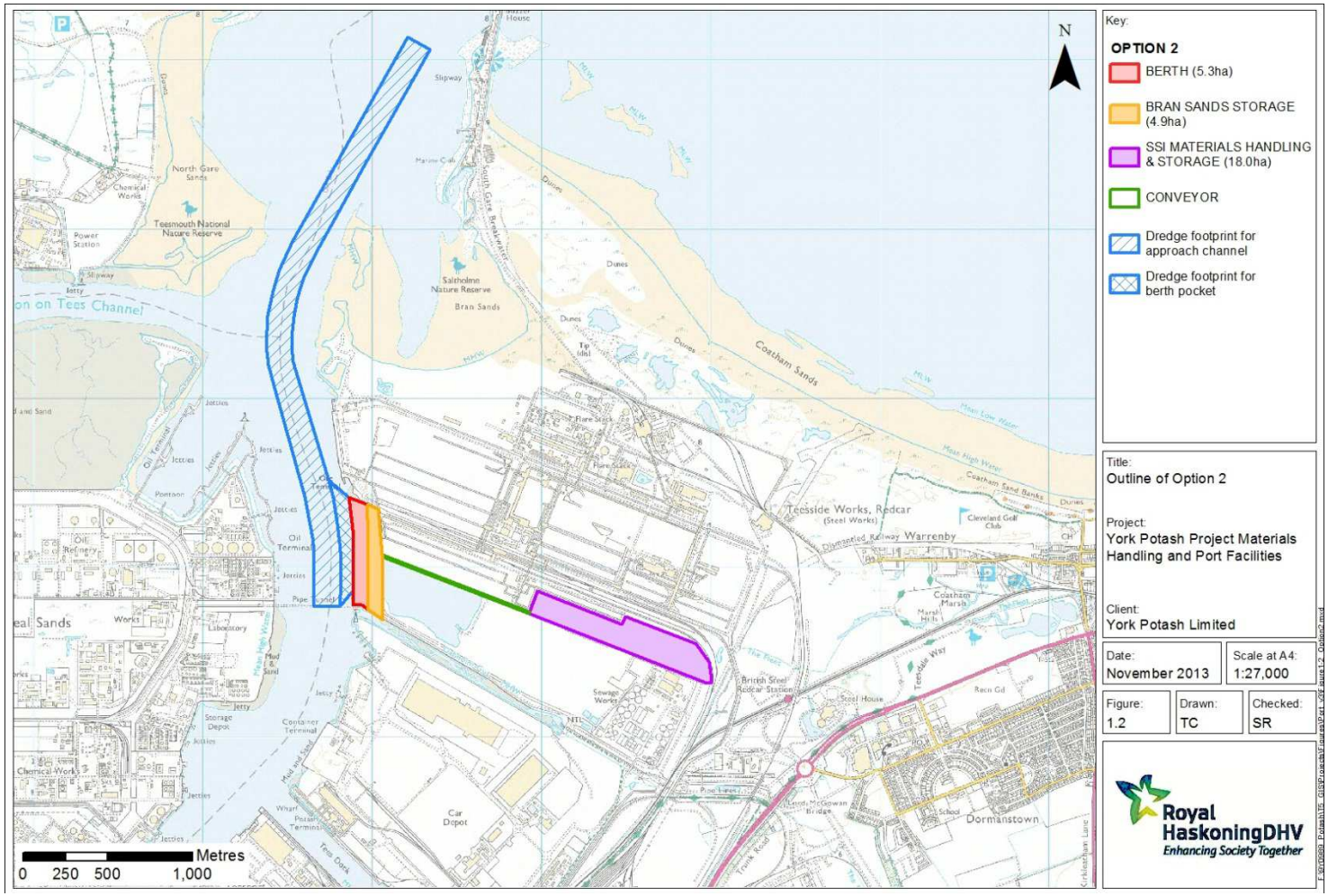


Figure 1.2 Location and layout - Option 2

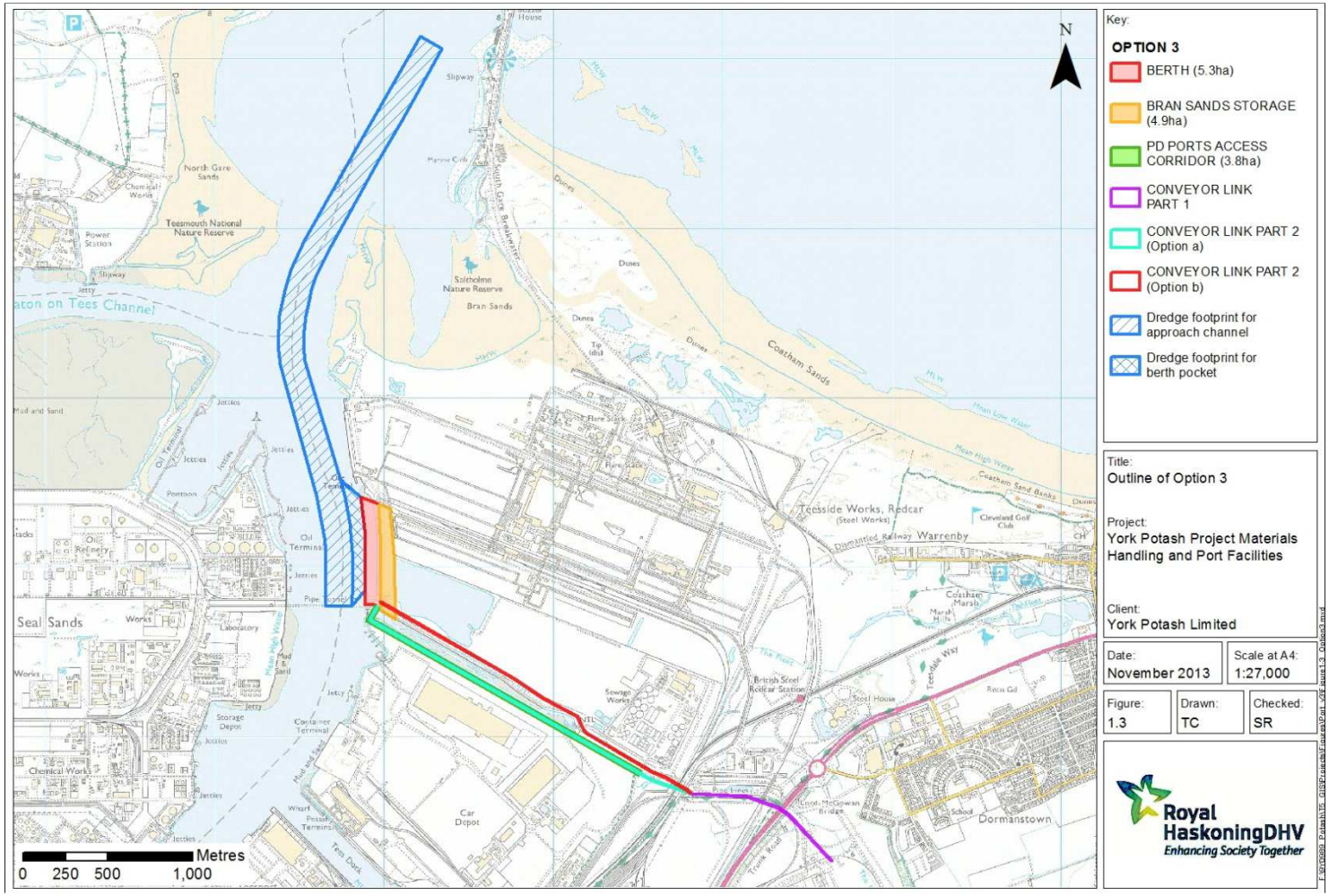


Figure 1.3 Location and layout – Option 3

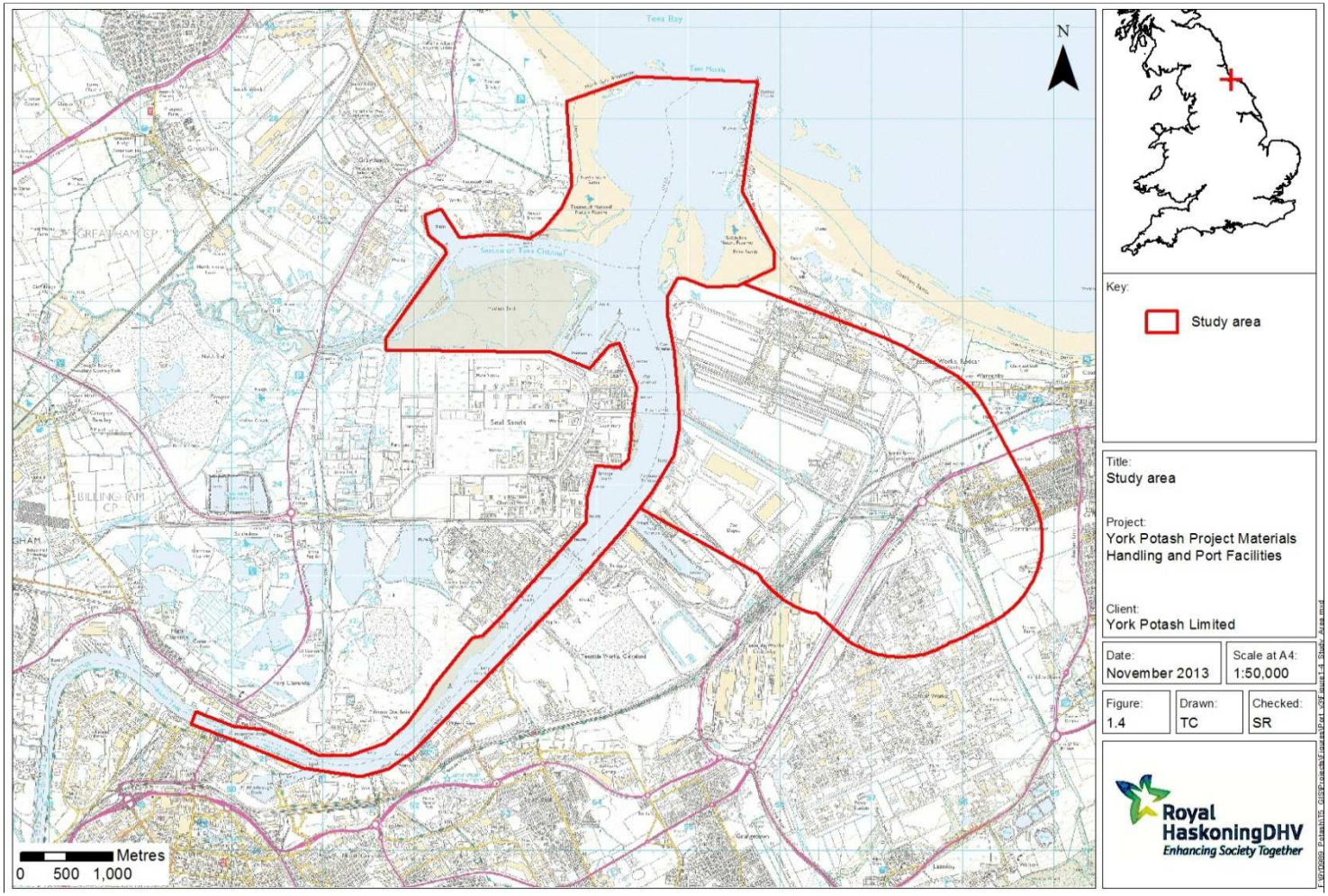


Figure 1.4 Study area

For the marine elements, the study area comprises the likely maximum extent over which potentially significant environmental impacts of the scheme may occur. In this case, the maximum extent of the potential impact has been determined to be the area over which the potential effects of the proposed scheme on tidal currents and sediment transport may occur. Such effects have the potential to affect other parameters, such as marine ecology, waterbird populations and water quality.

1.6 Report structure

Following this introduction, Section 2 considers the relevant legislative and regulatory regime, Section 3 provides a description of the proposed scheme and Section 4 presents the proposed approach to the EIA and ES. Section 5 identifies the potential environmental impacts associated with the relevant environmental topics and considers how these are proposed to be assessed and/or could be mitigated, and Section 6 presents a summary of the proposed way forward. Section 7 sets out the references used in production of this report.

Decommissioning is not explicitly covered in this report, but (as far as they are applicable) the likely implications of any decommissioning will be covered in the EIA. This examination will be at a high level, reflective of the degree to which decommissioning proposals are understood at this point in time. Any decommissioning would be regulated in due course.

2 LEGISLATIVE AND REGULATORY REGIME

2.1 The Planning Act 2008

The planning process for dealing with proposals for NSIPs was established by the *Planning Act 2008* (the 2008 Act). This process, as amended by the *Localism Act 2011*, involves an examination of major proposals relating to energy, transport, water, waste and waste water, and includes opportunities for people to have their say before a decision is made by the relevant Secretary of State.

The 2008 Act sets out the thresholds for NSIPs. For the ports sector, applications for development consent will be referred to PINS if the estimated incremental annual capacity exceeds:

- 0.5 million Twenty Foot Equivalent Units (TEU) for a container terminal;
- 250,000 movements for roll-on roll off (ro-ro);
- 5 million tonnes for other (bulk and general) traffic; or
- a weighted sum equivalent to these figures taken together.

The proposed scheme, once fully developed and operational, would provide for an export weight of 12mtpa of bulk product from the terminal. As a result, the export value exceeds the threshold stated within the 2008 Act with regard to the export of bulk materials from harbour facilities. The marine terminal therefore constitutes an NSIP, requiring consent from the Secretary of State via a DCO.

2.2 Environmental Impact Assessment Directive

The DCO application will be supported by an ES produced in accordance with the *Infrastructure Planning (Environmental Impact Assessment) Regulations 2009* and *Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2012*. These regulations have been produced in accordance with the *European Council Directive 85/337/EEC* which requires the assessment of the effects of certain public and private projects on the environment (the EIA Directive) and *Directive 97/11/EEC* (which amends *Directive 85/337/EEC*).

The potential for cumulative impacts associated with other proposed plans and projects (including other elements of the overall project being proposed by YPL), are considered in this Environmental Scoping Report.

Additional legislation which is likely to be of relevance to the EIA process is identified below.

2.3 Habitats Directive

The Conservation of Species and Habitats Regulations 2010 (the Habitats Regulations) implement *EC Directive 92/43/EEC* on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive). In accordance with Section 61 of the Habitats Regulations, Appropriate Assessment is required for any plan or project, not connected with the management of a European site, which is likely to have a significant effect on the site either alone or in-combination with other plans or projects. European sites comprise Special Protection Area's (SPA), as designated under *Council Directive 79/409/EEC* (the Wild Birds Directive), or a Special Area of Conservation (SAC), as

designated under the Habitats Directive. Appropriate Assessment is also required as a matter of government policy for potential SPAs, candidate SACs and listed Ramsar sites for the purpose of considering development proposals affecting them (ODPM, 2005).

The footprints of the three options do not lie within the boundary of a European nature conservation site or Ramsar site. However, given the proximity of the proposed scheme to the Teesmouth and Cleveland Coast SPA and Ramsar site, the potential exists for the proposed scheme to have an effect on these designated sites. This potential is considered further in this Environmental Scoping Report and will be examined in detail as part of a Habitats Regulations Assessment (HRA).

Should it be determined that an Appropriate Assessment is required, this would be undertaken by PINS as the 'competent authority', with advice from Natural England.

2.4 Wildlife and Countryside Act 1981

Under the terms of Section 28(4)b of the *Wildlife and Countryside Act 1981*, as amended by Schedule 9 to the *Countryside And Rights of Way Act 2000*, any operations within or adjacent to a Site of Special Scientific Interest (SSSI) require consent from Natural England. There are a number of SSSIs in the vicinity of the study area, including the Tees and Hartlepool Foreshore and Wetlands, Seal Sands, Seaton Dunes and Common, South Gare and Coatham Sands, Redcar Rocks and Cowpen Marsh (discussed further in Section 5.6 and 5.7).

Consent under Section 28 of the *Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act, 2000)* would be intrinsic to Natural England's overall response to the application.

2.5 Water Framework Directive

The *Water Framework Directive (2000/60/EC)* (WFD) establishes a legal framework to protect and restore clean water across Europe to ensure long-term, sustainable use. It applies to waters out to one nautical mile from the baseline from which territorial waters are drawn.

One of the aims of the WFD is to ensure that all European waterbodies are of Good Ecological Status or Potential (for 'heavily modified' and 'artificial' waterbodies) by 2015 by the setting of Environmental Quality Objectives (EQOs), for water chemistry, ecological and hydromorphological quality parameters. The WFD is transposed into English and Welsh law through *The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003*.

This legal requirement will be addressed through the undertaking of a WFD compliance assessment as part of the EIA.

2.6 Waste Framework Directive

The *Waste Framework Directive (2008/98/EC)* consolidates earlier legislation regulating waste. The Directive sets out the general rules applying to all categories of waste. A key objective of which is to provide measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and

management of waste and by reducing overall impacts of resource use and improving the efficiency of such use.

Article 3(1) of the Directive defines waste as:

"….any substance or object….which the holder discards or intends or is required to discard".

More generally, the Directive provides a general duty to ensure that waste is dealt with in an environmentally friendly way. The key to this is the 'waste hierarchy', which emphasises prevention (in the first instance) and then re-use, recycling and recovery of waste (see Figure 2.1). EU Member States must have regard to the waste hierarchy when dealing with waste. Disposal to landfill or at sea is the least favourable option.

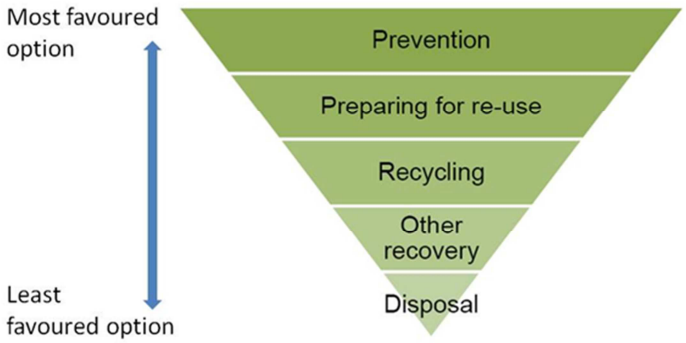


Figure 2.1 The waste hierarchy

Within the EIA, options for the disposal of waste will be identified in accordance with the waste hierarchy.

2.7 National, regional and local planning policy

All proposed development must take account of existing planning policy and guidance, and there are a number of national, regional and local plans and policies relevant to the proposed scheme.

2.7.1 National Policy Statement for Ports

The 2008 Act required new policy to inform decisions of NSIPs in England and Wales. Policy for such infrastructure is set out in the National Policy Statement for Ports (Department for Transport, 2012). In summary, the national Government seeks to:

- Encourage sustainable port development to cater for long term forecast growth in volumes of imports and exports by sea with a competitive and efficient port industry capable of meeting the needs of importers and exporters cost effectively and in a timely manner, thus contributing to long term economic growth and prosperity.
- Allow judgements about when and where new developments might be proposed to be made on the basis of commercial factors by the port industry or port developers operating within a free market environment.

- Ensure all proposed developments satisfy the relevant legal, environmental and social constraints and objectives, including those in the relevant European Directives and corresponding national regulations.

In order to help meet the requirements of the government policies on sustainable development, new port infrastructure should also:

- Contribute to local employment, regeneration and development.
- Ensure competition and security of supply.
- Preserve, protect and where possible improve marine and terrestrial biodiversity.
- Minimise emissions of greenhouse gases from port related development.
- Be well designed, functionally and environmentally.
- Be adapted to the impacts of climate change.
- Minimise use of greenfield land.
- Provide high standards of protection for the natural environment.
- Ensure that access to and condition of heritage assets are maintained and improved where necessary.
- Enhance access to ports and the jobs, services and social networks they create, including for the most disadvantaged.

Despite the recent recession, the national government believes that there is a compelling need for substantial additional port capacity over the next 20 to 30 years, to be met by a combination of development already consented and developments for which applications have yet to be received. Excluding the possibility of providing additional capacity for the movement of goods and commodities through new port development would be to accept limits on economic growth and on the price, choice and availability of goods imported to the UK and available to consumers. It would also limit the local and regional economic benefits that new developments might bring. Such an outcome would be strongly against the public interest (Department for Transport, 2012).

2.7.2 Redcar and Cleveland Borough Council Local Plan

RCBC originally adopted its Local Plan in June 1999. This provided the local policy for assessing proposed development in the Borough over the plan period to 2006. The *Planning and Compulsory Purchase Act 2004* made provision to save Local Plan policies until 27 September 2007, or until they were replaced by policies in Local Development Frameworks (LDFs).

RCBC adopted its Core Strategy in July 2007 and this provides the development framework for the Borough over the plan period to 2021. The document provides a suite of relevant policies that are required to be considered in the assessment of planning applications. At the same time the Council adopted its Development Policies Document which provides detailed development control policies that are intended to deliver the overarching policy objectives of the Core Strategy.

The adoption of these two Development Plan Documents has meant that the majority of the original Local Plan policies were deleted in July 2007. Those policies that have been 'saved' by the Council have no relevance to the proposed scheme.

Development Plan Document policies of relevance when considering the proposed scheme include the following:

a) Adopted Core Strategy Policies

- Policy CS1 explains that development proposals will be assessed against their contribution to delivering sustainability objectives, including a thriving economy; easy access to jobs; and, a healthy, safe, attractive and well-maintained environment.
- Policy CS4 promotes inward investment in the South Tees Employment Area.
- Policy CS8 explains that major employment proposals will be directed to a number of key locations, including South Tees. The Council is aiming to bring forward 160 hectares of general employment land in the Borough over the period up to 2021.
- Policy CS9 seeks to protect existing employment areas, including land in the South Tees area.
- Policy CS10 promotes the continued development and expansion of the port industry and port-related development along the River Tees.
- Policy CS20 encourages good quality and inclusive design in all new developments that respects and enhances the character of the local area.
- Policy CS24 refers to the requirement to protect and enhance the Borough's biodiversity and geological resource, including protecting the integrity of European sites.
- Policy CS26 requires development proposals to manage travel demand, including through the preparation and implementation of Travel Plans.

b) Adopted Development Policies Document Policies

- Policy DP2 sets out the criteria for assessing the suitability of a site or location, including compliance with site allocations and designations and ensuring that development does not cause a significant impact on the amenities of occupiers of existing or proposed nearby properties.
- Policy DP3 requires all development to be designed to a high standard that respects or enhances the character and surroundings of the site, including biodiversity designations. It requires proposals to include a Travel Plan where these are likely to generate more than 30 employees.
- Policy DP6 states that development that would give rise to increased levels of noise or vibration or which would add to air, land or water pollution would need to be acceptable in terms of human health and safety; the environment; and, general amenity.
- Policy DP7 requires effective measures to be agreed to deal with potential contamination or unstable land issues.
- Policy DP11 refers to the need to ensure that development does not adversely affect important archaeological sites or monuments.

It is noted that RCBC is currently in the process of reviewing its LDF with the intention of reverting back to a single Local Plan that, once adopted, will replace the LDF. The draft Local Plan was agreed by Cabinet on 21 September 2013, and sets out the preferred planning policies, site allocations and other designations that will guide development until 2029. RCBC is currently seeking views on the draft Local Plan. The consultation period on the draft Local Plan commenced on 21 October and is due to be completed on 2 December 2013. RCBC is proposing to adopt the Local Plan in December 2014, so for the purposes of this environmental scoping study the above policies remain relevant.

3 DESCRIPTION OF THE PROPOSED SCHEME

3.1 Introduction and alternatives

This section describes the key features of the construction and operational phases of the proposed scheme. The potential environmental impacts associated with the proposed scheme are described in Section 5.

YPL considered the use of a number of alternative ports along the eastern and north-eastern coast of England, prior to determining that the port in the Tees estuary is the most suitable export facility.

The port at Hull was considered as an alternative solution; however, this would involve the pipeline transporting the product approximately twice the distance from the minehead to the export facility as that required to export from Teesport (with greater associated disruption). The slurry transportation pipeline would be required to cross the Humber and potentially interact with wind industry cables and substations.

The port at Whitby was considered for the export of the product. However, this port is too small to accommodate the facilities required to export the planned volumes of product. Whitby port can only feasibly accommodate fishing trawlers. Given this assessment, Teesport was selected as the preferred location for the export facility.

Other potential locations were initially considered within the Tees estuary prior to selecting Bran Sands as the preferred location for the marine terminal. The other potential locations were the Northern Gateway Container Terminal (NGCT), Queen Elizabeth II (QEII) Jetty and No.1 Quay within Tees Dock.

The consented (but not yet constructed) NGCT is a proposed container terminal on the southern bank of the Tees estuary. YPL has determined that the use of containers as a means of export of the product is not economically sustainable as a business case for the proposed export volumes. As such, this option was ruled out from further consideration.

No.1 Quay (owned by PD Ports) has also been discounted as a potential option as PD Ports has indicated that it has other aspirations for the quay. The QEII jetty was discounted on technical grounds by YPL, as it is not possible to extend the berth to a size which would enable the export of 12mtpa of product.

An overview of the entire operational process from mining (ore extraction) to the export of the product from the marine terminal is provided in Figure 3.1. It should be noted that the elements that are shaded grey have been or are being assessed within EIAs that support the planning application for the mine and the DCO application for the pipeline. The elements shaded green form part of the current EIA process, of which this environmental scoping exercise forms part.

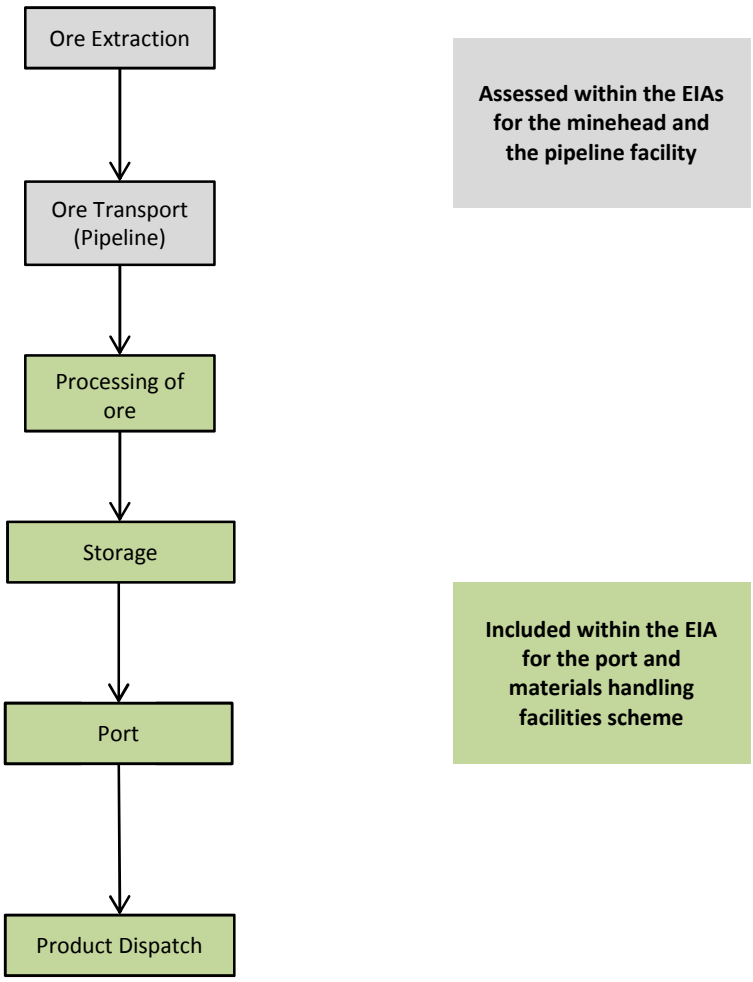


Figure 3.1 Overview of operational process from ore extraction to product export

The operational processes that are within the scope of this EIA process comprise the operation of the materials handling facility (Options 1 and 2), transfer of the product by conveyor to the marine terminal, product storage and export via the terminal. The materials handling facility is proposed to support an export capacity of up to 12mtpa.

3.2 Materials handling facility

3.2.1 Overview of the facility

The purpose of the materials handling facility is primarily to receive slurry (transported from the minehead within the pipeline) and convert the slurry into product which can be exported from the marine terminal in a solid form. The materials handling facility is proposed to comprise:

- a pipeline reception facility (with buffer storage);
- a materials handling plant (involving thickeners, belt filters, powder dryers, granulator banks, granule dryers, granule screening and coating);
- a product bagging and storage area; and,
- an administration and site services area.

The construction works are likely to comprise the following activities:

- ground preparation / earthworks;
- concreting foundations with a requirement for piled foundations for some elements;
- general construction activities; and,
- changes to surrounding infrastructure, including roads, drainage and conveyor systems.

A description of the construction and operational characteristics of the materials handling facility is provided below. This description applies to each option being considered for the location of the facility.

3.2.2 Construction works

It is considered likely that underground service cables and pipes may be present within the scheme footprint; if these have the potential to be affected by the works they would need to be removed / diverted prior to construction works commencing.

The current site levels within the proposed scheme footprint would be reduced by undertaking localised excavation of soils and hardstanding in order to accommodate a stone layer and concrete floor slab which will form the development platform for the proposed facility. The footprint of the materials handling facility for Option 1 is proposed to be approximately 15ha, whilst the footprint of the materials handling facility for Option 2 is approximately 20ha. The footprint of the materials handling facility for Option 3 is approximately 30ha; however, this is outside of the scope of this report.

The foundations for the proposed scheme would comprise a ground-bearing slab (cast in-situ). There would be a requirement for piled foundations for some elements of the proposed scheme.

A number of small internal access roads are also proposed.

Surface water from placed hardstanding areas would need to be collected and discharged into the surrounding surface water drainage system, with pollution prevention measures installed as appropriate for this type of facility.

It is anticipated that all machinery and equipment required to construct and operate the materials handling facility would access the site by road. The site is readily accessible by the surrounding access road network and, as such, the construction of new road infrastructure (except the internal roadways within the footprint of the proposed facility) is not considered necessary during the construction or operational phase.

The materials handling facility would accommodate all of the service and administration facilities for the plant, including:

- amenity building;
- workshop;
- laboratory;
- engineering store;
- electrical substation;

- first aid facilities;
- office building;
- control room;
- car park;
- laydown areas; and,
- associated items of plant hardware.

The footprint for the service and administration area would be up to 300m by 150m (4.5ha). The buildings within this area of the proposed scheme would have a maximum height of up to 15m.

3.2.3 Summary of operational processes

Thickening and filtering

The thickening and filtering process would separate the solids from the carrier brine, used to pump the slurry from the mine head. This process would involve slurry thickener(s), filter(s) and the associated items of plant hardware such as pump(s), pipeline(s) and storage tank(s).

Brine would be returned to the mine site process brine tank for reuse in milling and slurry pumping.

Powder drying

The powder drying process would remove more residual moisture contained in the product solids to a level where it can be granulated. This process would involve drier(s), elevator(s), conveyor(s), bag filter(s), storage tank(s) and feeder(s). The plant equipment would be mounted within an open steel frame structure with a maximum height of 50m.

The driers would be fired with natural gas and the exhaust gas would be treated through the dust collector to recover fine particles.

Dust collection

A dust collection building has been designed in conjunction with the dust collection system, which itself has been integrated in to the driers (see above).

Granulation

The granulation process would convert the product solids from fine powder to a granular material of 2mm to 4mm in size. In order to generate the granulated product, the dried powder would be mixed with a binder (starch) (to reduce excessive dust and to increase transportability) and passed through granulators. The plant equipment during this process would be mounted within an open steel frame structure with a maximum height of 50m.

Granulation drying

The granulation drying process would remove the residual water from the product. This process would involve drier(s), conveyor(s), elevator(s), heat exchanger(s) and bag filter(s). The plant equipment during this process would be mounted within an open steel frame structure with a maximum height of 50m.

Granulation finishing

The granulation finishing stage would sieve the granular product to separate out the desired granule size, and coat the product with a coating agent that enhances its properties.

Reagents and raw materials

The reagents and raw materials area of the materials handling facility includes receipt, handling and storage of reagents and feed materials such as flocculent, granulation binder and granule coating agent. This section would include silo(s), conveyor(s), elevator(s), building(s) and the associated items of plant hardware, such as pumps, pipelines and feeders.

Bagging plant

The bagging plant would include a bagging line for the backing up of 1mtpa of product into Flexible Intermediate Bulk Containers (FIBCs), plus associated bagged product storage. The plant equipment would likely be inside enclosed buildings or mounted on the outside of these buildings or adjacent open steel frame structures. The bagging process itself would be located within a building, and as such would not be exposed to the elements.

Process water area

This process water area is for the handling of process water which may include tanks, pumps, clarifiers and the associated items of plant hardware such as pipelines. All equipment is expected to be within a bunded area. The plant equipment would be likely to be mounted within an open steel frame structure with a maximum height of up to 25m.

3.2.4 Water usage and emissions

The main emission resulting from the operational phase of the proposed scheme would be emissions to the atmosphere from gas vents from product dryer filter bags. The materials handling plant is anticipated to produce a gaseous air discharge containing 0.47 tonnes of water vapour and 0.42kg of product dust per tonne of discharge air from the dryer bags. During normal operation of the plant, the release rate of gaseous emissions to the atmosphere is anticipated to be 240 tonnes / hour on a continuous basis. The discharge temperature is proposed to be above the dew point to avoid production of a visible plume.

The materials handling plant, storage areas and conveyor systems are proposed to handle dry solids. Fugitive emissions are highly likely to arise locally and would require mechanical / manual cleaning and offsite waste disposal to landfill.

Dust generated during the loading of bulk product into the hold of the ships is also likely to generate emissions to the atmosphere. However, the use of shiploaders (which are specifically designed to minimise dust emissions during loading operations) would ensure such emissions are reduced as far as practicable.

It is estimated that water emissions associated with the materials handling facility under normal operations would be approximately 60,000 litres per day.

3.2.5 Road access and traffic

Construction traffic would access the site via the existing trunk roads adjacent to the proposed scheme footprint (A1085).

Vehicles would require access to the site during the operational phase for a number of different reasons, involving transport of visitors to the site, transport of workers to the site and transport of materials required during the operational phase (e.g. flocculent and coating wax). Anticipated vehicle numbers (based on an export volume of 12mtpa) associated with the operational phase comprise:

- Visitors – approximately 140 vehicles per day (seven days per week).
- Staff – approximately 340 vehicles per day (seven days per week).
- Deliveries – approximately 20 vehicles per day (seven days per week).

The most likely access route to the scheme footprint for operational traffic is via the existing trunk roads, including the A1085 and Tees Dock Road.

3.3 Conveyor system

A conveyor system is required to transport the product from the materials handling facility to the marine terminal, with the proposed route and length of the conveyor being different depending on which option for the materials handling facility is progressed.

It is proposed, for all scenarios, that the conveyor system would be covered to reduce dust emissions to air.

In order to transport the product to the port facility at Bran Sands from the materials handling facility at Wilton (Option 3) it would be necessary to construct a crossing over Dabholm Gut (if conveyor route sub-option A is selected as the preferred approach, see Figure 1.3).

3.4 Storage buildings

It is proposed that storage buildings for the product would be located on the same site as the materials handling facility. The capacity of product storage at the site of the materials handling facility would be up to 750,000 tonnes. To accommodate this quantity of material the storage building would be approximately 75m wide and 500m long. The appropriately sized dried product would be fed to the marine terminal from the storage building via the conveyor system.

A storage capacity of up to 130,000 tonnes of product would be provided adjacent to the berth to cater for hatch changes and other ship loading interruptions to be able to load one Panamax 85,000DWT ship.

As indicated on Figures 1.1 to 1.3, all options require the partial reclamation of Bran Sands Lagoon in order to create a development platform for the construction of a storage area adjacent to the berth. The Bran Sands Lagoon is hydraulically connected to the Tees estuary via a culvert through the existing slag embankment between the lagoon and the estuary. The partial reclamation of Bran Sands Lagoon would involve:

- Installation of an approximately 230m long, 6m deep sheet-piled cut-off wall in a north-south alignment within the western section of the lagoon.
- Deposition of infill material within the reclamation area to raise the ground level and create a development platform. Deposition of infill material would commence in the southern section of the reclamation area and work northwards, in order to force water from the reclaimed area out of the existing outfall pipe.
- Installation of a new culvert or extension of the existing culvert so that it outfalls into the section of the lagoon which is not to be reclaimed, ensuring the lagoon remains hydraulically connected to the estuary.

Indicative locations of the storage buildings for each option under consideration for the marine terminal are shown on Figures 1.2 to 1.4.

Two double boom type scraper reclaimers would be used to reclaim the product from the storage buildings and transfer it onto belt conveyors, which would transport the product to the marine terminal for export. A proportion of the material would be sold to UK based customers using the UK highway network. The maximum volume of product to be transported by road to UK based customers would be approximately 100,000 tonnes to 150,000 tonnes per annum, with the remainder being transported by vessel to UK or international customers. Assuming that each load is 30 metric tonnes, the export of this volume of material by road would require 3,300 to 5,000 truck movements per year.

3.5 Ship loader

Ship loaders would be required to transfer the product from the conveyor system to the ships that would be berthed alongside. It is expected that two ship loaders would be required (this will be confirmed during the detailed design phase). Ship loaders are specifically designed to minimise dust emissions during loading operations.

The ship loading would be undertaken from a rail mounted luffing, or rail mounted slewing shutting ship loader with an enclosed cascade chute, fed from a conveyor in a (partially) enclosed conveyor gallery. Ship loaders would stand up to 25m above the deck of the jetty. The ship loaders would have a loading capacity of 5,200 tonnes / hour.

3.6 Marine terminal

The works associated with the construction of a new marine terminal on the Bran Sands river frontage are expected to include:

- Dredging an approach channel from 14.1m below Chart Datum (bCD) and 10.4m bCD to 15.1m bCD (approximately 800,000m^3 of material) and dredging a berth pocket to a depth of 16.0m bCD from an existing depth in the order of 10m bCD to 13m bCD (approximately 250,000m^3 of material) (the dimensions of the proposed dredge footprints are provided in Section 3.6.3).
- Construction of a new quay (marine terminal).
- Installation of ship loader support rails, ship loader tie down points, ship loader long travel end stops and installation of the ship loaders themselves.
- The installation of conveyor supports, conveyor drive stations and a conveyor connection from the proposed common facility to the berth.
- Provision of maintenance access.
- Installation of maintenance platforms.
- Installation of gangways.

There are two forms of construction currently under consideration for the new quay. These are as follows:

1. A suspended reinforced concrete deck approximately 524m long and 28m wide, constructed on approximately 500 tubular piles (in the order of 914mm diameter).
2. A continuous quay taking the form of a combi-piled wall retaining fill material, with dimensions approximately 524m long and 75m wide.

A suspended reinforced concrete deck would be formed with steel tubular piles to be driven into the bed. The piles would support a reinforced concrete deck onto which the shiploader rails and supports for the conveyor would be fixed.

A continuous quay would comprise a combi-piled wall formed with primary driven steel tubular king piles linked with secondary driven steel sheet piles. The front combi-piled wall would be connected by tie rods to a sheet piled anchor wall at a distance of approximately 30m to 40m. The king piles would support a reinforced concrete cope beam onto which the waterside ship loader rails would be fixed. A piled beam would be installed parallel to the cope beam to support the landside ship loader rails. The remaining area would be covered by a ground bearing concrete slab that would form the foundation for the conveying system.

Approximately 190 king piles and a 265m length of sheet pile wall would be required for the front combi-wall, with a 460m length of sheet pile wall required for the anchor wall. It is estimated that the piles for the rail beam would be installed between the tie rods at 7m centres, resulting in the requirement for approximately 75 piles to be installed.

The proposed location and maximum length of the terminal is constrained by the Northumbria Water Ltd (NWL) sludge jetty at the upstream end and by the Redcar Ore Terminal jetty at the downstream end.

An indicative layout of the marine terminal at completion is presented in Figure 3.2. Indicative cross sections of the suspended deck quay and the continuous quay (reclamation) options are shown on Figures 3.3 and 3.4 respectively.

The level of the quay would need to be approximately 8.85m above CD (+6.0m Ordnance Datum (OD)).

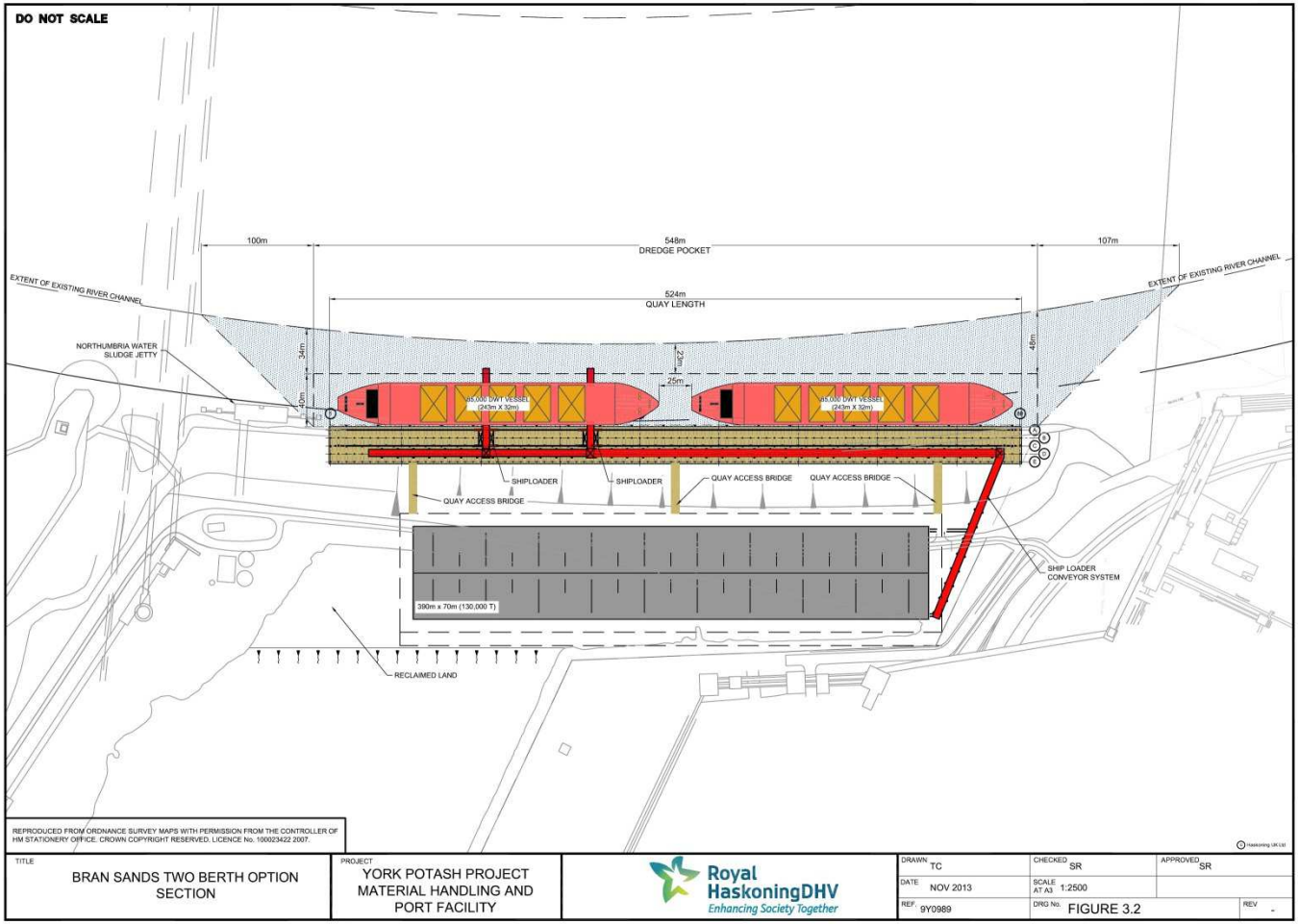


Figure 3.2 Indicative layout of Bran Sands marine terminal

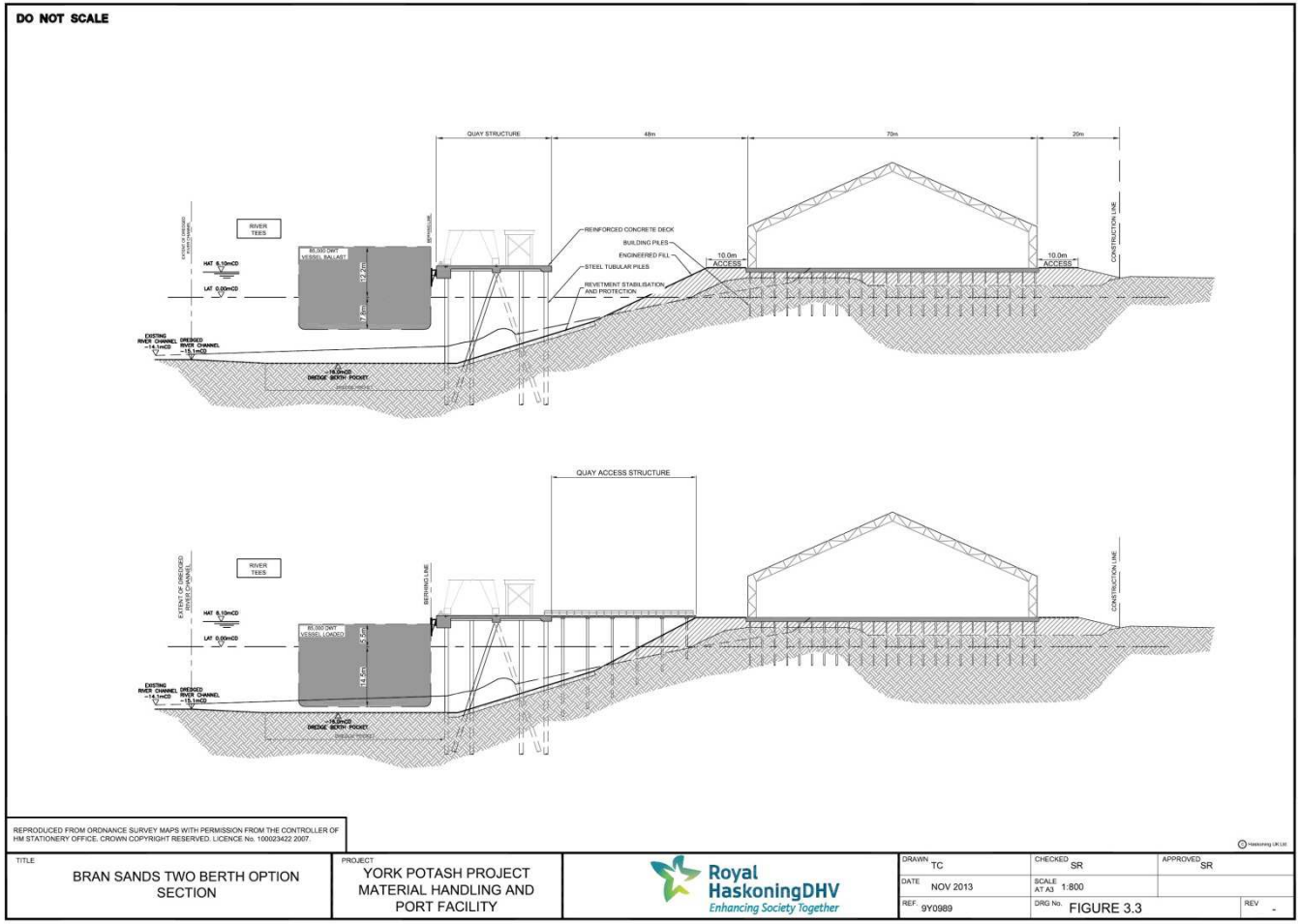


Figure 3.3 Indicative cross section of the suspended quay deck option

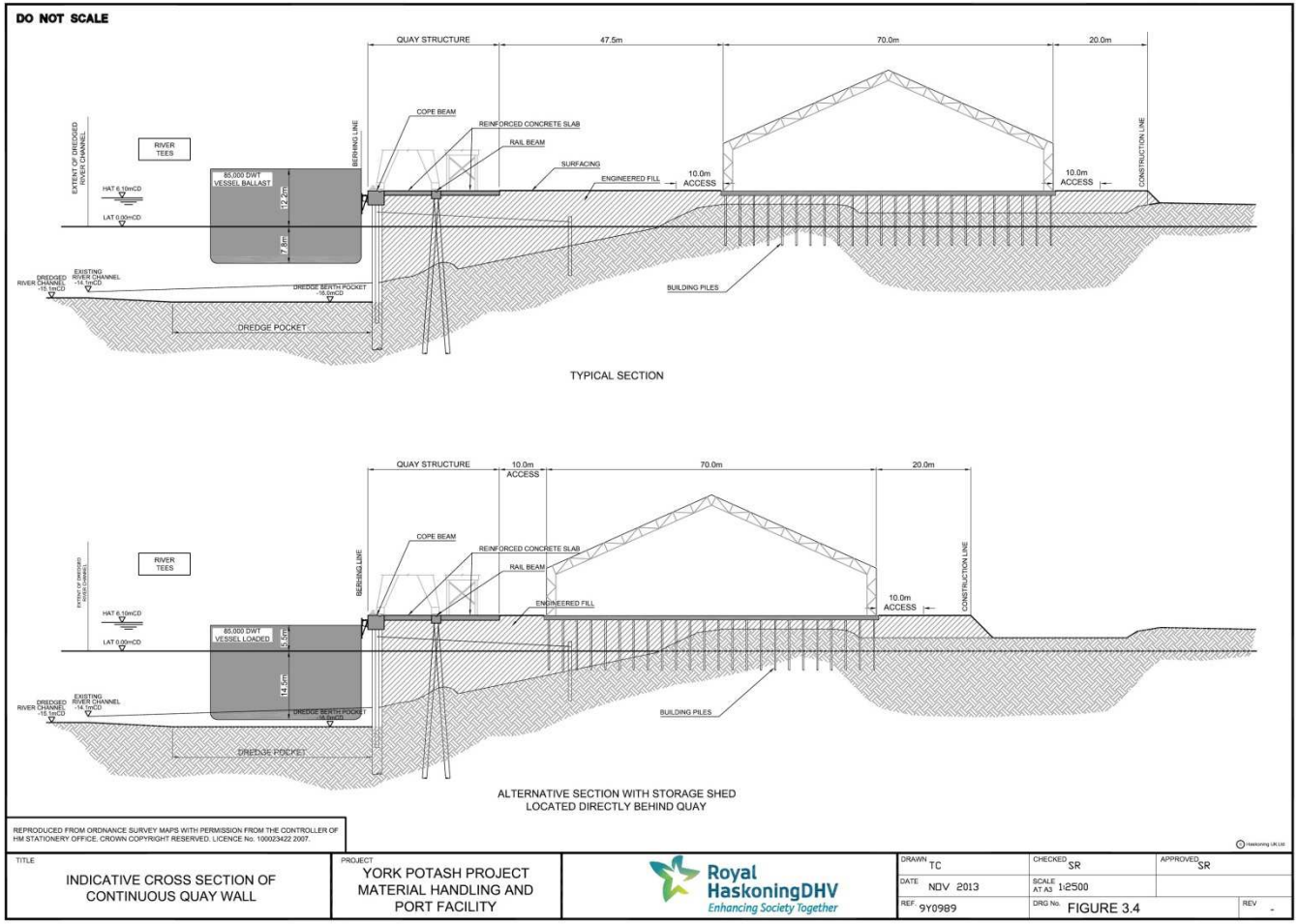


Figure 3.4 Indicative cross section of the continuous quay (reclamation) option

Depending on ground conditions it may not be possible to drive piles through hard layers within the mudstone bedrock (such layers are known to be present in the area from other projects undertaken in the vicinity of Bran Sands). Where the level of the bedrock is high, some pre-augering of piles to facilitate driving to the required depth, or the installation of reinforced concrete rock sockets at the base of tubular steel piles, may be required.

3.6.1 Details of the marine terminal construction sequence

The construction sequence for the marine terminal is anticipated to comprise the following:

- Mobilisation (including dredgers).
- Demolition and site preparation.
- Dredging of the approach channel and berth pocket.
- Construction of the quay.
- Installation of fixtures and fittings.
- Installation of mechanical and electrical services.
- Demobilisation.

3.6.2 Traffic and transport

During the construction phase, local parking capacity for approximately 100 to 150 cars would be required for the berth construction. The type of construction vehicles proposed to access the site during the construction phase of the marine terminal include:

- Ready mix concrete wagons.
- Low loaders.
- Articulated flat-bed trailers.
- Articulated bulk materials trailers.
- Private vehicles.
- Earth moving equipment and lorries.

Construction traffic would access the site via the existing trunk roads adjacent to the proposed scheme footprint (A1085).

3.6.3 Dredging

Capital dredging of the approach channel and the berth pocket at Bran Sands would be required to allow vessels to gain access to the marine terminal. A marine site investigation will be undertaken to assess the nature (type and quantities) of the material that would require dredging and to inform the detailed design of the facility. This will also inform the consideration of possible alternative uses for the dredged material (see Section 3.7).

The total volume of material to be dredged from the berth pocket and approach channel is estimated to be approximately 1.05 million m^3. The dimensions of the berth pocket are anticipated to be approximately 548m long x 40m wide (dredged to a depth of 16m bCD), while the approach channel would require dredging along a length of approximately 3,560m x 150m wide (dredged to a depth of 15.1m bCD).

The results of the marine site investigation will determine which method(s) of dredging are most appropriate. At this stage, a number of options are possible, namely:

- backhoe/grab dredger;
- cutter suction dredger; or
- trailing suction hopper dredger.

During the operational phase there is likely to be a requirement for periodic maintenance dredging within the berthing pocket and approaches. The volume of maintenance dredging required on an annual basis will be predicted during the EIA process (see Section 4.1). It is proposed that dredging activities would be carried out 24 hours a day.

3.6.4 Export of product via the marine terminal

The port facility will be designed to accommodate the export of up to 12mtpa of product, and to accommodate two Panamax size vessels, each up to 85,000 DWT. A typical loading rate for a Panamax bulk carrier is approximately three days. Depending on vessel size, between 35 and 55 ship loads could be exported from the marine terminal per annum, as outlined below:

- 55,000DWT – 55 vessel loads per annum.
- 65,000DWT – 46 vessel loads per annum.
- 75,000DWT – 40 vessel loads per annum.
- 85,000DWT – 35 vessel loads per annum.

3.6.5 Anticipated employee numbers

It is anticipated that the construction phase for the marine terminal (for either the suspended deck or the continuous quay) would require the employment of approximately 100 staff, predominantly comprised of labour and plant operatives.

3.7 Disposal of dredged material

3.7.1 The waste hierarchy

The Waste Framework Directive provides a general duty to ensure that waste is dealt with in an environmentally acceptable manner. In accordance with the Directive, it is necessary to seek alternative uses for the dredged arisings, with disposal at sea being the least preferred option (in accordance with the waste hierarchy, see Figure 2.1). Alternative uses can include habitat creation or improvement and use in reclamation projects.

Alternative use of dredged material

An option being considered for the use of dredged material is to reclaim Bran Sands Lagoon (in part) to create land for use as part of the port facility infrastructure. In addition, dredged material would be used as infill for the continuous quay (reclamation) option for the marine terminal.

The engineering feasibility of reclaiming the lagoon using dredged material depends on the nature of the dredged material (i.e. its geotechnical properties) and the volume of suitable material arising from the footprint of the berthing pocket and approach channel.

Alternative uses for the dredged material will be explored through the EIA process and in consultation with relevant stakeholders.

Offshore disposal of dredged material

There are two active disposal sites that could potentially accept the dredged material: Tees Bay A (TY 160) and Tees Bay C (TY 150) (see Figure 3.5). Both sites have historically been used for the disposal of dredged material and have received both capital and maintenance dredgings. Tees Bay C has predominantly been used for capital dredged material, but has received quantities of maintenance material in some years. Tees Bay A has been used for soft non-cohesive maintenance material.

DEFRA records show that the volume of material disposed of at Tees Bay A has fluctuated from 0.3 million to 2.4 million wet tonnes over a 15 year period, with a noticeable drop off in volumes post-1996. The largest volume deposited since 1996 was in 2002, when 1.8 million wet tonnes were deposited.

DEFRA records from Tees Bay C show periodic small scale usage, with a peak volume deposited in 1999 totalling some 1.9 million wet tonnes. However, the usual yearly volume is 0.1 million wet tonnes, with some years showing no usage at all.

Should it not be possible to use the dredged material in a beneficial way for either technical or environmental reasons, it is proposed that it would be disposed of at one, or both, of the offshore disposal sites. The potential for offshore disposal is, in part, subject to an assessment of sediment quality which would be undertaken as part of the EIA process.

3.8 Programme

The construction programme for the proposed scheme is predicted to be between 18 and 24 months.

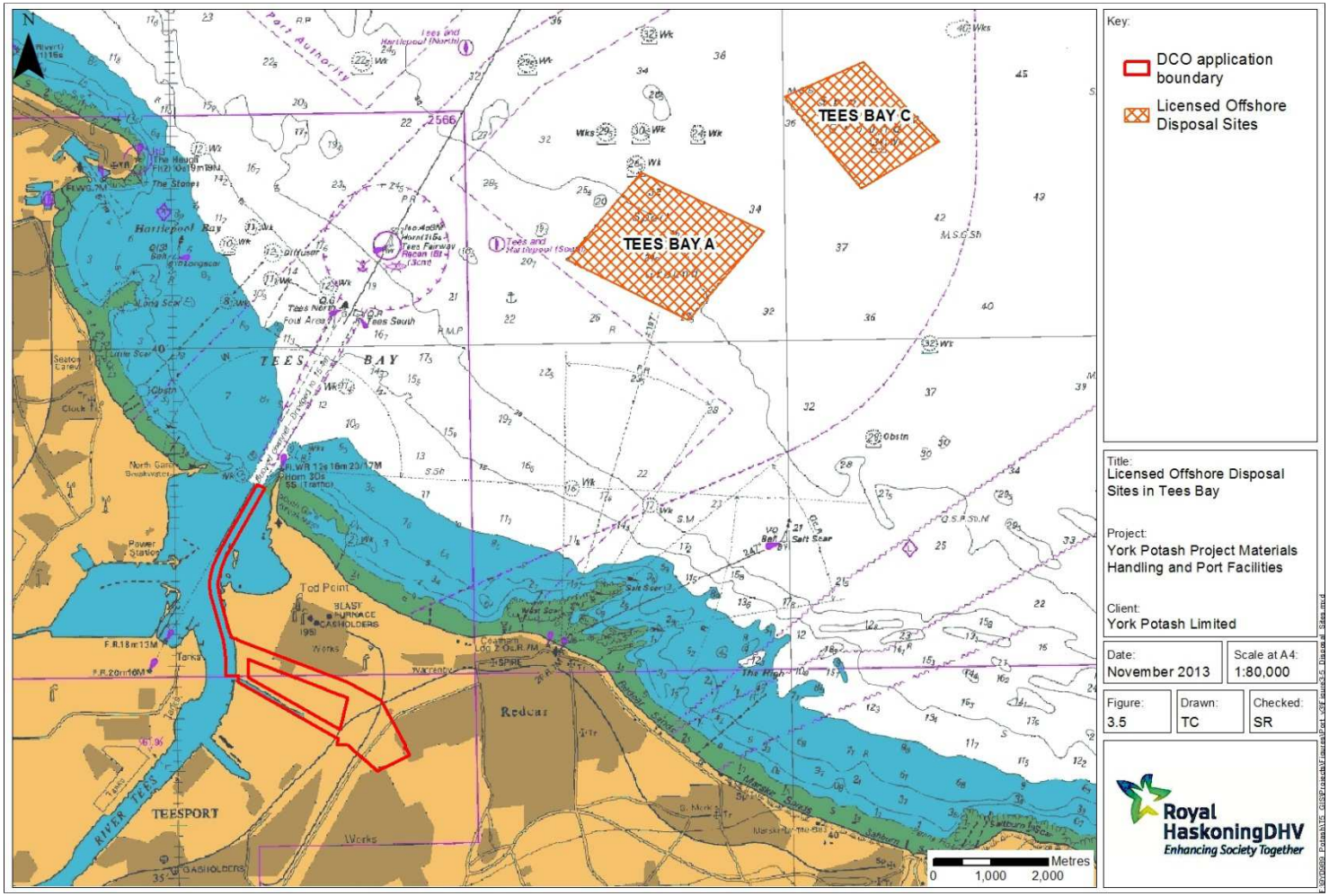


Figure 3.5 Location of licensed offshore disposal sites in Tees Bay

4 APPROACH TO EIA AND THE ENVIRONMENTAL STATEMENT

4.1 The Environmental Impact Assessment

The EIA for the proposed scheme will conform to the requirements of the *Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (SI 2009/2263)* and *Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2012.* It will consider the likely significant environmental impacts during the construction, operation and any decommissioning phases.

The information presented within this Environmental Scoping Report identifies the way forward for the assessment of the likely significant environmental impacts during the construction and operation (and decommission, see Section 1.6) associated with the proposed scheme. The general steps in the process that will be followed as the EIA is taken forward are shown in Figure 4.1.

The process of EIA is an iterative and evolutionary one that builds up layers of data as the assessment progresses. The approach it takes needs to be comprehensive and well-organised given the variety of technical specialisms involved, as well as the need to integrate many of the environmental and social issues potentially arising.

Further work that is considered necessary to fulfil the data requirements for the EIA is described in Section 5. In all cases where significant impacts are identified, appropriate mitigation measures will be developed and details provided in the ES. The residual impact will then be assessed and reported. The ES will report the outcomes of the process, and technical appendices will provide additional information for relevant topic areas. The ES will also be accompanied by a separate Non-Technical Summary (NTS).

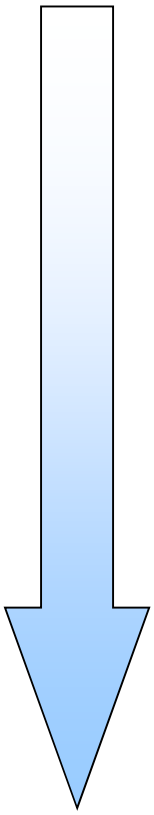
4.2 ES format

The ES is a formal report that documents the findings of the EIA process. The ES will incorporate the following:

- Project introduction, including a description of the EIA process, including details on screening, scoping, consultation and impact assessment.
- Detailed description of the proposed scheme, including the alternative options considered, and the reasons for selecting the preferred approach.
- Detailed description of the existing environment.
- Detailed description of the potential impacts and mitigation measures identified during the EIA process for each of the environmental issues under consideration. This part of the ES will cover the construction, operational and decommissioning phases of the scheme and both beneficial and adverse impacts.
- Consideration of the implications of the scheme on sites designated for nature conservation interests, in light of their conservation objectives.
- Consideration of the implications of the scheme under the Water Framework Directive.
- Description of the predicted cumulative effects of the project with other relevant plans or projects.
- Summary of findings.

- A list of references of information and publications cited in the ES.
- Appendices, containing relevant survey information and reports that may be produced during the undertaking of the EIA.

Figure 4.1 The EIA process

Stage	Task	Aim/objective	Work/output (examples)
Screening report	Screening	To formally confirm route for EIA and lead responsible authority.	Appropriate level of information on proposals and approach.
Scoping study	Scoping	To identify the potentially significant direct and indirect impacts of the proposed scheme.	Preliminary consultation with key consultees. Targets for specialist studies.
EIA 	Consultation	Consult with statutory and non-statutory organisations and individuals with an interest in the area and the proposed scheme.	Local knowledge and information.
	Primary data collection	To characterise the existing environment.	Background data including existing literature and specialist studies.
	Specialist studies	To further investigate those environmental parameters which may be subject to potentially significant impacts.	Specialist reports.
	Impact assessment	To evaluate the existing environment, in terms of sensitivity. To evaluate and predict the impact (i.e. magnitude) on the existing environment. To assess the significance of the predicted impacts.	Series of significant adverse and beneficial impacts.
	Mitigation measures	To identify appropriate and practicable mitigation measures and enhancement measures.	The provision of solutions to minimise adverse impacts as far as possible Feedback into the design process, as applicable.
	Environmental Statement	Production of the ES in accordance with EIA guidance.	Environmental Statement.

4.3 Habitats Regulations Assessment

A section will be included within the ES which draws together information regarding the potential for the proposed scheme to affect the Teesmouth and Cleveland Coast SPA and Ramsar site (and any other relevant European or internationally designated sites), and presents an assessment of the potential impacts with respect to interest features, and the supporting habitats, of these sites.

Should PINS determine that there is the potential for a 'likely significant effect' on the Teesmouth and Cleveland Coast SPA and Ramsar site, a further aim of the ES will be to enable a full assessment to be made of the implications of the scheme for European sites in accordance with the Habitats Regulations.

Under Regulation 61 of the Habitats Regulations, an Appropriate Assessment needs to be undertaken in respect of any plan or project which:

- either alone or in combination with other plans or projects would be likely to have a significant effect on a European site; and,
- is not directly connected with the management of the site for nature conservation.

The initial determination of the potential for likely significant effect should ensure that all relevant plans and projects likely to have a material effect on a European site are considered.

Natural England's *Habitats Regulations Guidance Note (HRGN) 1, The Appropriate Assessment (Regulation 48) (English Nature 1997)* describes how Appropriate Assessment should be undertaken. This guidance bases the assessment on a series of nine key steps that the competent authority should follow. It is intended that the ES will provide the competent authority and its advisors/consultees with the information required to determine whether or not a significant effect on a European site is likely and, should it be required, undertake the Appropriate Assessment.

4.4 Water Framework Directive

In order to assist in the assessment of the potential impacts of the proposed scheme on the ecological status/potential of water bodies screened into the WFD assessment, it is proposed that the Environment Agency's *Clearing the Waters* guidance (Environment Agency, 2012) is used. *Clearing the Waters* is aimed at assessing the potential impacts of dredging and disposal and recommends a four stage process, as follows:

- Screening Stage (Stage 1): This stage only applies to pre-existing activities. In this context, this means activities which started or were on-going during the period 2006 to 2008. New projects, that is, those commencing after 1 January 2009 should go straight to the scoping stage (i.e. Stage 2). However, initial screening information is necessary as part of the scoping stage and, therefore, this stage is still often completed to inform Stage 2.

- Scoping Process (Stage 2): The scoping stage enables regulators and operators to determine the scope of the assessment required to establish whether an activity will have a non-temporary effect on water body status. Scoping therefore assists in defining which WFD parameters could be affected and in agreeing an appropriate level of assessment to meet WFD requirements.

- Assessment (Stage 3): This stage of the assessment aims to assess whether the activity will have a significant non-temporary effect on the status of one or more WFD parameters at water body level. The test is therefore to determine whether the activity is likely to affect a parameter sufficiently to lower its existing class status. For priority substances, the process requires the assessment to consider whether the activity is likely to prevent the parameter to achieve good chemical status.

- Identification and Evaluation of Measures (Stage 4): If it is established that an activity is likely to affect water status at water body level (that is, by causing deterioration or by preventing achievement of the WFD objective), or that an opportunity may exist to contribute to improving status at a water body level, potential measures to achieve either of these must be investigated. This stage considers these measures and, where necessary, evaluates the measures in terms of cost and whether it is disproportionate.

4.5 Consultation

4.5.1 Introduction

Consultation is an important part of the EIA process. A comprehensive approach towards consultation is necessary to ensure that issues of concern with regard to the potential impacts of the proposed scheme are identified at an early stage in the EIA process and, as such, can be investigated thoroughly and the results presented in the ES. Relevant consultees will include, but not be limited to, the following:

- Marine Management Organisation (MMO).
- Environment Agency.
- Natural England.
- English Heritage.
- PD Ports (harbour authority).
- The Crown Estate.
- Maritime and Coastguard Agency.
- Industry Nature Conservation Association (INCA).
- Teesside Bird Club.
- Yorkshire Wildlife Trust.
- Tees Valley Wildlife Trust
- RCBC.
- North Yorkshire County Council.
- Cefas.
- North East Inshore Fisheries Associated (IFCA).
- Royal Society for the Protection of Birds (RSPB).

4.5.2 Consultation strategy

A well-designed consultation strategy will allow all potentially affected parties to comment on and input to the planning and development process. The 2008 Act sets out the provisions for consultation with relevant parties, prior to submission of a DCO application.

A consultation strategy has been developed that defines who will be consulted, when and how consultation will occur and that sets out the reasons for consultation.

5 POTENTIAL ENVIRONMENTAL IMPACTS ASSOCIATED WITH PROPOSED SCHEME OPTIONS

Over recent decades a number of environmental studies and surveys have been undertaken in the Tees estuary to characterise the baseline environment and to assess the environmental impact of various development proposals. The baseline environment presented throughout this section has drawn on relevant information from publicly-available information sources, including the ESs produced for NGCT (Royal Haskoning, 2006), the QEII jetty (Royal Haskoning, 2009) and the Tees Dock No.1 Quay (Royal HaskoningDHV, 2012a), in addition to a maintenance dredging baseline document produced for PD Ports (Royal HaskoningDHV, 2012b).

The ESs mentioned above were issued to the appropriate regulators alongside applications for consent for such schemes; all three of the aforementioned proposed schemes have received consent.

In this section each of the environmental parameters/topics determined to be relevant in the context of a comprehensive EIA of the proposed scheme are considered in turn.

5.1 Hydrodynamic and sedimentary processes

This section describes the baseline hydrodynamic and sedimentary regime of the Tees estuary and the approach that will be taken in the ES to assess the changes arising from the proposed scheme on these baseline conditions. The implications of any predicted changes to the physical regime of the estuary will be assessed in terms of the significance of any potential impact on various environmental parameters (e.g. marine ecology, water quality and fisheries) in the relevant ES section.

Over recent decades a considerable volume of work has been undertaken to characterise the baseline physical regime of the Tees estuary and to assess the effects of various development proposals. The section of the ES dealing with hydrodynamic and sedimentary processes will draw on information from publicly-available information sources such as a conceptual model of the estuary processes (ABPmer, 2002), previous numerical modelling studies (HR Wallingford 1989a, 1989b, 1992, 2002, 2006, 2008), and the ESs produced for NGCT, QEII jetty and No.1 Quay.

5.1.1 Overview of the baseline environment and receptors

Prior to the mid-19th century the Tees estuary was a wide, shallow estuary bordered by extensive wetlands and had tidal ingress for about 44km from the mouth. Since this time, the estuary has undergone substantial anthropogenic changes as the channel was trained, land was reclaimed and the channel deepened to its present depth. The present estuary morphology can be considered to be almost entirely man-made.

The most recent major anthropogenic influence on the Tees estuary has been the construction of the Tees Barrage in the mid-1990s. The barrage (at Blue House Point) has truncated the tidal section (about 16.5km into the former estuary) and has reduced the tidal volume upstream of South Gare by about 7% (ABPmer, 2002).

Anthropogenic activities over the last 150 years have resulted in an estuary that is essentially a narrow ‘canalised’ channel bordered near the estuary mouth by sandy

intertidal areas partly trained by various historic training works. Within this area a remnant of the originally large Seal Sands is divided from the other intertidal areas by Seaton Channel.

As the present study is focused on any changes to the regime of the estuary following the proposed scheme, the baseline conditions considered are taken as the state of the estuary since the construction of the Tees Barrage. Details of the pre-barrage hydrodynamic and sedimentological regimes in the Tees have been described elsewhere (ABPmer, 2002).

Tides and water level

The tide at the mouth of the Tees estuary is observed to be very close to sinusoidal in shape with ranges of 4.6m and 2.3m for mean spring and neap tides respectively (UKHO, 2006). Mean High Water Spring (MHWS) tidal levels at the mouth of the Tees estuary are 5.50m above CD and 2.65m above OD respectively. The other tidal parameters of the estuary mouth are summarised in Table 5.1 (ABPmer, 2002).

Table 5.1 Tidal levels for the Tees estuary

Description	Level (m CD; '+' indicates above CD, '-' indicates below CD)
Highest recorded water level	6.86
Highest astronomical tide	6.10
Mean high water spring tide	5.50
Mean high water neap tide	4.30
Mean sea level	3.20
Mean low water neap tide	2.00
Mean low water spring tide	0.90
Lowest Astronomical Tide	0.00
Lowest recorded water level	-0.38

The variation between the astronomical maximum and minimum and the highest and lowest levels recorded indicate that the level can be strongly influenced by meteorological effects, such as winds, surge and waves.

Fluvial flow

The River Tees has its source about 160km from the sea on Cross Fell in the Pennines and drains a catchment of 1,932km^2. The main freshwater input to the estuary is measured at Low Moor. HR Wallingford (1992) calculated the long term monthly mean flows for the period 1981-88, which ranged from 9m^3/s in summer to 30m^3/s to 40m^3/s in winter. Lewis *et al* (1998), also looked at the flows at Low Moor and presented a long term average flow of 20m^3/s, a maximum recorded flow of 563m^3/s, a minimum of less than 3m^3/s and a 10% exceedence flow of about 47m^3/s.

The fluvial flow is further regulated by the Tees Barrage which is operated to maintain upstream water levels and prevent the upstream penetration of saline water. The flow through the Barrage is, therefore, very unlike the natural flow especially as the flows are no longer continuous.

Density effects

The regulated freshwater flow (as a result of the Barrage) enters the estuary and partially mixes with saline water entering through the estuary mouth. This partial mixing and the associated longitudinal salinity gradient both contribute to a density driven gravitational circulation. This effect is a result of the density changing the vertical profile of the flow such that the ebbing flows are strong at the surface whereas the flooding flows are more evenly spread through depth. In the Tees estuary, under many circumstances this effect becomes dominant such that continuous near-bed upstream (flooding) flows are observed.

Waves

Wave conditions in the Tees estuary are a combination of offshore swell and locally generated wind waves. The direction from which swell can enter the estuary is limited by the North Gare and South Gare breakwaters. The majority of offshore swell in the region has been found to come from a northerly direction (HR Wallingford, 2002).

An analysis of wind speeds observed at South Gare between 1999 and 2005 undertaken as part of the studies for the NGCT (HR Wallingford, 2006) shows the most common winds are from the south-west (210-270^{o}N) but the most common large wind events (> 40 m/s) are from the north.

From the wave climate observed at the waverider buoy north of Tees North Buoy the return periods for significant wave heights were calculated (Table 5.2) (HR Wallingford, 2006).

Table 5.2 Calculated wave return periods at waverider buoy locations

Return period (years)	Significant wave height (Hs (m))
0.1	3.87
1	6.03
10	8.63
50	10.69

Into the estuary, upstream of the ConocoPhillips Dock area, only remnants of the swell wave energy combined with short period local wind waves occur due to the limitation in the penetration of swell waves into the estuary as a result of the North Gare and South Gare breakwaters.

Sediment

In general, suspended sediment concentrations are low within the estuary and within Tees Bay. The highest observed values tend to occur on spring tides. This relationship is not strong, but the extreme values are also attributed to either high rainfall or storm events. In general, the suspended sediment concentrations appear to be dominated by freshwater inputs above Middlesbrough Reach and marine influences further downstream. In the vicinity of the proposed scheme, suspended sediment concentrations are, for the most part, less than 20mg/l with short-term peaks from 40mg/l to 80mg/l. In terms of the tidal sequence, the highest suspended sediment levels occur close to high water. After storm periods, higher concentrations of suspended

sediment have been noted around the Shell Jetty, but with little penetration further up the estuary. On other occasions the reverse has been true, thus the effect of storm events is not consistent within the estuary.

Bed sampling results in the vicinity of the proposed scheme show bed sediments in the area to comprise predominantly (65% to 70%) silt, with some (20%) clay and the remainder sand and gravel (Halcrow, 1991). These observations match the particle size distribution results from bed grabs undertaken in this vicinity for previous studies (Royal Haskoning, 2009).

The sources of material into the estuary system are fluvial inputs coming through the Tees Barrage, material entering from Tees Bay and any industrial inputs. These inputs are in addition to material eroded from the estuary bed. Within the system, the driving forces for sediment transport are the tidal flows, density driven currents, wave induced currents, vessel induced forces and resuspension of material by dredging operations.

5.1.2 Potential environmental issues associated with construction and operation of all options

For the construction phase, the main issue associated with the hydrodynamic and sedimentary regime of the estuary is likely to arise from the capital dredging of the berthing pocket and approach channel to 16.0m bCD and 15.1m bCD respectively. This activity is likely to cause increased turbidity in the water column in the form of a 'plume' of sediment released from the bed and/or overflowing from the dredger. Sediments within this plume would be dispersed by tidal action and ultimately become deposited on the bed elsewhere. Whilst disturbance of seabed sediments would occur during the strengthening works to the quay, this would be a far more local effect and the magnitude of any related plume would be negligible compared with the dredging-related plume.

The dredged material generated during the construction phase may (following consideration of alternative uses) be disposed of at one or more offshore dredged material disposal sites. There are two disposal sites in Tees Bay and the offshore disposal of dredged material may have an effect on the hydrodynamic and sedimentary regime (e.g. effect on tidal currents and sediment transport). However, as both are licensed sites and the quantity of dredged arising under the proposed scheme is of the same order of magnitude as previous disposal activity, it is not envisaged that there would any significant effects on the hydrodynamic and sedimentary regime beyond those previously assessed, and accepted, in licensing of the sites.

For the operational phase, the potential effects of the proposed scheme are considered to be:

- Changes in the estuarine hydrodynamics due to the presence of the proposed quay structure, berth pocket and deepened approach channel (the suspended deck option would be expected to have a more localised effect than the reclamation option, given that the former is an open structure).
- Changes to the sediment regime in the area as a consequence of any changes in the estuarine hydrodynamics, including sedimentation into the dredged berth pocket and approach channel.
- In-combination effects with other projects in the Tees estuary.

The development of a storage facility adjacent to the marine terminal (as shown on Figure 1.1) would require the partial reclamation of Bran Sands Lagoon in order to provide a development platform. The lagoon is connected to the Tees estuary via a pipe which allows controlled tidal exchange between the two bodies of water. The proposed scheme would allow for the continued tidal exchange between the lagoon and the estuary; as such, there would be no significant changes to estuary processes or morphology as a consequence. The impacts on the lagoon due to such reclamation principally would be ornithological, as discussed in Section 5.5. There are also potential impacts on sediment and water quality, as discussed within Section 5.3.

5.1.3 Approach to the EIA for all options

Hydrodynamics

It is proposed that the TELEMAC-3D flow model, set up by HR Wallingford on behalf of PD Ports for the NGCT ES (Royal Haskoning, 2005), will be used to examine the impact of the proposed scheme (including quay structures and the dredged berth pocket and approach channel) on the local flow regime and to show the footprint of any effects.

Existing conditions in the estuary will be used as the baseline. To determine the impacts of the proposed dredging, the existing bathymetry in the berth area and approach channel will be modified to represent the developed scenario. Simulation of the effect of the proposed quay structure will be included by representation of the additional drag force of the piles on the flow (for the suspended deck option) and the presence of the continuous quay face for the reclamation option.

The model will then be run for two tidal/freshwater conditions, namely: (i) spring tide with no freshwater flow; and (ii) neap tide with a high freshwater flow (60 m^3/s flow at the Tees Barrage). These simulations would encompass the variability in the hydrodynamics of the Tees due to the changing balance between the density driven forces (due to freshwater flow) and tidal influence.

For the open, suspended deck structure, with a minor change to the configuration of the shoreline, the baseline wave conditions at the site are unlikely to be significantly affected by the works and no wave modelling is proposed. Wave modelling would be undertaken for the continuous quay face option, as this structure would be likely to result in of wave reflection.

No assessment on hydrodynamics (tidal flows or waves) is deemed necessary for either the possible placement of dredged material in the Bran Sands Lagoon or the offshore disposal of dredged material. This is because the infill of the lagoon would not significantly affect the morphology or processes of the estuary and the offshore disposal sites have previously been licensed for use on the basis of no significant adverse effects on hydrodynamic processes.

Sediment dispersion from dredging

Based on sediment release rates (to be defined when further information is known about dredged sediment types and quantities, dredger vessels and production rates), the SEDPLUME model will be used to demonstrate the fate of fine materials released into the water column during the capital dredging.

Two sets of flow results will be used to drive the SEDPLUME model. The low freshwater flow, spring tide flow simulation will be used to demonstrate the maximum extent of the sediment plume and the high freshwater flow, neap tide conditions will be used to show a minimal dispersion case. Results from this simulation representing footprints of elevated suspended sediment concentrations and deposition arising from the plume will be presented as figures to assist in interpretation of the results.

An assessment of sediment dispersion (or retention) from the offshore disposal sites will be undertaken. The potential for release of sediment into the Tees estuary (e.g. through dewatering of part of Bran Sands Lagoon) will also be assessed and quantified.

Sedimentation

The scale of capital dredging proposed is unlikely to significantly alter the estuary-wide sedimentation regime as it would not significantly change the amount of sediment imported to the Tees from offshore (the largest sediment input). However, it is proposed that a desk-assessment of sedimentation rates at the proposed quay is undertaken. This will be informed by dredged volume data from nearby jetties or berth pockets, and the results will inform the prediction of future maintenance dredging requirements.

5.2 Hydrology, hydrogeology and soils

5.2.1 Overview of the baseline environment and receptors

Topography and surface water

The proposed locations of a materials handling facility at Options 1 and 2, the proposed marine terminal and the related development (comprising the conveyor routes and storage facilities) are low-lying, at elevations of less than 10m Above Ordnance Datum (AOD).

The proposed marine terminal is located on the southern bank of the Tees estuary, adjacent to a number of smaller surface water bodies including ponds, lagoons and drainage channels (as identified on Figure 5.1 and discussed below).

The local area is drained by Dabholm Gut, which is a locally important, tidally influenced drainage channel whose catchment includes the Wilton Estate. It is a partly culverted, partly canalised channel 1.35km long, with a weir at the end adjacent to the estuary which maintains the level in the Gut above that of the estuary at times when the tide is below the crest level of the weir. Historically this channel received untreated domestic sewage and industrial effluents which were discharged directly into the Tees estuary. Under the WFD, the Environment Agency has classified Dabholm Gut (upstream of the normal tidal limit) as being of moderate ecological status (see Section 5.19). The tidal part of Dabholm Gut is identified under the WFD as the Wilton (Tidal Tees) Area.

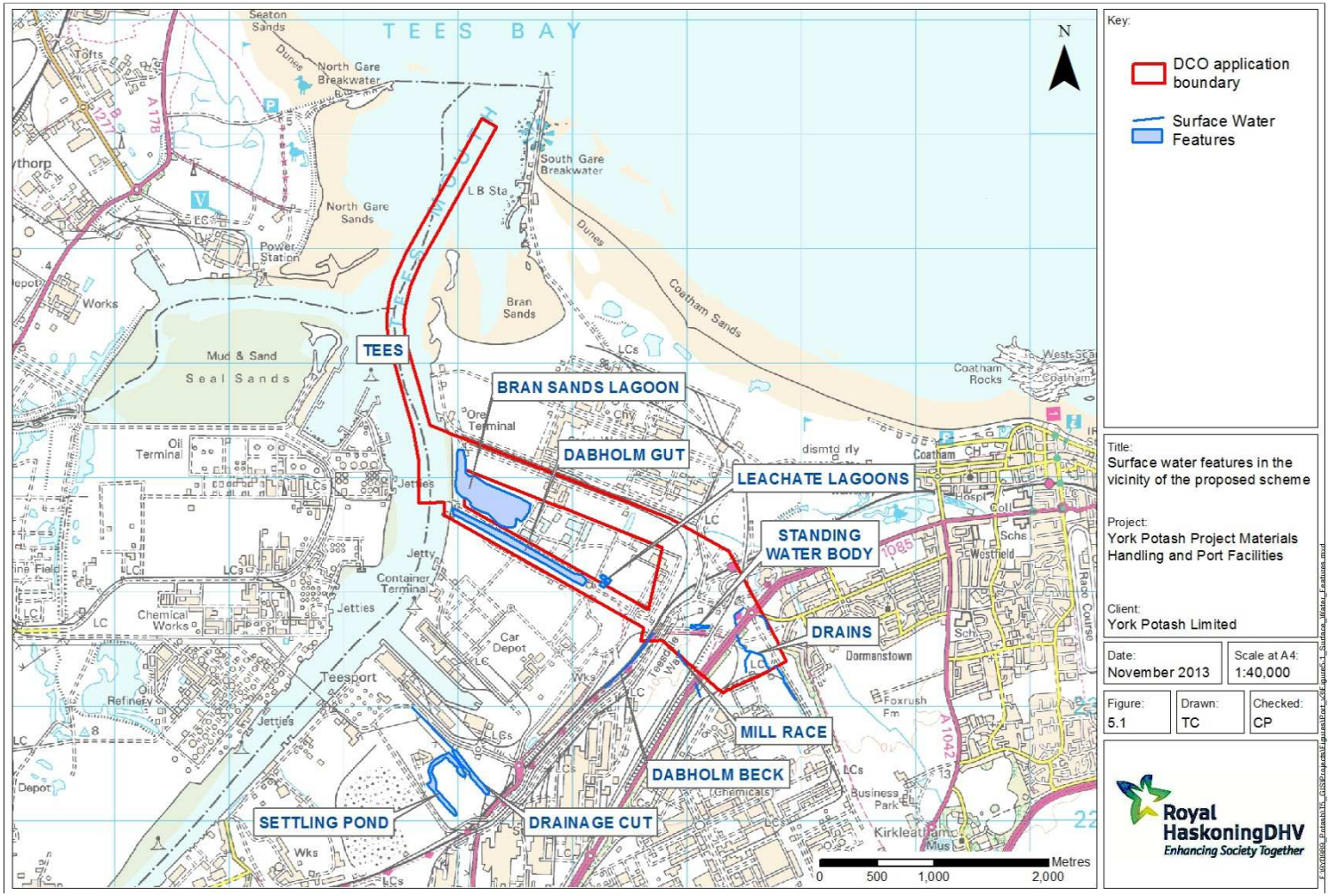


Figure 5.1 Surface waters in the vicinity of the proposed scheme

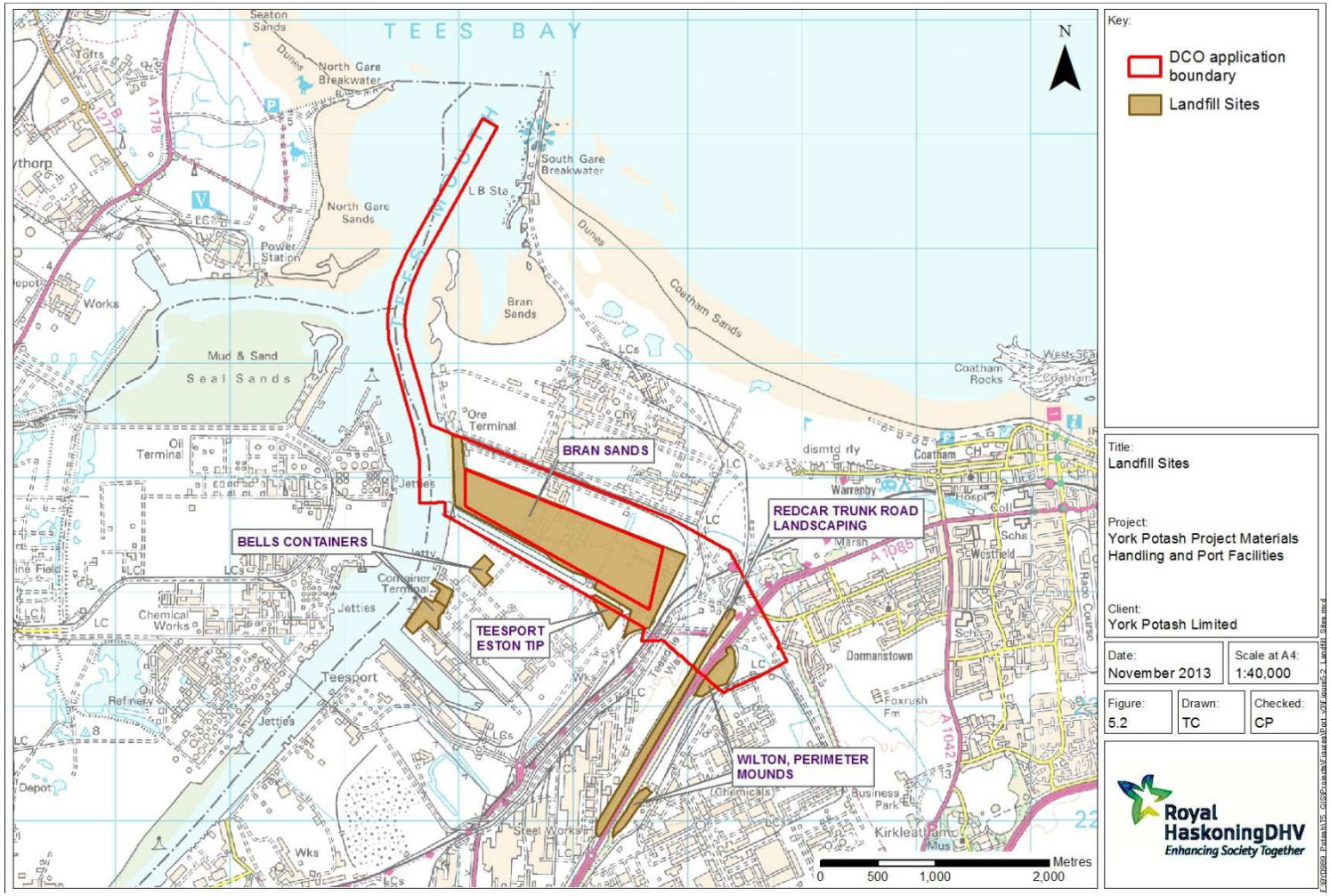


Figure 5.2 Landfill sites in the vicinity of the proposed scheme

With the exception of the Tees estuary, the largest surface water feature in the vicinity of the proposed scheme is the Bran Sands Lagoon. The water level within Bran Sands Lagoon varies due to the presence of an 800mm diameter (approximately) concrete pipe which links the lagoon to the Tees estuary. An additional three smaller un-named lagoons are located approximately 950m further inland from Bran Sands Lagoon. These three smaller lagoons are reported to be leachate collection lagoons (Amec, 2012). It is understood that leachate is pumped from extraction wells within the Bran Sands landfill (illustrated on Figure 5.2) into one of the three leachate collection lagoons and then piped and discharged via an outfall in to the Tees estuary (Amec, 2012).

Dabholm Beck, two drains and the Mill Race are also located in the vicinity of the proposed scheme footprint.

Geology and soil

The geological mapping (British Geological Survey (BGS)), 1:50,000 Series, England and Wales, Sheet 33, Stockton, Solid and Drift Geology, BGS Geology of Britain viewer and BGS borehole logs indicates that the majority of the study area is underlain by made ground deposits, beneath which are superficial deposits. Given the industrial setting and the history of the study area, the made ground deposits are considered to have the potential to be contaminated. Information taken from the BGS Geoindex website describes made ground in the area as 'slag', underlain by superficial deposits at a thickness of around 6m.

The superficial deposits underlying the landside footprint of the marine terminal, the conveyor routes and the materials handling facility options are reported to comprise Tidal Flat deposits. The BGS describes Tidal Flat deposits as sand, silt and clay.

There is a small area of land within the footprint of the conveyor route for Option 3 which is reported to contain no superficial deposits (near to the Tees estuary); here the made ground deposits are likely to directly overlie the bedrock.

The solid geology beneath the footprint of the proposed scheme options comprises mudstone of various ages. Beneath the footprint of all options, the mudstone comprises Mercia Mudstone, the Redcar Mudstone Formation and a narrow band of Penarth Mudstone.

Both the Mercia Mudstone and Penarth Group Mudstone were deposited during the Triassic Period, whilst the Redcar Mudstone Formation was formed during the Jurassic Period.

The location of historic and current landfills in the vicinity of the scheme footprints are indicated in Figure 5.2. Environment Agency mapping indicates that the marine terminal is proposed to be located immediately adjacent to a currently authorised landfill (Bran Sands landfill). The Waste Management Licence (reference EAWML60092) permits the site to accept controlled waste as defined by Section 75 of the Environmental Protection Act 1990 (as amended) including inert waste, general and biodegradable waste, metals, contaminated general wastes, asbestos and mineral wastes from thermal processes. Waste is no longer deposited within the landfill as it has been capped with a composite capping system.

To the south of Bran Sands landfill there is a historic landfill known as Teesport Eston Tip, which was operational from December 1977 to September 1993. Waste deposited in this landfill is likely to be wide ranging, including, inert, industrial, chemical and household wastes. There are also landfill sites to the south east of the Bran Sands landfill site, namely Redcar Trunk Road and Wilton Perimeter Mounds. Waste was received at the Redcar Trunk Road landfill site from September 1977 to August 1979 and the site was licensed to receive inert and industrial waste.

Hydrogeology

Due to the nature of the geology below the proposed scheme footprint, there is little potential for significant quantities of groundwater to be present. The Environment Agency has classified the superficial deposits beneath the proposed scheme footprint as predominantly Secondary (undifferentiated) aquifer, with a small area of Secondary B aquifer within the eastern sections of Options 2 and 3, indicating that the deposits are of relatively low permeability, capable of storing and yielding limited amounts of groundwater. The underlying bedrock has been classified by the Environment Agency as also being Secondary B aquifer, with the exception of the Penarth Group Mudstone, which is defined as a Secondary (undifferentiated) Aquifer.

The vulnerability of the aquifer to pollution will be greatest where the superficial deposits are absent or where they are relatively permeable, for example, where there are sand deposits. In the areas of silt and clay, the vulnerability of the aquifer to pollution will be relatively low.

Under the WFD, the study area is located in the Tees Mercia Mudstone and Redcar Mudstone groundwater body, within the Northumbria River Basin District (see Section 5.20). The current quantitative status of this water body is good and the current qualitative status has been assessed as poor due to the impact on surface water quality and ecological status.

5.2.2 Potential environmental issues associated with construction and operation of all options

The proposed construction of the marine terminal itself would not comprise any landside works beyond the quay and, as such, the potential risk to freshwater, hydrogeology and soils associated with proposed construction of the marine terminal is not predicted to be significant.

There is the potential that construction of the conveyor route, storage building and the materials handling facility (for Options 1 and 2 only) may lead to the release of pollutants associated with the anticipated made ground slag deposits. Such pollutants (if present within the made ground deposits) have the potential to migrate towards, and impact upon, nearby surface water bodies and the underlying groundwater aquifer during the construction phase.

Due to the number of landfill sites adjacent to the footprint of the proposed scheme and the likely presence of made ground deposits, there is the potential for the build-up of landfill / ground gas within any excavations required, which could result in asphyxiation risks to construction workers. There is also the potential for health and safety risks to construction workers associated with dermal contact, inhalation or ingestion of any

contamination which may be present within soils or controlled waters, during excavations or earthworks.

The proposed materials handling facility would require the installation of piled foundations. Piles have the potential to result in the creation of pollution linkages and preferential pathways between geological strata. Such linkages/pathways have the potential to result in the transfer of contaminants into underlying controlled waters (e.g. leachate entering the groundwater body or any perched shallow groundwater).

The chemical composition of the soils/groundwater is currently unknown; however, there is the potential for made ground deposits to contain contaminants. The potential therefore exists for aggressive ground conditions to be present, which could adversely impact upon the composition of construction materials.

The proposed construction of a hardstanding layer (required for the materials handling facility and storage facility) has the potential to influence the existing ground gas regime during the operational phase. The hardstanding would be likely to form an effective near-impermeable gas barrier, which may result in the build-up of ground gas concentrations; such a build-up of gas may cause a significant driving force resulting in the migration of gases.

The proposed scheme requires the construction of a storage area within a currently authorised landfill site (Bran Sands), although it should be noted that the lagoon itself has not historically received waste. In order to construct the storage facility at this location, there would be a requirement to de-water and infill a section of the lagoon in order to create a development platform. Such works could impact upon the hydrological regime and drainage characteristics of the area.

The Bran Sands Lagoon is located adjacent to the operational waste disposal area and little is known at this stage about why the lagoon was excavated. Given its proximity to the waste disposal area, it is considered that there is potential for the sediment within the lagoon and the water itself to be contaminated. Any construction works within the lagoon itself are likely to result in a release of contaminants, which could lead to pollution of surface water and groundwater. The discharge of water from the lagoon also has potential to impact upon water quality within the Tees estuary.

The proposed cut-off wall within the lagoon has the potential to result in the creation of pollution linkages and preferential pathways between geological strata. Such linkages/pathways have the potential to result in the transfer of contaminants into underlying controlled waters (e.g. leachate entering the groundwater body or any perched shallow groundwater).

No other on-going impacts are anticipated during the operational phase with respect to hydrology, hydrogeology and soils.

5.2.3 Approach to the EIA for all options

The works required to construct a new marine terminal would not comprise any landside works beyond the quayside, therefore the risk to soils, groundwater and surface water is not considered to be significant in the context of this scheme component. Therefore, it is proposed that these aspects are scoped out of the EIA process.

The approach to determine the significance of environmental impacts associated with the installation of the conveyor route, materials handling facility and storage facilities will be based on site visits, desk-based review of available data and results of an intrusive investigation (if required). Consultation with RCBC and the Environment Agency will inform the assessment.

A desk based assessment, including a preliminary risk assessment, will be undertaken to assess the likely risks and liabilities associated with the historic and current potentially polluting activities within the footprint of the scheme options, which will involve a review of publicly available information sources, such as:

- historical mapping;
- geological mapping;
- topographical survey data;
- BGS borehole logs and groundwater level data;
- any previous site investigation data obtained from the local authority and the Environment Agency;
- historic and operational landfill information from the Environment Agency; and,
- abstraction licence data and Environmental Permitting Regulation licences from the Environment Agency.

In parallel with the EIA, a Flood Risk Assessment will be undertaken in accordance with guidance set out within the National Planning Policy Framework. This will inform the identification of any required mitigation measures.

Subject to consultation, to inform the ES it may be necessary to undertake a site investigation. This would be designed following review of previous investigations and existing data sets. The results of any additional site investigation will be presented in a Phase 2 site investigation report, which will form an appendix to the ES. This work will be undertaken in accordance with Model Procedures for the *Management of Land Contamination (Contaminated Land Report (CLR) 11)* and will identify potential pollutant linkages through a risk assessment process.

Furthermore, a Water Framework Directive compliance assessment will be undertaken to inform the ES to evaluate whether the proposed development is likely to cause deterioration in the status of any water bodies (see Section 5.19).

5.2.4 Potential mitigation measures for key issues

It is likely that mitigation measures will be implemented through appropriate design and the construction methodology. Relevant guidance published by the Environment Agency and CIRIA will be used to inform the design of mitigation measures, in addition to consultation with key stakeholders. Likely mitigation measures include:

- implementation of health and safety measures, such as appropriate PPE to prevent workers coming into contact with contaminants;
- adoption of best practice pollution prevention measures, including use of bunds around potentially polluting activities, designated areas for refuelling and storage of potentially contaminative substances;
- adherence to a Construction Environmental Management Plan;

- appropriate design of foundations to account for management of groundwater and soil, with particular focus on mitigation of pollution;
- subject to identification of a potential pollutant linkage, completion of a piling risk assessment in line with Environment Agency's guidance, to confirm most appropriate piling methodology;
- installation of ground gas membranes within buildings;
- flood prevention measures and appropriate drainage design; and,
- appropriate siting of stockpiles to prevent potential contamination in made ground or soil leaching to controlled waters, including Dabholm Gut and superficial and bedrock aquifers.

5.3 Marine sediment and water quality

5.3.1 Overview of the baseline environment and receptors

Sediment quality

The Tees estuary has historically received a considerable amount of waste discharges containing contaminants due to the heavily industrialised nature of the surrounding environment. Whilst significant improvements have been made to waste management and wastewater discharges, this legacy remains in areas of estuarine sediments that remain undisturbed. This is less of an issue where sediment is regularly removed, such as within the existing navigational channel.

There have been a number of sediment quality studies undertaken in the Tees estuary over the years which have generally shown decreasing levels of contaminants within the sediments (Tansley, 2003).

Sediment samples were collected as part of the EIA for the NGCT during 2006 (Royal Haskoning, 2006) along the navigation channel (downstream of the Tees Dock area) and within the area proposed for the container terminal. The sediment sampling locations for this survey are presented in Figure 5.3. Overall, the chemical data indicated some level of contamination within the samples recovered, particularly in terms of heavy metals. However, levels were not deemed high enough to prohibit the material from being disposed of to sea. As a result, a licence was issued for disposal of dredged material at the designated offshore disposal sites in Tees Bay.

A sediment quality survey was carried out in December 2008 to characterise the area that is proposed to be dredged as part of the QEII jetty refurbishment project. In consultation with Cefas, it was agreed that vibrocore and surface grab samples would be taken from the proposed dredge area. The vibrocores sampled down to 4m below OD or as deep as the sediment layer went, whichever horizon was reached first. The results from two of the vibrocores (locations shown on Figure 5.3) identified that all metals analysed for (not including dibutyl tin (DBT) and tributyl tin (TBT) were above Action Level 1 (action levels discussed further in Section 5.3.3). There were also a number of samples with concentrations of contaminants which exceeded Action Level 2.

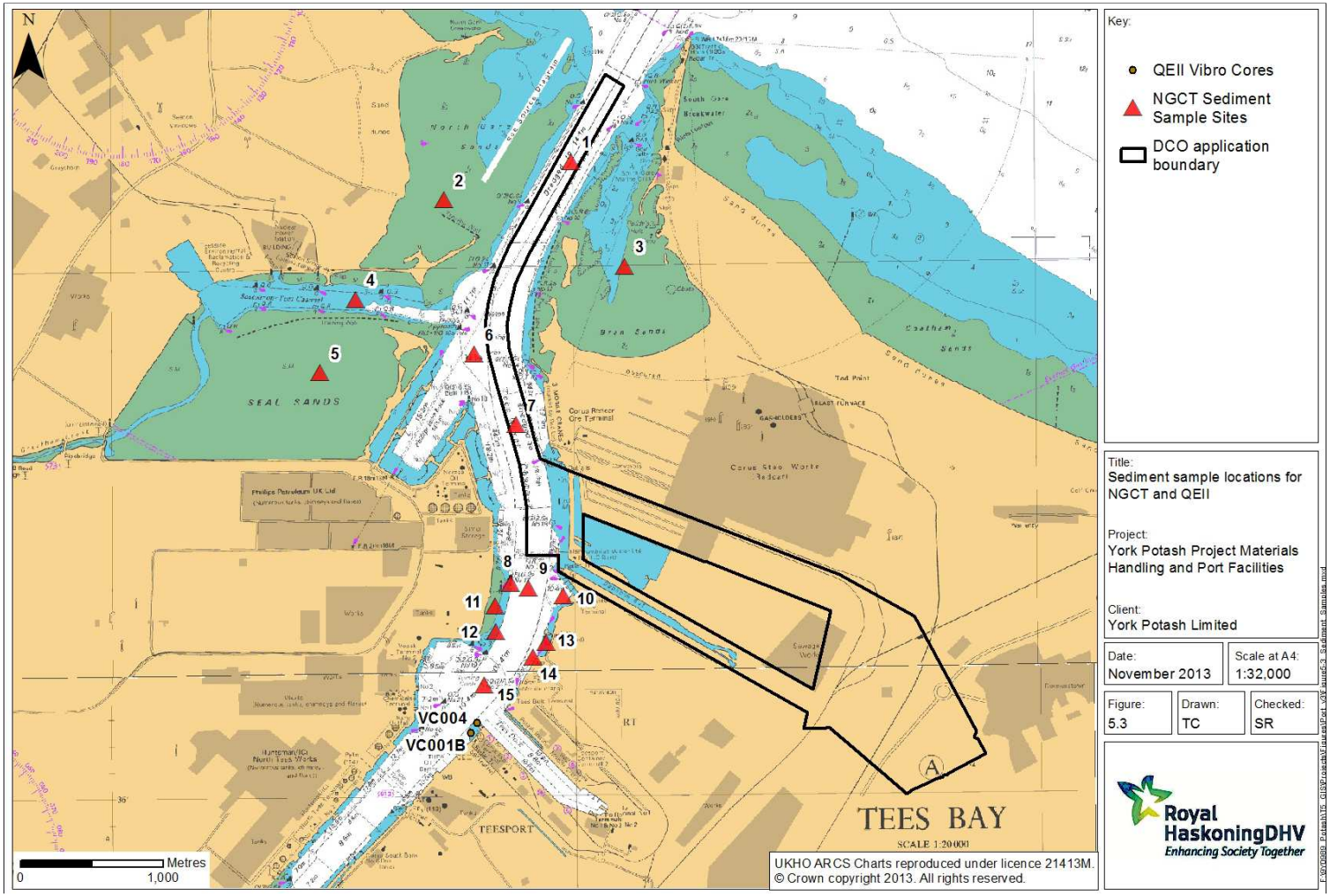


Figure 5.3 Sediment sample locations for the NGCT EIA and QEII Jetty EIA

The data indicated that there was a pattern of increasing contamination with depth in two vibrocores sampled. Only 1 sample recorded any polyaromatic hydrocarbon (PAH) at a concentration which was below Action Level 1. Only the Mercia mudstone constituent of the proposed dredge was licensed for offshore disposal; the overlying unconsolidated material was precluded from disposal at sea and alternative methods of disposal needed to be sought.

There is no existing sediment quality data available for the footprint of the proposed berth pocket at Bran Sands.

Water quality

In terms of water quality, historical data indicates general improvements throughout the estuary particularly in relation to dissolved oxygen concentrations. This is reflected in the high status classification associated with the Tees water body classified under the WFD (see Section 5.19 for more detail on WFD). Dissolved inorganic nitrogen and phenol levels are, however, identified as being at moderate status and therefore the overall classification for physico-chemical supporting elements is moderate.

In terms of chemical status, all contaminants are deemed to be at high status with the exception of tributyltin compounds and, as a result of this failing element, the overall assessment for chemical elements is classified as 'failing'. It is unlikely that there will be any water quality information available for the Bran Sands Lagoon; however, given its proximity to the operational waste disposal area at Bran Sands landfill, it is considered that there is potential for water and sediment within the lagoon to be contaminated (although the connectivity of the lagoon with the Tees estuary would likely result in a certain degree of 'flushing' of the lagoon).

There are designated bathing waters (designated under *The Bathing Waters Directive (76/160/EEC*) to be replaced by *The Revised Bathing Waters Directive (2006/7/EC))* located along the open coast, outside of the estuary. Modelling undertaken for the NGCT, which proposed dredging of 4.8million m^3, did not, however, predict any impacts on the designated bathing waters associated with the dredging plume.

The receptors for this topic are estuarine and marine water quality and areas of seabed where any disturbed sediment may be deposited.

5.3.2 Potential environmental issues associated with construction and operation of all options

Reduced water quality associated with sediment disturbance during dredging and piling

The potential exists for sediment disturbance / re-suspension during dredging of the approach channel and berth pocket at Bran Sands, as well as construction of the marine terminal itself (e.g. through the installation of piles). The disturbance and re-suspension of sediment during such activities has the potential to adversely impact upon water quality within the Tees estuary, due to increased concentrations of suspended solids and release of contaminants adsorbed to sediment (if present) into the water column.

Impact from accidental spillage of oils, fuels and chemicals from vessels during construction and operation

The potential exists for the construction and operational phases of the proposed scheme to result in potential spillages or leakages of substances (e.g. fuels, the product, oils, etc.) which would adversely impact upon water and sediment quality.

Reduced water quality during disposal activities

Disposal of dredged material at the offshore disposal sites would cause a temporary and short lived increase in turbidity in the water column. Tees Bay A and Tees Bay C are both licensed offshore disposal locations.

Simulations were undertaken for disposal activities over an entire spring-neap tide cycle at both the maintenance disposal site (Tees Bay A) and the capital disposal site (Tees Bay C) as part of the EIA for the NGCT. The modelling predicted that dispersion under calm conditions is limited, with most fines remaining close to the point of disposal. Concentrations were predicted to increase by approximately 5mg/l within an area 2km from the boundary of the disposal area. No peak deposition depths greater than 1mm were predicted outside the boundary of the disposal area during the simulation.

The NGCT EIA concluded that, in the context of the existing disposal of maintenance dredging, the effect of the disposal of fine material at the disposal sites is of minor significance. The capital dredging was predicted to result in far lower rates of introduction of fines to the disposal sites than occurs during maintenance dredging. Therefore, the physical effects of the material disposed at the site during capital dredging will be lower. There would be some short-term build-up of fine sandy sediment and it was predicted that this would be dispersed over time. Some longer term accumulation of coarser sediments arising from the dredging of stiff clay was also predicted to occur on the seabed.

The partial reclamation of Bran Sands Lagoon would require the lagoon to be partially de-watered through the placement of infill material. Water from within the proposed reclamation area effectively would be forced through the existing outfall pipe into the Tees estuary. As mentioned within Section 5.3.1, it is considered likely that the water quality of the lagoon may be contaminated given the proximity of the lagoon to the waste disposal area at Bran Sands landfill site (potential migration of leachable contaminants from the landfill into the lagoon). Such disposal of water from the lagoon into the estuary could, therefore, impact upon water quality within the estuary. The Bran Sands Lagoon is hydraulically connected to the Tees estuary via an approximately 800mm diameter pipe (discussed further within Section 5.14). This pipe allows limited tidal exchange of the water level; and the lagoon level does not vary by the full tidal range. Impacts of discharging water from Bran Sands Lagoon during the proposed reclamation associated with all options will be considered within the EIA.

Increased suspended sediment concentration due to maintenance dredging

During the operational phase, maintenance dredging at the berth would be required to maintain the advertised dredge depth. Such maintenance dredging is likely to lead to an increase in suspended sediment concentration. It is anticipated that this would be included within PD Port's wider maintenance dredge campaigns.

5.3.3 Approach to EIA for all options

Due to the lack of site-specific sediment quality data and the undisturbed nature of the seabed at the location of the proposed berth pocket, it is proposed that sediment samples will be collected both at the surface and at depth at this location. It is also proposed that sediment samples are recovered at depth and at the surface along the proposed approach channel (where dredging is envisaged). The sampling sites and parameters to be analysed will be agreed with Cefas and the MMO.

It is proposed that the sediment samples will be analysed for the following parameters:

- organic matter content;
- particle size analysis;
- metals (arsenic, mercury, cadmium, chromium, copper, nickel, lead and zinc);
- polychlorinated biphenyls;
- polyaromatic hydrocarbons;
- total petroleum hydrocarbons;
- TBT and DBT; and,
- organochlorine pesticides.

The data will then be compared to two sets of standards that are available to inform the impact assessment, namely:

- Cefas Guideline Action Levels for the disposal of dredged material (Cefas, undated); and,
- Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME, 2002).

For the assessment of water quality impacts, a desk-based study will be undertaken using existing information to characterise the baseline environment. The Environment Agency is likely to hold water quality data which can feed into this section. The potential impacts both during construction and operation will be assessed in relation to the existing environment and the potential for exceeding Environmental Quality Standards (EQS).

The numerical modelling (see Section 5.1) and any existing sediment survey data for the material to be dredged will inform this assessment.

5.3.4 Potential mitigation measures for key issues

The main form of mitigation to limit sediment plume generation due to dredging is achieved through the selection of the dredging method. The use of an enclosed backhoe dredger is the most acceptable method as this would result in a significantly lower release rate of sediment to the water column compared with, for example, a cutter suction dredger or trailing suction hopper dredger. The selection of an appropriate dredging method is a combination of technical, economic and environmental factors and these will be explored during the EIA process.

It is considered that impacts to water quality from spillages or leakages of product, fuels, oils and construction materials (e.g. concrete) could be effectively mitigated by ensuring

a spill kit is kept on site. PD Ports is also a spill responder for the Tees estuary and, as such, there are plans in place to ensure spillages or leakages can be rapidly and effectively managed.

The risk of reducing the water quality of the Tees estuary by discharging water into the estuary from the Bran Sands Lagoon (in order to partially reclaim the lagoon) could be reduced by incorporating best practice measures into a dewatering operation (e.g. use of settlement tanks and appropriate disposal of sediment to a licenced waste management facility). This will be examined in more detail within the EIA.

5.4 Marine ecology

5.4.1 Overview of the baseline environment and receptors

The Tees estuary comprises intertidal sand and mudflats, rocky shore, saltmarsh and sand dunes. The estuary has been significantly modified over the last 150 years by activities such as land-claim, construction of breakwaters and training walls. Over 80% of the intertidal sedimentary habitats of the Tees estuary have been reclaimed over this period.

Benthic invertebrates and habitat

The remaining intertidal areas in the estuary are composed of mud and sand, with mats of *Enteromorpha* sp. on sheltered mudflats (notably at Seal Sands). The strand-line and foreshores of North and South Gare (either side of the estuary mouth) and the mudflats of Seal Sands and Bran Sands are backed by their respective dune systems and series of open wet grasslands at Seaton Common and on Cowpen Marsh.

As with intertidal habitats, the subtidal environment is heavily modified with extensive areas subject to regular dredging and sediment removal. Analysis of macrobenthic data from the Tees estuary suggests that between 1979 and 2001 there was a trend of increasing biological diversity of infaunal invertebrates, with less domination by opportunistic species and some sensitive species starting to become present (NMMP, 2004). This change reflects the improvements in water quality in the last 20 years. It is considered, however, that the subtidal benthic communities within the navigation channel and existing berth pockets along the banks of the Tees estuary will be representative of highly disturbed conditions as a result of frequent maintenance dredging.

There is no recent baseline data with regard to the benthic invertebrate community or condition of habitat within the development footprint for the proposed scheme.

Saltmarsh

Greatham Creek has well developed saltmarsh and is the only extensive example of this habitat between the Humber Estuary and Lindisfarne. A managed realignment scheme is underway with the objective of creating 22ha of intertidal habitat (mudflat and saltmarsh) along Greatham Creek.

All of the above locations have been recognised for their conservation value through national and international designations. The designated sites within the study area (Figure 5.4) are:

- Teesmouth and Cleveland Coast SPA and Ramsar site;
- Tees and Hartlepool Foreshore and Wetlands SSSI;
- Teesmouth National Nature Reserve (NNR);
- Seal Sands SSSI;
- Cowpen Marsh SSSI;
- Redcar Rocks SSSI;
- Seaton Dunes and Common SSSI; and,
- South Gare and Coatham Sands SSSI.

Marine mammals

Seal Sands is an important haul-out site for both common (harbour) seals (*Phoca vitulina)* and grey seals (*Halichoerus grypus*), and is also the only breeding site for common seals on the east coast between the Wash and the Tay. Both the common seal and grey seal are listed as vulnerable under the EC Habitats Directive. INCA has been monitoring the seal population at Seal Sands since 1989, with the most intensive monitoring being undertaken during the common seal pupping season (between early June and late August).

Figure 5.5 shows the key haul out sites used by marine mammals at Seal Sands. Site 'A', 'B', 'E' and 'The Wall' are used mainly by common seals, while Site 'D' is used by grey seals. Site 'C' and 'The Spit' are used by both species (INCA, 2012).

The 2012 season saw the birth of 18 pups, which continues the upwards trend in pup births which has been evident in recent years. The result from 2012 is the highest number observed to date.

In 2012, a maximum daily number of 88 common seals were counted on 11 August. These were divided across Greatham Creek and Seal Sands. This is the highest daily maximum recorded since monitoring began in 1989 and represents an 11% increase on the previous year.

This section does not cover the baseline environment with regard to birds or fisheries, which are covered separately within Section 5.5 and 5.7 respectively.

5.4.2 Potential environmental issues associated with construction and operation of all options

Direct loss of benthic habitat as a result of capital dredging and piling

The dredging required to deepen the approach channel and create a berth pocket would result in the direct loss of benthic community within the footprint of the dredging. This does not represent a habitat loss but, in the short term, the benthic community would be removed from within the dredged areas. A total dredge volume of 1.05 million m^3 is anticipated for the proposed scheme, with 250,000m^3 of material removed from the berth pocket and 800,000m^3 dredged from the approach channel. The benthic habitat within the dredge footprint for the berth pocket is likely to be relatively undisturbed, given that the area is not subject to regular disturbance from maintenance dredging.

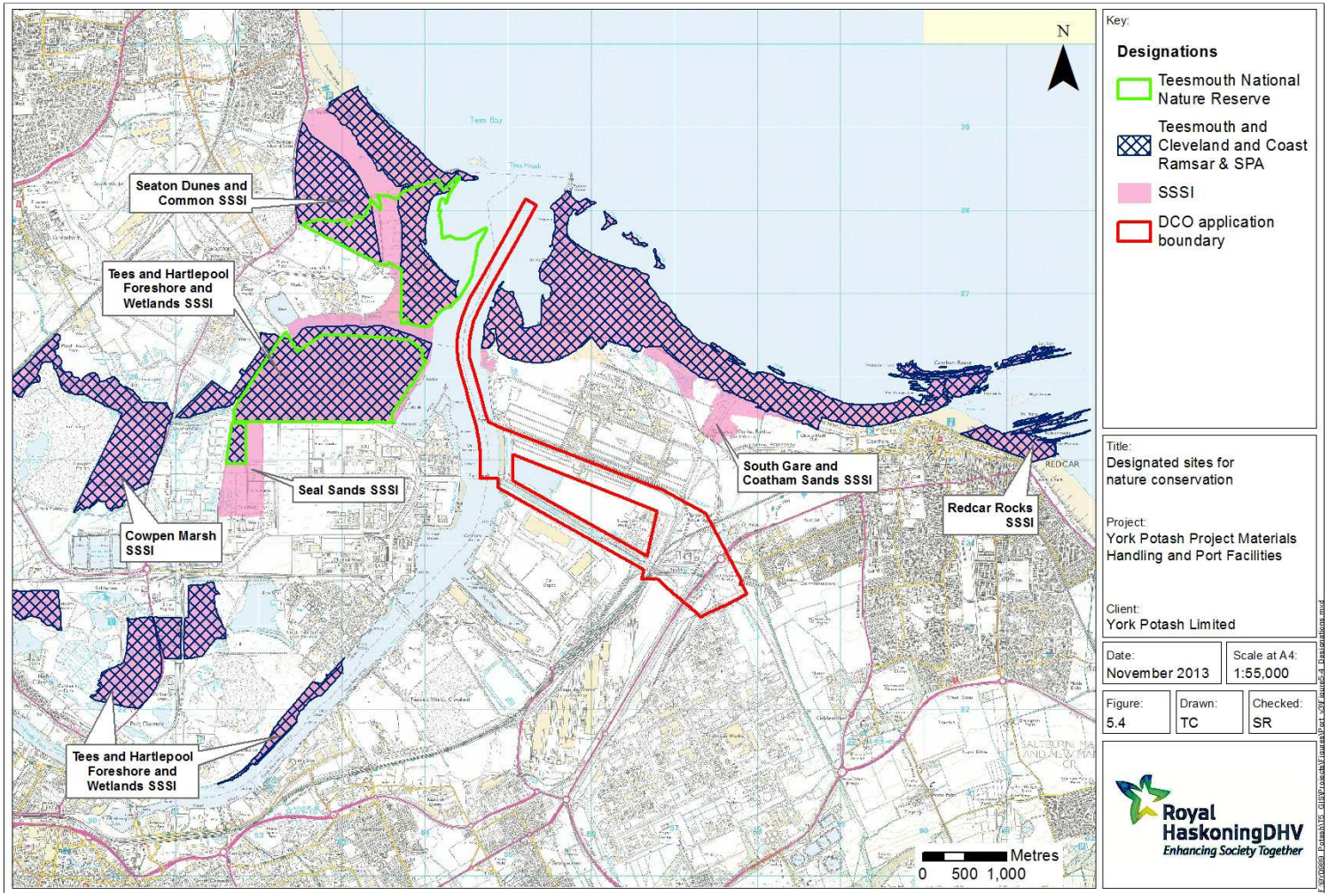


Figure 5.4 Environmentally designated sites in the vicinity of the proposed port facility

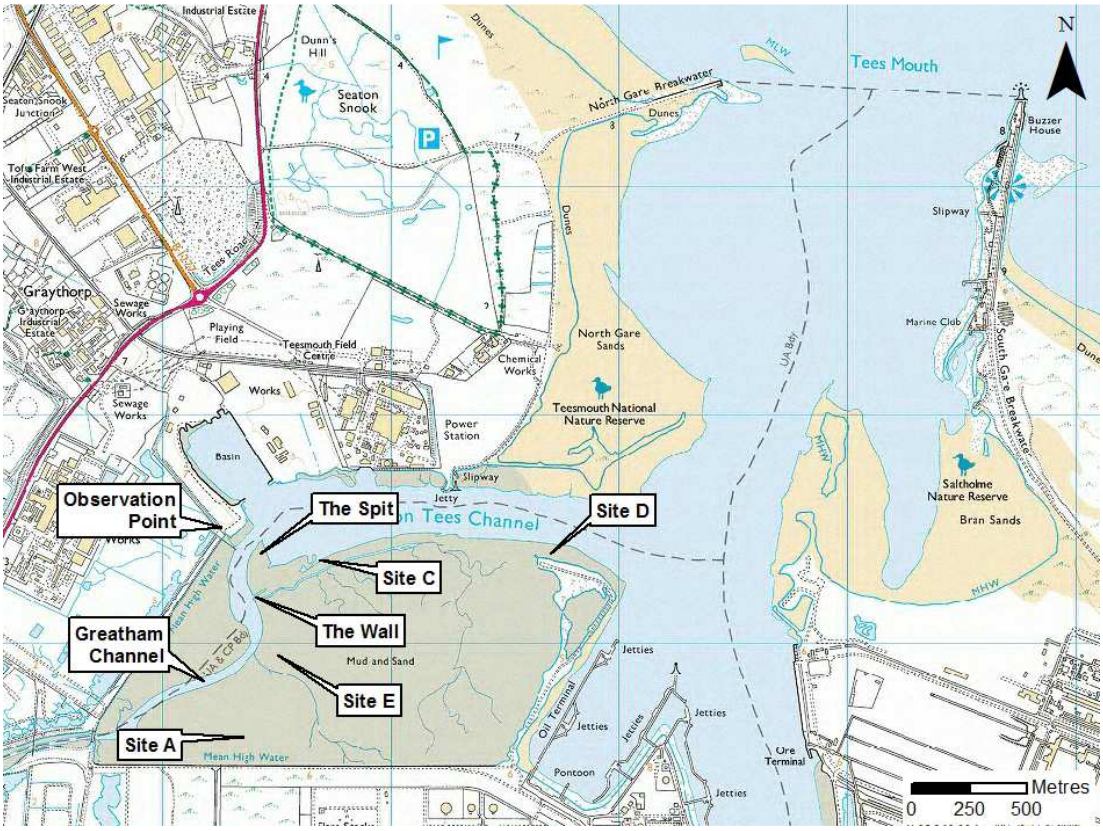


Figure 5.5 Location of seal haul out sites on Seal Sands

For the suspended deck quay option, the installation of approximately 500 tubular piles (with a diameter of approximately 914mm) for the construction of the marine terminal would result in the direct loss of approximately 330m^2 of benthic habitat. The reclamation option would result in the loss of approximately 4 to 5ha of seabed.

Direct loss of benthic habitat within Bran Sands Lagoon due to reclamation

The reclamation of Bran Sands Lagoon would result in the direct loss of benthic habitat. The quality of the habitat within the lagoon is currently unknown; however, the lagoon is not dredged by PD Ports and, as such, the habitat will not have been subject to regular disturbance.

Potential impacts on marine ecology from increased (potentially contaminated) total suspended sediment during dredging and deposition following dredging

An increase in the total suspended sediment (TSS) concentration in the water column would increase turbidity and reduce the depth of water that light can penetrate and, therefore, the amount of light available for primary production by phytoplankton and marine algae.

The release of sediment into the water column could potentially affect the dissolved oxygen concentrations, particularly during the summer months. This is due to an increase in inorganic matter and nutrients in the water column leading to increased biological oxygen demand. Sediment would disperse from the dredge location and

settle onto the seabed elsewhere, potentially affecting ecology of the water column and the seabed at the locations where sediment settles out of suspension. Dredging is also likely to release contaminants that may be bound to seabed sediments into the water column, making them available for uptake by marine organisms.

Any significant increase in TSS in the water column is likely to be relatively restricted to the location of the dredging activity, with the volume of sediment released into the water column being influenced by the dredging method employed. Beyond the immediate vicinity of the dredging, dispersion and dilution of the sediment plume would occur and any increase in TSS would be less significant than at the dredge site.

Capital dredging is a temporary activity which (based on previous modelling assessments within the Tees) is unlikely to have a prolonged effect on suspended sediment concentrations. However, this effect will be considered fully within the EIA.

Impact from accidental spillage of oils, fuels and chemicals from vessels

The potential exists for the construction and operational phases of the proposed scheme to result in potential spillages or leakages of substances (e.g. fuels, product, oils, etc.) to impact on marine ecology, and in extreme cases, could lead to death of marine organisms.

Noise and vibration disturbance to marine ecological receptors

It is known that the Tees estuary is used by marine mammals, including common seals and grey seals. Marine mammals have potential to be disturbed / injured (or in extreme cases killed) as a result of underwater noise and vibration. Such noise and vibration disturbance is likely to be generated during piling and dredging activities, required as part of the proposed scheme regardless of which option is adopted for the quay construction.

Fish and seals are the species most likely to be impacted by underwater noise in the Tees; however, both are highly mobile and will tend to avoid such disturbance. Given that the Tees Estuary is an industrialised environment, with high levels of shipping and construction along its banks, it is considered that there will be significant existing underwater noise. As such, the underwater noise generated during the construction phase is considered unlikely to result in an unacceptable risk to marine ecology; however this will be assessed fully within the ES.

There is also potential for noise disturbance during the operational phase, however, given the existing volume of shipping traffic within the Tees estuary, the operational phase is considered unlikely to significantly disturb marine mammals. Such impacts will be considered within the EIA.

Smothering of benthic habitat due to disposal of dredged material

Dredged material is proposed to be disposed of within licensed offshore disposal sites. Given that the disposal sites are licenced to accept dredged material, no unacceptable ecological impacts are anticipated from the offshore disposal of dredged material.

An impact of minor significance was anticipated with regard to the disposal of fine material from the NGCT scheme at offshore disposal sites (a much larger volume of material was proposed for offshore disposal for that scheme than the currently proposed scheme). The ES for the NGCT scheme also concluded that capital dredging will result in far lower rates of introduction of fines to the disposal sites than occurs during maintenance dredging. Therefore, the physical effects of the material disposed at the site during capital dredging were considered to be lower. It was predicted that there would be some short-term build-up of fine sandy sediment and this would be dispersed over time. Some longer term accumulation of coarser sediments arising from the dredging of stiff clay will occur on the seabed.

Based on the previous assessments, it is considered that offshore disposal of capital dredged material is unlikely to result in an unacceptable impact; however, this will be considered within the EIA.

5.4.3 Approach to EIA for all options

Benthic invertebrate surveys were undertaken as part of the EIAs for the NGCT and the QEII jetty development, and this information is contextually relevant. However, additional targeted survey is likely to be required to supplement and update the existing dataset, and survey of the benthic habitat within the Bran Sands lagoon may also be required. The scope of the surveys will be agreed with the relevant bodies (e.g. Natural England, Cefas, the MMO and the Environment Agency) and is likely to comprise benthic grab sampling and epibenthic beam trawl surveys. The results of such additional sampling will be used to inform the EIA for this section of the ES.

The EIA will consider any impacts upon local wildlife sites in the area; these sites will be identified through consultation with the Tees Valley Wildlife Trust. The EIA will also assess the impacts of the proposals on habitat and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List, published under the requirements of Section 41 of *The Natural Environment and Rural Communities Act, 2006.*

The results of the hydrodynamic and sedimentary assessment will also inform this section of the EIA, particularly the prediction of sediment plume dispersion during capital dredging.

This aspect of the EIA will also inform a WFD compliance assessment, which will be reported as a separate section of the ES.

5.4.4 Potential mitigation measures for key issues

Measures to mitigate the direct loss of benthic habitat are limited, as this is an unavoidable consequence of the works. In order to minimise the impact on the existing benthic habitat, the disturbance footprint will be minimised as far as possible, within the constraints of the infrastructure engineering and operability.

As part of the EIA, a benthic survey is proposed within the footprint of the proposed works. The results from this survey will inform the need or otherwise for specific mitigation measures.

Measures to reduce the impact of underwater noise to marine mammals could include adherence to Joint Nature Conservation Committee (JNCC) protocol regarding minimising risk of injury to marine mammals from piling noise. Measures to manage the risk to marine mammals could include:

- pre-piling search for marine mammals;
- use of acoustic deterrent devices; and,
- use of soft start pile driver where the hammer energy is ramped up over a period of time to allow marine mammals to vacate the area.

The requirement for such mitigation measures will be considered based on the findings of impact assessment.

5.5 Marine and coastal ornithology

5.5.1 Overview of the baseline environment and receptors

Although heavily developed for industry, the Tees estuary retains large areas of important habitats (intertidal mud and sand flats, saltmarsh, sand dunes, rocky shore and freshwater marsh) that support a diverse range of bird species. The main ornithological features of interest are the large numbers of waders and wildfowl that use the estuary outside of the breeding season, either for wintering or on passage, and the use of certain areas by breeding little and sandwich terns and shelduck, the latter of which can be found nesting in Bran Sands Lagoon (Geoff Barber, INCA, *pers. comm.* June 2013).

Designated conservation sites

There are a number of sites within the Tees estuary that are designated (either in whole or in part) for marine and coastal waterbird interests under national and international legislation. Those considered relevant to the proposed port options are presented in Table 5.3 and illustrated in Figure 5.4.

Table 5.3 Designated sites of ornithological interest relative to the proposed port options

Designated site	Distance from marine terminal
South Gare and Coatham Sands SSSI	0.7km
Teesmouth and Cleveland Coast SAC and Ramsar site	1km
Seal Sands SSSI	1.2km
Teesmouth NNR	1.3km
Seaton Dunes and Common SSSI	1.3km
Tees and Hartlepool Foreshore and Wetlands SSSI	3km
Cowpen Marsh SSSI	4km
Redcar Rocks SSSI	5.5km

Wetland Bird Survey (WeBS) data

Data from WeBS are routinely used when assessing the ornithological interest of estuarine areas potentially affected by development. WeBS Core Count data concentrates primarily on the winter period, but at selected sites (including the Tees

estuary), counts are made once per month throughout the year. Counts are usually made at high tide when birds are most easily counted at roosts. Low tide counts are conducted at most large estuaries at least one winter every six years, with up to four counts being made through the period November to February. Low tide counts are designed to complement the estuarine Core Count data and are principally concerned with illustrating bird distributions, allowing the identification of those parts of estuaries, inlets or bays which are important for birds (BTO, 2010).

A number of WeBS Core Count and low tide count sectors are located in close proximity to the proposed scheme footprint, including (see Figure 5.6 and 5.7 for the location of count sectors):

- Core Count sectors
  - Tees estuary (52901) (not shown on Figure 5.6).
  - Tees south (52407) (not shown on Figure 5.6).
  - Peninsular East (52424).
  - Tees estuary opposite Smiths Dock and Hargreaves Quarry (52426).
  - Bran Sands South (52427).

- Low tide count sectors:
  - DT021.
  - DT020.
  - DT011.
  - DT022.

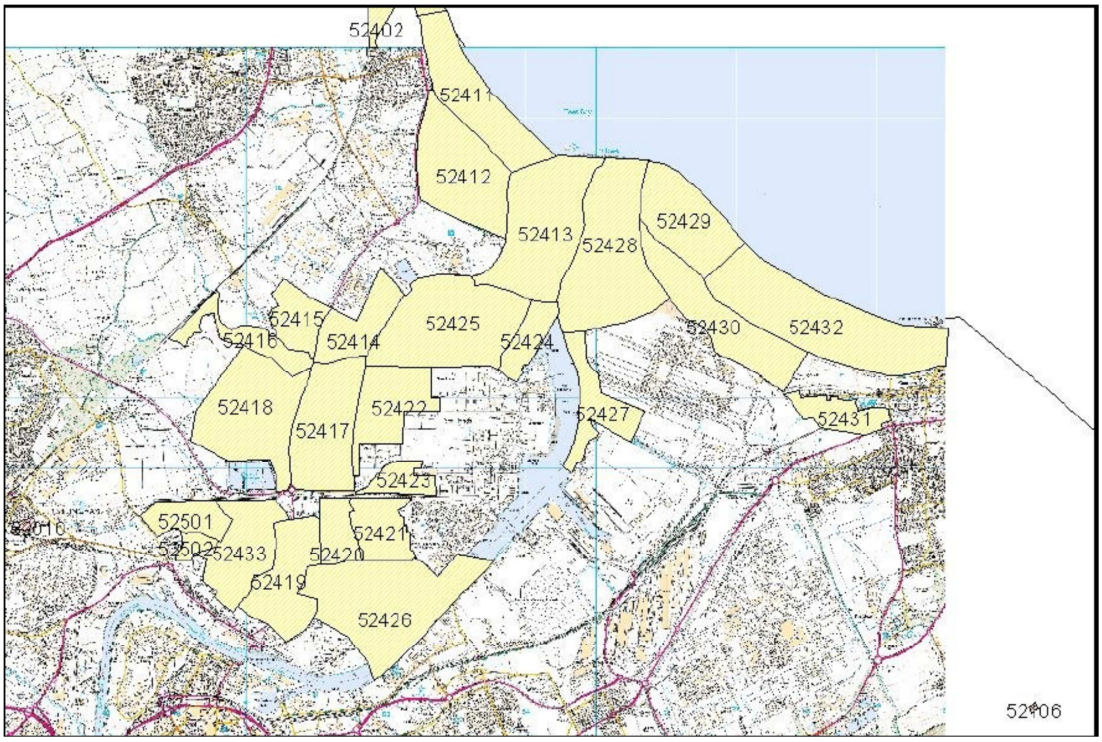


Figure 5.6 WeBS Core Count Sectors within and around the Tees estuary

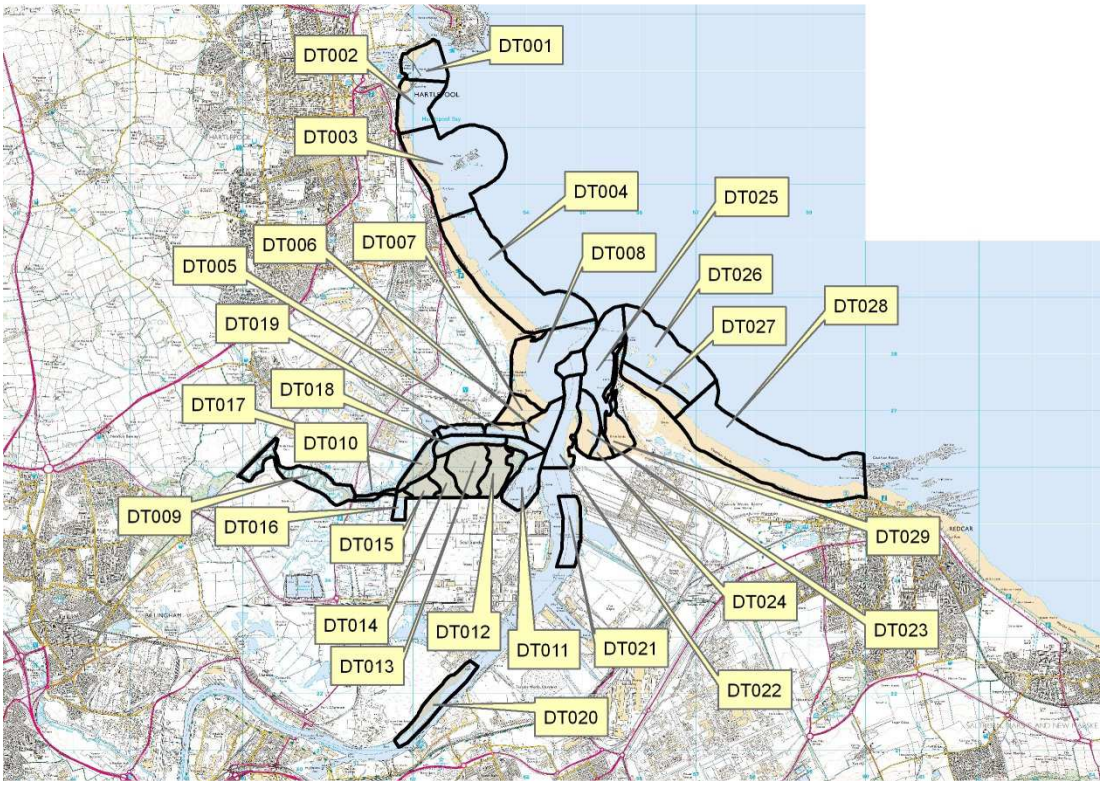


Figure 5.7 WeBS Low Tide Count Sectors within and around the Tees estuary

Dabholm Gut and Bran Sands Lagoon

It is understood that Dabholm Gut and Bran Sands Lagoon are both used by waterbirds and that at certain times of the year significant numbers of birds can these areas.

Teesport Estate

Bird surveys were undertaken by INCA in 2010 for intertidal and river banks to the immediate north and south of Tees Dock entrance. No birds, including those notified for designated areas, were observed within the area being surveyed. However, notified birds were observed at other locations within the estuary at the same time the surveys were undertaken (Royal Haskoning, 2012).

Vopak foreshore

Counts of waterbirds using the Vopak foreshore (approximately 650m from the footprint of the proposed marine terminal, on the opposite bank of the estuary) were undertaken for the NGCT studies (Royal Haskoning, 2006, 2007). The surveys concluded that the Vopak foreshore was not considered to be of major importance as a feeding area for birds on the estuary; however, the area was considered to be of local ecological significance for wintering/passage wildfowl and waders.

Breeding birds

As part of the NGCT EIA, a breeding bird survey was conducted on the Teesport Estate by ESL (ESL, 2005). It was concluded that the site had limited interest for breeding birds. The potential interest identified as part of the studies for the NGCT ES relates to the wider Teesport estate, away from the hardstanding areas of Tees Dock. Overall, it was concluded that the breeding bird community at the site was of low significance.

5.5.2 Potential environmental issues associated with construction and operation of all options

The dredging required for the proposed scheme has the potential to affect food resources for birds, in particular terns, through increased total suspended sediment concentrations within the water column of the Tees estuary. Consequently, there is potential for adverse impacts to terns which feed within Tees Bay and near the mouth of the estuary. Intertidal food resource also has the potential to be affected through the deposition of fine sediment disturbed by dredging.

As stated in Section 5.5.1, Bran Sands Lagoon is used for nesting by shelduck and also by other birds species for roosting. The placement of dredged material to partially reclaim the lagoon, therefore, would result in a reduction of available habitat known to support waterbird populations. The piling (and other construction activities) required as part of the proposed scheme could result in an indirect potential impact as a result of noise, vibration and visual disturbance.

The potential operational impacts, in particular noise and visual disturbance arising from materials handling activities, product transfer and ship loading have the potential to indirectly impact upon waterbirds.

During the operational phase, there is likely to be an increased maintenance dredge requirement which has potential to indirectly affect the morphology of intertidal areas used by waterbirds.

Disturbance to feeding and roosting waterbirds could potentially occur due to shipping activity during the operational phase. Shipping activity can disturb waterbirds in two main ways; firstly, through noise generated by the vessels and the port operation and, secondly, due to shipwash. However, no significant impacts are predicted given the existing shipping activity in the estuary and the control measures already in place.

5.5.3 Approach to EIA for all options

It is proposed that the waterbird interest of the study area is defined by collating and analysing available information, to include including WeBS data (all Core Count and Low Tide Count Sectors identified in Section 5.5.1), Teesmouth Bird Club data and data collected from specific counts undertaken of Bran Sands Lagoon, Dabholm Gut and the VOPAK foreshore.

It is proposed that the TELEMAC-3D flow model will be used to predict effects on the flow regime. In addition, sediment dispersion modelling will be undertaken to demonstrate the fate of sediment released into the water column during the capital dredging (see Section 5.1.5). This modelling work will be used to predict the effects of the proposed scheme on intertidal morphology that support waders and wildfowl and to

understand how food resource for waterbirds could be affected through deposition of fine sediment.

The potential impact of noise and vibration on waterbird populations will be assessed and this aspect will be informed by the noise and vibration assessment undertaken as part of the EIA process.

Consultation will be undertaken with Natural England to confirm the approach to be taken to this aspect of the assessment.

5.5.4 Potential mitigation measures for key issues

The EIA will determine the requirement for the implementation of mitigation measures to reduce the significance of any impacts on marine and coastal ornithology. If it is determined that significant impacts have the potential to arise, the following mitigation measures may reduce their significance to an acceptable level (however this will be investigated during the EIA):

- Switching on machinery only when necessary, and shut down when not in use to avoid unnecessary noise disturbance.
- Construction plant machinery should be chosen to be as quiet as possible where appropriate.
- Machinery should be sensitivity sited and well maintained to reduce noise disturbance as much as possible.

5.6 Terrestrial ecology

5.6.1 Overview of the baseline environment and receptors

Designated sites

The proposed scheme footprints are not located within the boundary of a statutory or non-statutory designated nature conservation site. However there are a number of environmentally designated sites for nature conservation within 5km of the proposed scheme footprints (see Figure 5.4), namely:

- Teesmouth and Cleveland Coast SPA.
- Teesmouth and Cleveland Coast Ramsar site.
- Seal Sands SSSI.
- Seaton Dunes and Common SSSI.
- South Gare and Coatham Sands SSSI.
- Redcar Rocks SSSI.
- Tees and Hartlepool Foreshore and Wetlands SSSI.
- Cowpen Marsh SSSI.
- Teesmouth NNR.

Habitat in the vicinity of Option 1

The materials handling facility associated with Option 1 is proposed to be located on land predominantly occupied by numerous mounds of ore associated with the Redcar Bulk Terminal, located downstream of the proposed marine terminal at Bran Sands.

The area also contains conveyor systems to transport material to the ore terminal, as well as electricity pylons.

The proposed footprint of the materials handling facility for Option 1 is located directly adjacent to the Bran Sands Lagoon. The Bran Sands Lagoon is bounded by a water treatment works and a landfill site to the east and the Tees estuary to the west. Several ponds are present approximately 100m further to the east.

Habitat in the vicinity of Option 2

The materials handling facility associated with Option 2 is proposed to be located on land occupied by two different land uses. The western half of the proposed materials handling footprint is predominantly occupied by mounds of ore and a conveyor, with grassland and scrub vegetation present in the eastern half. An unnamed deep water pond is present in between these two differing land uses.

Habitat in the vicinity of Option 3

The conveyor route from the materials handling facility at Wilton to the marine terminal at Bran Sands is largely comprised of grassland / scrub vegetation and hardstanding. A number of surface water bodies are present within the vicinity of the proposed conveyor route, including Dabholm Gut, Mill Race, leachate lagoons, ICI Ecology Pond and drains.

Overall assessment of habitat within the areas currently being considered for development by YPL

All the areas of land being considered as options by YPL have been visited by Geoff Barber, an experienced ecologist at INCA. Most of these areas were visited during the peak season of June and July 2013, however, the two parcels of land within the footprints of Option 1 and Option 2 were visited in November 2013.

Geoff Barber has visited these sites on numerous occasions over the past twenty years and most of the areas being considered by YPL for development have been visited by Vince Jones, the botanical recorder for the Vice County. INCA undertook a complete Phase 1 habitat survey of the area, incorporating all the options being considered for the current development, in 2011.

On the basis of this experience and previous records it can be stated that none of the habitats surveyed are of ecological significance, being for the most part semi-improved calcareous or mesotrophic grasslands which have lost most of their interest due to becoming overgrown and rank.

Species in the vicinity of all options

Dabholm Gut and Bran Sands Lagoon are both areas that are used by birds that form part of the population of the Teesmouth and Cleveland Coast SPA.

Common lizard has been recorded on Coatham Marsh in places less than 1.5km from parts of the proposed scheme footprint. Otter regularly use the Tees estuary and have been recorded breeding downstream on the river banks downstream of the proposed

scheme footprint. Nesting shelduck are currently being recorded as part of the on-going fortnightly counts being undertaken by INCA.

INCA carried out a great crested newt survey of the deep water pond within the footprint of Option 2 during 2007. Great crested newts were not identified during the 2007 survey.

5.6.2 Potential environmental issues associated with construction and operation of all options

The construction of the materials handling facility, conveyor system and the port facility has the potential to cause direct and indirect disturbance to terrestrial ecology within and adjacent to the footprint of the works, comprising:

- Indirect impacts on designated nature conservation sites, including habitat and species for which it is afforded protection (e.g. noise, presence and lighting disturbance) during construction.
- Indirect (e.g. noise, human presence and lighting disturbance) and direct (injury or death from vehicle of personnel movements) impacts on legally protected species during construction and operation.
- Loss of habitat due to reclamation and land take requirements.
- Noise impacts on overwintering bird populations.

There is potential for the Bran Sands Lagoon to support a range of protected species, including otter. The partial reclamation of the Bran Sands Lagoon would result in the partial loss of habitat which may support protected species.

The potential impacts to bird species that use Bran Sands Lagoon and Dabholm Gut are addressed separately under marine and coastal ornithology (Section 5.5.4).

5.6.3 Approach to EIA for all options

An Extended Phase 1 habitat survey is proposed for the footprint of the proposed scheme. This will broadly follow the Extended Phase 1 methodology as set out in *Guidelines for Baseline Ecological Assessment* (Institute of Environmental Assessment, 1995) and the JNCC Handbook for Phase 1 Habitat Surveys (JNCC, 1990). This survey would provide up-to-date information on the key habitats within the footprint of the proposed scheme and would identify the potential for notable fauna to occur in or adjacent to the proposed working areas. Consultation with INCA has identified that the areas to be directly impacted as a result of the proposed options are not of sufficient botanical interest or habitat scarcity to merit more detailed investigation, such as a Phase 2 National Vegetation Classification (NVC) survey.

Discussions have been held with INCA to identify the likely requirement for surveys of notable fauna in order for these to be undertaken at the appropriate time of year to inform the EIA. In addition to the Extended Phase 1 habitat survey, it is proposed that the following surveys are undertaken within the footprint of the proposed scheme where appropriate (i.e. based on the findings of the Phase 1 survey):

- Reptile survey – common lizard have been recorded on Coatham Marsh in places less than 1.5km from parts of the site.

- Water vole survey – there are historic records of water vole on watercourses in the area but all surveys over the past five years have been negative. INCA is not aware of any water vole survey work being undertaken on the watercourse which bounds the site to the south west.

- Bird survey of the Bran Sands Lagoon and Dabholm Gut - INCA has extensive records of bird use of these waterbodies and that survey work, carried out every two weeks at varying states of the tide and times of day, continues.

- Bird use of the VOPAK Foreshore - any piling work on the river has the potential to disturb birds of the SPA feeding and loafing on this area of intertidal habitat across the river. INCA has extensive records of bird use of these sand and mud banks and that survey work, carried out every two weeks at varying states of the tide and times of day, continues.

- Otter survey - otter regularly use the river and have been recorded breeding on the river banks downstream of this location. There is potential for otter to use Dabholm Gut and Bran Sands lagoon.

- Bat survey - there is some grassland habitat in the area but it is surrounded by saline waterbodies and exposed to the winds of the estuary making it unlikely feeding habitat for bats. Bats have been recorded feeding in the area around Dabholm Beck, Eston Pumping Station Pond and the ICI Ecology Pond along this corridor. There are four modern bridges crossing the corridor which may have some potential for roosting bats. A survey to assess bat roosting potential is proposed.

The nearest known breeding site for great crested newt is over 7km away. However, consultation with INCA has identified that a great crested newt survey should be undertaken at the pond which is located within the footprint of the materials handling facility at Option 2.

Nesting shelduck are currently being recorded as a part of the fortnightly counts which are on-going.

As set out in Section 5.4.3, the EIA will also assess the impacts of the proposals on habitat and/or species listed as 'Habitats and Species of Principal Importance' within the England Biodiversity List, published under the requirements of Section 41 of *The Natural Environment and Rural Communities Act, 2006.*

5.6.4 Potential mitigation measures for key issues

The requirement for mitigation measures to be implemented during the construction and operational phases will largely be dependent on the results of the ecological surveys to be undertaken (they will effectively manage the risk posed by the proposed scheme on terrestrial ecology). Mitigation measures will be identified during the EIA process, but could include:

- Habitat translocation.
- Protected species trapping and translocation.
- Vegetation clearance prior to commencement of bird breeding season.

5.7 Natural fisheries resource

5.7.1 Overview of the baseline environment and receptors

Resident and migratory species

Tees Bay and the Tees estuary provide important habitats for a number of fish species which feed on benthic invertebrates found in subtidal and intertidal sediments. The lower Tees estuary supports many fish, some of which are estuary dependant (e.g. flounder *Platichthys flesus*) and some temporary residents (e.g. plaice *Pleuronectes platessa*), which use the estuary as a nursery ground (Tansley 2003), with herring (*Clupea harengus*) and sprat (*Sprattus sprattus*) also recorded.

Herring and plaice are identified as BAP species and priority species by the grouped plan for commercial marine fish (UK BAP, 2009). Sandeels are also abundant in the local area and although there is no commercial fishery, they are an important food source for bird populations.

Migratory fish species are also present within the Tees estuary, including salmon (*Salmo salar)*, sea trout (*S. trutta)*, and European eel (*Anguilla anguilla)*. Improvements in water quality in recent years have enabled the numbers of salmonids to steadily increase, and the Tees is now recognised as a main salmon river in England and Wales, for which the Tees Salmon Action Plan (SAP) is enforced by the Environment Agency. There are upstream movements of salmon from May onwards through summer to peak movement in September/October, with the downstream smolt run peaking in May.

The river lamprey (*Lampetra fluviatilis)* is found only in Western Europe and is widespread in the UK. Whilst not a true 'fish' (as it is jawless), lamprey are a migratory species which grow to maturity in estuaries and then move into fresh water to spawn in clean rivers and streams. River lampreys enter the Tees estuary to spawn and have been observed at the Tees barrage at Stockton. Sea lampreys have also been recorded within the Tees estuary.

Environment Agency monitoring

The Environment Agency monitors migratory fish numbers for the Tees estuary through the collation of records of salmon and sea trout caught on rod and line. Although the salmon and trout rod catches have generally increased over recent years, the catch is limited in the context of other estuaries. For example, in 2009, 61 salmon were caught in the Tees, compared to 3,735 in total for all north-east rivers, representing a total of less than 2%. Sea trout catches for 2009 in the Tees represented only 1.8% of the total catch in north-east rivers.

Sea fisheries

Sea fisheries out to 6nm from the UK territorial baseline fall under the jurisdiction of the North Eastern Inshore Fisheries and Conservation Authority (NEIFCA). The Environment Agency has responsibility for the management of migratory fisheries for salmon, trout and eels within this area.

Most commercial fishing activity takes place outside of the estuary, although there is a small amount of fishing targeted at lobster (*Homarus gammarus*) and velvet swimming crab (*Necora puber*) in the lower estuary during summer. The digging of lugworms,

ragworms and peeler crabs takes place in the intertidal mud and sandflats of the outer estuary and adjacent coast. Ragworm digging takes place throughout the year but peaks in May and September.

5.7.2 Potential environmental issues associated with construction and operation of all options

Direct uptake and disturbance of fish during dredging

Depending upon the method employed, dredging operations have the potential to result in the uptake of fish eggs, fish, shellfish and the food resources on which they rely, with the potential for direct uptake greatest for demersal fish, such as flatfish. The disturbance caused by the dredge head of a cutter suction dredger or the bucket of a backhoe dredger are likely to cause the majority of fish to move away from the immediate dredge area, thereby avoiding the likelihood of direct uptake. The proposed method of dredging for the proposed scheme has not yet been determined.

The capital dredging required has the potential to indirectly impact on fish species through temporarily increasing total suspended solids concentrations. At high levels and/or for prolonged periods of time, an increase in suspended sediment concentration can impact on fish through clogging of gill lamellae, potentially leading to death, whilst lower concentrations can result in sub-lethal stress or avoidance reactions. Dredging can also release contaminants bound to seabed sediments into the water column, making them available to marine organisms. Contaminants may cause morphological and reproductive changes in shellfish and fish species.

There is potential for the dredging and piling operations to generate underwater noise, which could result in stress/avoidance reactions or, in extreme cases, death.

Impact from accidental spillage of oils, fuels and chemicals from vessels

The potential exists for the construction and operational phases of the proposed scheme to result in potential spillages or leakages of substances (e.g. fuels, product, oils, etc.) which could impact on fish, and in extreme cases, could lead to death of fish species.

Potential impact on benthic feeding resource

Fish feed from a wide range of benthic invertebrates which live within and on the surface of the seabed. The proposed capital dredging has potential to adversely impact on feeding resource, through the direct removal of or reduction in feeding value within the dredge footprint. Given that the proposed berth pocket is not routinely maintenance dredged, there is potential for a diverse benthic community to be present which may represent important feeding grounds for fish.

5.7.3 Approach to EIA for all options

There are several potential impacts on fish populations that would require assessment as part of the EIA. The ES will be informed by desk-based assessment, comprising collection of Environment Agency data of fish catch returns, consultation with NEIFCA and literature on movements of salmon and sea trout within the estuary. A requirement to collect new primary data is not envisaged.

The findings of the impact assessment with regard to the hydrodynamic and sedimentary regime, marine sediment quality, water quality and marine and coastal ecology will also be used to inform the assessment of potential impacts on fish populations and fisheries.

5.7.4 Potential mitigation measures for key issues

Measures to mitigate the direct loss of benthic habitat and species (which represents a feeding resource for fish species) are limited, as this is an unavoidable consequence of the scheme. In order to minimise the impact on the existing benthic habitat, the disturbance footprint will be minimised as far as possible, within the constraints of the infrastructure engineering and operability.

In order to mitigate for the potential reduction in water quality and consequent impacts on fish species, it is considered that ensuring a spill kit is kept on site would likely reduce the significance of the impact to an acceptable level. As mentioned above, PD Ports is also a spill responder for the Tees estuary, and as such, there are likely to be plans in place to ensure spillages or leakages can be rapidly and effectively managed.

The main mitigation measure to limit sediment plume generation due to dredging is the selection of the dredging method. The use of an enclosed backhoe dredger is the most environmentally acceptable method as this would result in a significantly lower release rate of sediment to the water column compared with, for example, a cutter suction dredger or trailing suction hopper dredger. The selection of an appropriate dredging method is a combination of technical, economic and environmental factors and this will be explored during the EIA process.

The requirement for mitigation measures to be implemented will be determined on the basis of the significance of the potential impacts identified within the EIA.

5.8 Transport

5.8.1 Overview of the baseline environment and receptors

Existing road network

The proposed scheme is located to the north-west of the A1085, which is a dual carriageway, with two lanes in both directions. Commencing from Grangetown to the south-west, via a roundabout junction with the A66 and A1053, the A1085 runs north-east past the site, continuing through Redcar before heading south-east along the coast and then south through Marske-by-the-Sea. The A1085 terminates to the south of Marske-by-the-Sea at a roundabout junction with the A174.

The Department for Transport collect transport data from the A1085 road, for a distance of approximately 3.2 miles from the A1053 to the A1042 (count point identification number 37582). The annual average daily flow (AADF) count data recovered during the last three years is presented in Table 5.4.

Table 5.4 Summary of Department for Transport AADF count data from count point 37582 on the A1085

Year	Pedal cycle	Motor cycle	Cars and taxis	Buses and coaches	Light goods	All HGVs	All motor vehicles
2010	70	169	15,694	403	2,461	422	19,149
2011	77	143	15,647	380	2,746	444	19,360
2012	72	100	12,509	267	2,165	804	15,846

The information within Table 5.4 indicates that there has been a reduction in vehicle numbers along the A1085 in 2012 with regard to all vehicle classes, with the exception of heavy goods vehicles which have nearly doubled in comparison with the data collected during the previous two years. The A1085 contains a number of bus stops in both directions, providing an additional transport option for members of the public.

Access to the proposed port facility would likely be taken from Tees Dock Road.

Rail network

The study area contains a number of railway tracks, which service both passenger and industrial / commercial sectors.

5.8.2 Potential environmental issues associated with construction and operation of all options

Impacts on air and noise due to construction and operational phase traffic

The majority of vehicles entering and leaving the construction site during the construction phase are likely to do so by road. However, the proposed access route for transport of construction materials to the site is currently not defined and will be established during the detailed design phase. There is potential for construction materials to be transported to the site by barge, however this will also be established during the detailed design phase (see Section 5.12).

The main environmental issues in relation to transport will be the impacts on air and noise associated with construction traffic during the construction period and traffic visiting the site during the operation of the facility. These issues will be considered separately within the air quality and noise sections of the EIA.

Impacts on existing road users due to increased traffic movements during the construction and operational phase

The construction and operational phases of the proposed scheme are likely to result in increased traffic movements along the existing road network. Such increased vehicle numbers on the road network could result in disturbance to existing road users. Disturbance could take a number of forms, including increased risk of collision and delays to journeys.

5.8.3 Approach to EIA for all options

The transport section of the EIA will assess the traffic impact on the local highway network that the proposed scheme could have during the construction and operational phases. If it is found that the traffic impact associated with these phases would have a significant adverse impact on the local highway network, improvements will be proposed to mitigate the impact.

Initial liaison has been carried out with RCBC's Highway Authority to agree a proposed study area for the traffic assessment. At the time of writing, the Highway Authority has not confirmed if the suggested study area is acceptable.

The EIA will consider potential impacts on the local highway network during the construction and operational phases (based on predicted traffic numbers). It is considered likely that a Transport Assessment will be required for the proposed scheme. The Transport Assessment will be used to inform the traffic and transportation section of the EIA.

Construction and operational phase impacts will be assessed following the Institute of Environmental Management and Assessment (IEMA) guidance. The significance criteria in Table 5.5 of the construction phase and operational phase will be assessed.

Table 5.5 Significance criteria (increase in traffic flow)

Significance rating	Description of significance
Major	Where the impact leads to serious and lasting disruption (e.g. a 90% increase in baseline traffic) and permanent mitigation measures are required.
Moderate	Where the impact is of a temporary nature, leading to disruption (e.g. a 60% increase in baseline traffic) and short term mitigation measures are required.
Slight	Where the impact exceeds industry standard design thresholds, or the traffic increase is above 30%, but does not lead to disruption. No mitigation measures are required.
Insignificant	No perceivable impact. No mitigation measures are required.
Positive	Where the proposals result in an improvement to current conditions.

Existing baseline, construction traffic and operational traffic data will be assessed to determine whether construction or operational traffic would result in a detrimental adverse impact on the existing highway network during a weekday morning and evening peak hour. Mitigation measures will be proposed where it has been demonstrated that the traffic impact associated with the construction or operational phase would have a detrimental adverse impact on the existing highway network.

To facilitate the impact assessment, the following data will be obtained:

1. Baseline traffic conditions during a weekday morning and evening peak period within the study area.
2. A plan showing the extent of public adopted highway in the vicinity of the site.
3. Accident statistics within the study area.

4. An assessment of existing pedestrian/cycle/bus/rail routes within the study area.
5. Proposed parking provision during construction and operational phases.
6. Trip generation, including number of heavy goods vehicles and staff trips, associated with construction phase.
7. Type of construction vehicles proposed to access site.
8. Maximum size of future vehicles likely to access port.
9. Trip generation associated with the scheme, when operational.

5.8.4 Potential mitigation measures for key issues

The EIA will determine the requirement for the implementation of mitigation measures to reduce the significance of the impact to transport receptors. If it is determined that significant impacts have potential to arise, the following mitigation measures may reduce the significance of the impact to an acceptable level (however this will be fully investigated during the EIA):

- Undertaking consultation with the local authority to arrange suitable access to the construction site and identification of optimum routes and times for construction traffic to use.
- Committing to repair or make good any damage caused to existing highways due to construction and operational traffic movements.
- Investigating the potential to transport construction materials and plant to the construction site by sea rather than road to reduce the effect on the local road network.

The above list is not intended to represent an exhaustive list of potential mitigation measures; however such mitigation measures have potential to effectively manage the risk to transport receptors.

5.9 Air quality

5.9.1 Overview of the baseline environment and receptors

The proposed scheme is not located within a designated Air Quality Management Area (AQMA) and RCBC has not declared any AQMAs within their administrative area.

RCBC undertakes ambient monitoring of nitrogen dioxide (NO_2) and particulate matter (PM_{10}) at one automatic monitoring location in Dormanstown. This monitoring site is classified as a suburban industrial location and is located approximately 3.7km to the east of the proposed marine terminal at Bran Sands. No 2012 monitoring data from this continuous analyser was available in RCBC published review and assessment reports or via its website at the time of writing.

The 2012 *Updating and Screening Report* (RCBC, 2012) states that NO_2 diffusion tube monitoring is not undertaken within the Borough.

Air quality monitoring at background locations is not undertaken by RCBC within the Borough. Background concentrations of NO_x, NO_2 and PM_{10} were, therefore, obtained from the background concentration maps provided by Defra for the 1km x 1km grid squares covering the study area and potential receptor locations to be considered.

Average, minimum and maximum annual mean background concentrations for these grid squares are presented in Table 5.6 for 2013.

Table 5.6 2013 NO_X, NO_2 and PM_{10} minimum, maximum and average annual mean background concentrations for the 1km x 1km grid squares covering the EIA scoping area

Background concentrations	2013 (µg.m^{-3})		
	NO_x	NO_2	PM_{10}
Minimum	26.97	17.81	12.73
Maximum	69.32	35.60	18.94
Average	33.94	21.06	14.50
Annual Mean Objective	-	40 µg.m^{-3}	

The annual mean background NO_2 and PM_{10} concentrations, shown in Table 5.6 are below their respective Air Quality Objectives.

The closest existing residential receptor locations to the proposed port facility are situated in Dormanstown, Grangetown and South Bank approximately 1.15km to the east, 3.1km to the south and 4.0km to the south-west respectively.

The closest existing designated site to the proposed port facility is the South Gare and Coatham Sands SSSI which is located approximately 0.7km to the north of the footprint of the proposed marine terminal.

5.9.2 Potential environmental issues associated with construction and operation of all options

The main emissions to air from construction and operation of the proposed scheme are likely to be the products of combustion from HGVs, cars and non-road mobile machinery (NRMM), such as carbon monoxide (CO), nitrogen dioxide (NO_2) and particulate matter (normally assessed as the fraction of airborne particles of mean aerodynamic diameter less than ten micrometres (PM_{10})).

Fugitive dust emissions may also occur from earthworks, construction and transport activities associated with the construction phase.

The distance to potential receptor locations varies between the three currently proposed options and the level of emissions associated with each option would also vary due to the variable works involved with implementation of each option.

During the operational phase, dust emissions may also arise from activities including processing, handling and bagging of the product at the materials handling facility and transfer to the storage areas via the conveyor system onto vessels, although it should be noted that the conveyor system would be enclosed, which would reduce the potential for dust generation. It is anticipated that the proposed materials handling facility would require an Environmental Permit for the above processes. It is expected that the Environmental Permit would cover all aspects of air emissions and would ensure that the Best Available Techniques are used to prevent or reduce emissions from the activities to be carried out.

The operational phase will also involve drying processes to separate the product solids from the carrier brine, venting of gas emissions from the product dryer bag filters and release of emissions from the heat exchanger; such emissions have potential to adversely impact upon air quality. Air quality also has potential to be adversely impacted due to release of emissions from HGVs, cars and NRMM, including CO, NO_2 and PM_{10} during the operational phase.

5.9.3 Approach to EIA for all options

The air quality assessment will be undertaken in accordance with guidance provided by Defra in their document *Local Air Quality Management, Technical Guidance LAQM.TG(09), February 2009*.

The Institute of Air Quality Management (IAQM) has published guidance on undertaking construction phase assessments in their document *Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance* (January 2012). This guidance specifies that receptor locations within 350m of proposed construction works should be identified and an assessment undertaken to determine any potential impact. No residential or ecological receptor locations are situated within 350m of the proposed construction works for Options 1 and 2 and, as such, it is not proposed that a construction phase assessment will be undertaken for these options. There are human receptor locations within 350m of the proposed construction footprint for Option 3 (residential properties at Dormanstown); therefore, a construction phase assessment will be undertaken for Option 3.

The impact of vehicle exhaust emissions associated with both the construction and operational phases on air quality at identified receptor locations will be assessed using the methodology provided by The Highways Agency in the *Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA207/07* (DMRB).

A Gap Analysis will also be undertaken using the methodology provided by The Highways Agency in the Interim Advice Note *IAN 170/12 Updated air quality advice on the assessment of future NOx and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1, Air Quality* (November 2012). Predicted concentrations of NOx will be converted to NO_2 using the NOx to NO_2 calculator provided by Defra. Mapped background concentrations obtained from Defra will be used in the assessment.

Receptor locations will be identified adjacent to roads that will experience an increase in road traffic as a result of the proposed port facility. Changes in pollutant concentrations (NO_2 and PM_{10}) will be compared to significance criteria provided by Environmental Protection UK in their guidance document *Development Control: Planning for Air Quality* (2010 Update). Predicted pollutant concentrations will also be compared to the relevant Air Quality Objectives.

No residential receptor locations are situated within 1km of the section of the Tees estuary that would be affected by any marine vessel movements generated by the construction and operation of the port facility options. As no significant impact would be expected, the impact of exhaust emissions from marine vessel movements on air quality at residential receptor locations will not therefore be assessed.

Consideration of fugitive dust emissions during the operational phase of the facility will be undertaken and measures to mitigate dust will be recommended as necessary. Assessment of fugitive dust emissions and emissions from product dryer bag filters and heat exchangers during the operational phase of the scheme (for Options 1 and 2 only given the exclusion of the materials handling facility at Wilton from the scope of this EIA process) will also be undertaken. Measures to mitigate the operational phase emissions will be recommended as necessary.

5.9.4 Potential mitigation measures for key issues

The EIA will determine the requirement for the implementation of mitigation measures to reduce the significance of the impact to receptors sensitive to changes in air quality. If it is determined that significant impacts have potential to arise, the following mitigation measures may reduce the significance of the impact to an acceptable level (however this will be fully investigated during the EIA):

During the construction phase, dust emissions could be managed through following best practice in the control of dust and dust emissions, such as that outlined in the *Greater London Authority and London Councils Control of Dust Emissions and Construction and Demolition Best Practice Guidance* (GLALC, 2006).

Both static and mobile NRMM and plant should be well maintained. If any emissions of dark smoke occur then the relevant machinery should stop immediately and the problem rectified. In addition, the following controls should apply to NRMM:

- All NRMM should use fuel equivalent to ultra-low sulphur diesel (fuel meeting the specification within EN590:2004).
- All NRMM shall comply with either the current or previous EU Directive Staged Emission Standards (*97/68/EC, 2002/88/EC, 2004/26/EC*). As new emission standards are introduced the acceptable standards will be updated to the previous and most current standard.
- Implementation of energy conservation measures, including throttle down or switch off idle construction equipment, switch off the engines of trucks whilst they are waiting to access the site and while they are being loaded or unloaded, ensure equipment is properly maintained to ensure efficient energy consumption.

5.10 Noise and vibration

5.10.1 Overview of the baseline environment and receptors

Baseline noise monitoring has not been undertaken to date within the study area and there is no existing monitoring data available. The surrounding heavy industrial land uses (including the Norsea Oil Terminal at Seal Sands, North Tees Oil Refinery, Hartlepool nuclear power station, Seal Sands storage terminal) are considered likely to be the main contributors to the baseline noise levels. There are numerous other industrial and commercial activities in the surrounding area which operate for 24 hours a day. The adjacent rail and road network is also likely to contribute to the existing noise environment.

There are no significant sources of ground-borne vibration in the local environment and vibration levels are expected to be negligible.

5.10.2 Potential environmental issues associated with construction and operation of all options

The potential impacts associated with noise and vibration during the construction phase may include:

- Disturbance to marine ecological species from piling and dredging (e.g. fish, marine mammals, birds).
- Disturbance to terrestrial ecological species (e.g. great crested newts, reptiles, water voles, otter, bats).
- Disturbance to local communities (i.e. noise, general construction activities and traffic movements).

Potential impacts on local communities may arise in the form of noise disturbance arising from lorry movements (required to transport construction materials from site and potentially waste materials from site), construction activities themselves, vessel movements during dredging and piling activities.

The proposed works have the potential to generate high levels of noise, particularly during activities such as piling.

The existing marine fleet composition within the Tees estuary is likely to change once the facility is operational. Noise emissions from marine vessels (including those involved in maintenance dredging activities) and vehicles used to transport site operatives and product have the potential to increase the background noise levels, as described above for construction impacts. The operation of the machinery within the materials handling facility (comprising thickeners, belt filters, powder dryers, granulator banks, granule dryers and granule screening and coating (for Options 1 and 2 in this case)) and the conveyor system also has potential to increase the background noise levels.

5.10.3 Approach to EIA for all options

Construction noise affecting existing receptors will be assessed using the guidance and datasets contained in British Standard (BS) 5228: *Code of practice for noise and vibration control on construction and open sites - Part 1* and based on knowledge of similar projects. The noise calculations will be undertaken using the calculation methodology within BS5228; taking into account the sound power levels of construction equipment, distance to receptors, screening from barriers or topography, 'on-times' of equipment and soft ground absorption. Predicted impacts will be assessed against the proposed limits provided in Annex E of the standard and reported within the ES alongside any mitigation measures.

An assessment of the road traffic noise impact will be undertaken using the calculation method contained in Calculation of Road Traffic Noise (CRTN), and the results considered against the criteria within the DMRB. This will indicate the level of impact predicted to arise due to the traffic associated with the development.

The operational phase, including operation of the conveyor system, marine terminal and materials handling facility (Options 1 and 2 only) will require noise assessment based on the guidance contained within BS 4142: *Method for rating industrial noise affecting mixed residential and industrial areas.* This requires the existing baseline noise levels at nearby noise sensitive properties to be established through a noise survey and the impact of the development to be referenced against these existing levels. Advice will be provided for the level of noise emission acceptable from the site, with reference to the baseline situation, within the ES.

The following scope of work is proposed:

- Liaison with the local Environmental Health Department to agree the assessment method and any specific concerns that may exist with regard to noise from the site.
- Baseline noise survey (the scope of which will be agreed with the Environmental Health Department).
- Construction noise assessment.
- Road traffic noise assessment – the impact of the change of use will be calculated using computer modelling software to indicate the level of noise impact associated with the changes in traffic flow and composition.
- Industrial noise assessment – a noise impact assessment will be conducted to provide guidance on the likelihood of complaints due to the proposed use. This will comprise a noise measurement survey and a noise modelling exercise to quantify the level of noise from the proposed development.

5.10.4 Potential mitigation measures for key impacts

The EIA will determine the requirement for the implementation of mitigation measures to reduce the significance of the impact to noise sensitive receptors. If it is determined that significant impacts have potential to arise, mitigation measures may reduce the significance of the impact to an acceptable level (however this will be fully investigated during the EIA).

During the construction phase, potential mitigation measures to reduce the significance of impact from construction related activities could include adherence to the principles of Best Practicable Means (BPM), as defined in BS 5228.

Operational phase noise could be reduced by ensuring machinery is well maintained, switched off when not in use and appropriate for the proposed works.

5.11 Archaeology and heritage

5.11.1 Overview of the baseline environment and receptors

There is an accepted view that the Tees estuary is of both archaeological and historical interest. The landscape is one of 19th and 20th century industrial heritage, and industry still defines and dominates the region today.

In the wider area there are known Anglo-Saxon and medieval settlements, there is a protected wreck site Seaton Carew at Seaton Sands, north of the mouth of the Tees, and Listed Buildings in Redcar, Kirkleatham, Wilton, Lazenby and South Bank. The

nearest Scheduled Monuments are approximately 4km to 5km to the south on Eston Moor, and also within Wilton Moor Plantation and Court Green Wood.

A Cultural Heritage desk-based assessment was undertaken by AOC Archaeology in 2006 for the NGCT and the ES Non-Technical Summary concluded that "*the majority of the proposed development area has been reclaimed during the past 150 years and has been subject to industrial use and dumping. The proposed development site itself, therefore, has no archaeological interest and no structures are covered by any form of archaeological designation*" (Royal Haskoning, 2006). The plan of cultural heritage sites within the AOC Archaeology desk based assessment for the NGCT project indicates that there are no cultural heritage sites within the boundaries of the proposed scheme footprint.

The desk-based assessment undertaken to inform the NGCT EIA highlighted that within the Tees estuary the presence of peat and alluvial deposits "*may preserve evidence of early use of the Tees and as such should be subject to further investigation*" (AOC, 2006).

There are also records of shipwrecks known to be located within the Tees estuary.

Although extensive reclamation has taken place within the Tees estuary, the potential for the presence of prehistoric land surfaces (indicated by for example surviving peat deposits) still remains, preserved beneath later sediments. There is also potential for historic wreck material, as indicated by the use of the estuary as a historic shipping transport and trade route, and also the use of the Tees as a port from at least the medieval period onwards.

Previous geotechnical investigation work includes vibrocores taken during site survey related to the QEII berth (AEG, 2009). These showed evidence of occasional plant material, potentially indicative of a former land surface in previously undredged areas. However, data from a later geotechnical borehole programme undertaken within Tees Dock indicated that there were "*no relict land surfaces present*", and the boreholes recorded no peat or other organic remains (AEG, 2011).

Royal HaskoningDHV are unaware of the dredge footprint (berth pocket and dredge channel) and construction footprint associated with the proposed scheme having been subject to archaeological assessment (in the form of analysis of borehole / vibrocore logs).

5.11.2 Potential environmental issues associated with construction and operation of all options

The potential environmental issues associated with the proposed scheme include:

- The presence of and disturbance to any surviving prehistoric/historic land surfaces (often indicted by peat deposits and other organic sediments).
- The presence of and disturbance to *in situ* archaeological remains, possibly preserved beneath later sediments.
- The presence of and disturbance to maritime finds and wreck material.
- Setting effects on known heritage assets.

The proposed dredge area for the berth pocket associated with the proposed scheme is outside the limits of the existing dredged approach channel and, therefore, there is the potential for archaeological remains to be present within the underlying deposits. The proposed approach channel for the marine terminal is within the boundary of the currently dredged channel and, as such, the potential for encountering archaeological finds and features is reduced in comparison within the berth pocket (however such risks cannot be ruled out at this stage).

Depending on specific construction methodologies, the extent of the reclaimed land and depth of deposits there also exists the possibility that the construction of the conveyor route and materials handling facility (forming part of Options 1 and 2 for the purposes of the current EIA process) could impact upon potential buried historic/prehistoric land surfaces.

Adopting a precautionary approach, the potential for surviving archaeological remains to be present at the site is currently believed to be at least medium. There are also potential setting effects that would be assessed as part of the EIA, although at this stage these are anticipated to be negligible.

5.11.3 Approach to the EIA for all options

The archaeological significance of the proposed NGCT site and surrounding area up to a radius of 1km was assessed as part of the ES for that project. An additional detailed archaeological study of the proposed QEII site was undertaken in support of the ES produced for the MGT Power Ltd Teesside biomass power station, and the recent No.1 Quay ES utilised previous and existing information to assess archaeological and heritage impacts.

Given that this previous information is within the public domain, it is proposed to utilise, as far as possible, the existing information to inform an archaeological desk-based assessment specific to the proposed scheme options. A walkover / site visit will also be undertaken as part of the project specific archaeological desk-based assessment. Further recommendations, if applicable, will be made as part of the desk-based reporting. This will include consideration of any potential setting effects that the proposed scheme may have on the historic (industrialised) landscape and both designated and undesignated heritage assets (including built heritage) within the vicinity.

It is considered unlikely that new record searches will need to be conducted given the presence of relevant information within the public domain. However, if deemed appropriate, borehole and vibrocore logs from any planned programme of geotechnical site investigation will be analysed for evidence of the presence of peat or other organic material. This will be determined through consultation with the archaeological adviser to RCBC.

No intrusive investigation work is envisaged at this stage other than if potentially significant remains are identified in the vibrocore and borehole logs, in which case further palaeo-environmental assessment and/or analysis may be deemed necessary. This requirement would be agreed in consultation with the archaeological adviser to RCBC.

If any greenfield, previously undisturbed, ground is identified as falling within the proposed scheme footprint then archaeological geophysical survey may be an appropriate response in the first instance. This would need to be agreed in consultation with the archaeological adviser to RCBC. If potential anomalies of archaeological interest were identified from any geophysical survey conducted, this may lead to a requirement for archaeological trial trenching, although due to the character of the surrounding landscape, this is deemed unlikely at this stage.

There should also be a reporting protocol put in place outlined within a written scheme of investigation (WSI) specific to the scenario of any unexpected wreck material being identified during the construction works.

With the exception of potential setting effects to known heritage assets during operation, any potential impacts to the archaeological and heritage resource are anticipated to occur during construction only.

5.11.4 Potential mitigation measures for key impacts

The EIA will determine the requirement for the implementation of mitigation measures to reduce the significance of the impact to archaeology and cultural heritage. If it is determined that significant impacts have potential to arise, it may be necessary to undertake archaeological trial trenching, archaeological watching brief or full archaeological recording and excavation to reduce the significance of the impact to an acceptable level (however this will be fully investigated during the EIA).

5.12 Commercial navigation

5.12.1 Overview of the baseline environment and receptors

Many of the riverside industrial plants along the 17km stretch of the River Tees have docking and cargo facilities and, therefore, the River Tees experiences significant commercial vessel traffic. At present, there are approximately 1000 shipping movements on the river every month (YPL, 2012).

The Tees estuary is approached from the north-east through a deep water channel in Tees Bay. The approach channel has a dredged depth of 15.4m below CD from Tees fairway light buoy to the entrance, where it reduces to 14.1m below CD. Thereafter the maintained depth is progressively reduced to 4.5m below CD, seven nautical miles from the entrance. The current dredge depths of the channel are shown in Figure 5.8.

There are currently two turning areas; one within the Seaton Channel area which can accommodate vessels 350m in length and is regularly used for large tankers which berth at the Tees North Sea Oil Terminal and large bulk carriers bringing coal and ore to Redcar Oil Terminal. The second is the Tees Dock turning area which is used to turn vessels which berth at Tees Dock and at the bulk liquid jetties opposite.

Large deep drafted ships bound for Tees North Sea Oil Terminal and the Redcar Oil terminal pick up tug assistance after passing South Gare. Fully laden ships can only enter on the high tide but can leave at any time once their cargo has been discharged. Similarly, any fully laden ships to exit the river must wait for the high tide. Vessels are

turned when unloaded either in the Seaton Channel turning area or in the Tees Dock Turning Area depending on which quay or jetty they are destined for.

The channel is maintained by PD Ports which has a statutory responsibility to maintain the channel for safe navigation. Additionally, traffic in the Tees estuary is controlled by a sophisticated vessel traffic system (VTS).

Key receptors include all commercial shipping and any other activities of other operators present within the vicinity of the proposed construction works.

5.12.2 Potential environmental issues associated with construction and operation of all options

The proposed scheme requires approximately 1.05 million m^3 of material to be dredged from the approach channel and berthing pocket. There may be a requirement to deliver some of the construction materials to the site by sea and, therefore, the construction phase has potential to result in a temporarily increased number of vessel movements within the Tees estuary.

The presence of the dredger and construction plant has potential to result in conflicts with existing commercial and recreational vessels. This could take a number of forms, including delays to shipping, increased risk of collision between vessels and the prevention / interference of activities of other operators present in the vicinity of the proposed quay/jetty. The Harbour Master has previously confirmed (for the NGCT, QEII and No.1 Quay schemes), that there are no concerns over conflicts arising during the construction phase given that mechanisms exist for effective management of all shipping traffic within the Tees estuary and Tees Bay via the VTS. An exclusion zone would need to be enforced during the construction phase and, therefore, disturbance impact is not considered likely to represent an unacceptable risk.

During the operational phase, it is envisaged that the increase in shipping activity would be significant. The port facility will be designed to accommodate the export of up to 12mtpa of product, and to accommodate two Panamax size vessels, each up to 85,000 DWT. Depending on vessel size, between 40 and 95 ship loads could be exported from the marine terminal per annum. There is, therefore, the potential for a change in the risk of collision or delays due to increased traffic levels. Navigational safety of the larger vessels will also require consideration and it is possible that additional navigational aids would be required in order to ensure the safety of the increased number of ships on the river.

The ES for the QEII jetty predicted that there would be no impact during the operational phase of the proposed development associated with the movement of up to an additional 96 ships per annum within the Tees estuary. As such, the increase in shipping traffic associated with the operation of the marine terminal is not considered likely to result in an unacceptable impact.

Consideration will also need to be given to any predicted hydrodynamic changes, particularly in terms of tide and wave propagation, which could impact on navigational safety during the operational phase.

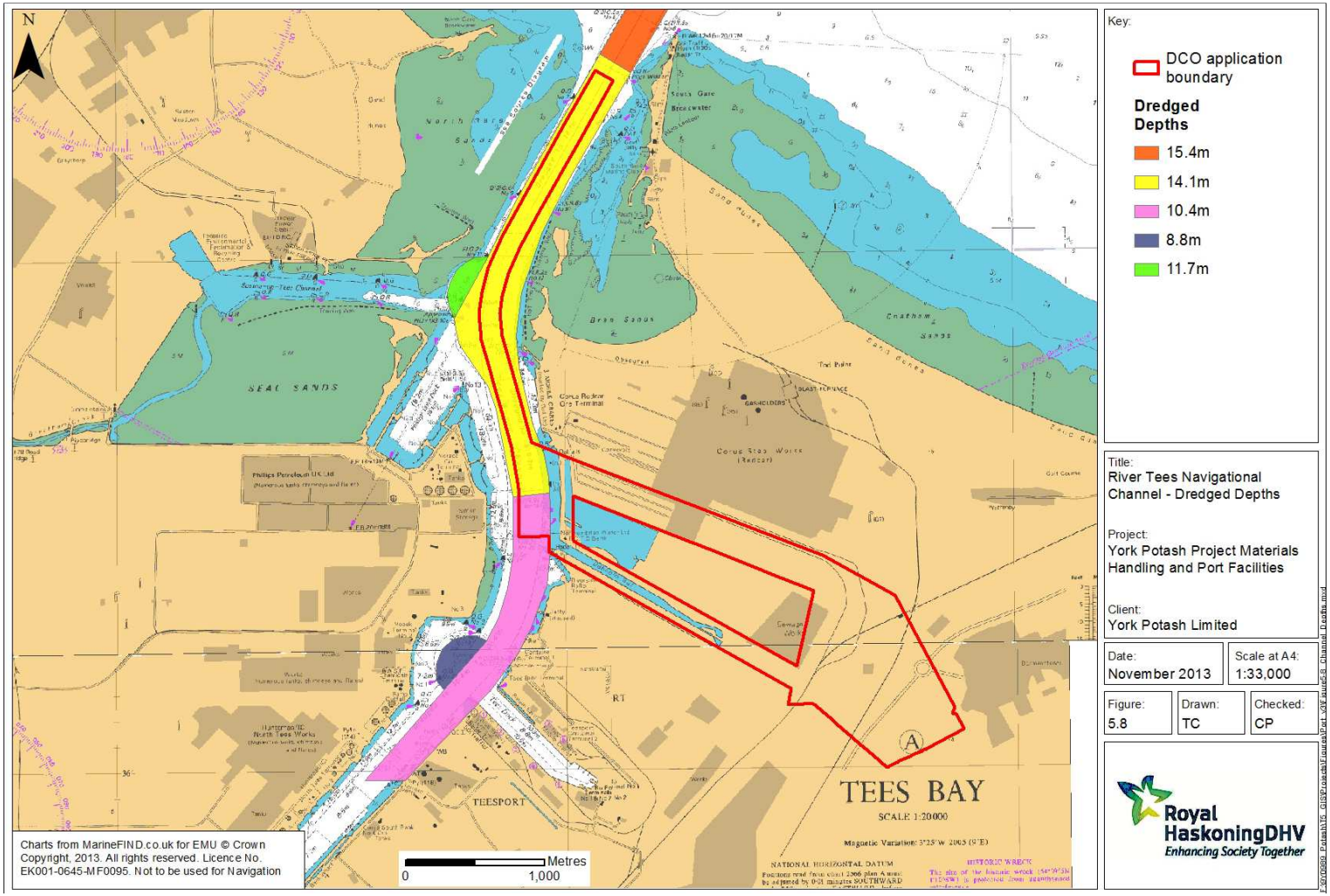


Figure 5.8 Dredged depths within the Tees estuary

5.12.3 Approach to the EIA for all options

A Marine Navigation Risk Assessment will be undertaken to inform the EIA process. This assessment will address the impact of:

- Implementation of an exclusion zone during the construction phase.
- The port facility operating at maximum throughput of 12mtpa.

Dredging operations at the proposed berth will not be specifically considered because the proposed berth pocket dredging will fall within the construction exclusion zone.

Dredging of the approach channel would impact the operation of Port and a specific plan would be developed to manage this impact, in consultation with PD Ports, in advance of the commencement of the construction works.

5.12.4 Potential mitigation measures for key issues

There are a wide range of mitigation measures that can be implemented to mitigate the risks to existing shipping traffic within the Tees estuary. The potential conflict between the construction works and shipping can be managed through one-way control of vessels, appropriate timing of vessel movements and enforcement of an exclusion zone. It is considered likely that the existing VTS would be utilised to manage such alterations in port traffic required during the construction and operational phase.

5.13 Coastal protection and flood defence

This section describes the flood and coastal defences along relevant frontages of the Tees estuary.

Information has been obtained from the Flood Risk Assessment (FRA) report produced in support of the NGCT ES (Royal Haskoning, 2006), which also covered the areas of land relevant to the proposed scheme options. The most recent advice from the Environment Agency with regard to flood risk and the potential effects of climate change on sea level rise has been taken into consideration herein.

5.13.1 Overview of the baseline environment and receptors

There are 11km of flood defences located on the estuary, which contribute to minimising the risk of flooding (Environment Agency, 2009). These include defences along the Tees at the confluence with Lustrum Beck and Billingham Beck, and at Port Clarence. There are also defences along Greatham Creek and at Hartlepool Power Station, along the Old River Tees around Teesside Park and the tidal barrier across Marton West Beck. The Tees Barrage is not a flood defence asset. In addition to the above, there are many informal defences which provide a range of levels of protection, such as sand dunes, embankments and also quays and wharves.

The Environment Agency's Tees Tidal Flood Risk Management Strategy (Environment Agency, 2009) identified the need for improvements or raising of existing flood defences within the Tees estuary, up to the Tees Barrage. This report also highlighted areas which may be at risk of flooding, either at present or in the future. Areas identified as being at risk are referred to as 'flood cells', and are located where ground levels are less

than 5.0m above OD. This level carries a 0.1% (1 in 1,000) probability of a flood event occurring in any one year. The highest recorded flood event along the Tees occurred in 1953 and reached a level of 4.0m above OD. A water level with a 0.5% (1 in 200) probability of occurrence in any one year is 4.19m above OD (Environment Agency, 2009). The existing cope level at Tees Dock is 7.39m above CD, which equates to 4.54m above OD (CD is 2.85m below OD in the Tees estuary).

5.13.2 Potential environmental issues associated with construction and operation of all options

The principal environmental issue in relation to coastal protection and flood defence is whether the proposed scheme could alter the risk of flooding, both to the development site and to other areas within the Tees estuary.

The proposed scheme would result in the encroachment of a structure into the estuary system and dredging to create a berth pocket and required depth in the approach channel. Such dredging would increase the depth of water adjacent to the river bank. The encroachment into the estuary and increased depth of water has potential to result in effects to the hydrodynamic and sedimentary regime, which consequently could impact upon the flood risk to the development itself as well as other areas around the Tees estuary (the suspended deck option would be expected to have a more localised effect on hydrodynamics and sedimentary regime (and consequently flood risk) than the reclamation option, given that the former is an open structure).

There is the risk of potential flood hazard to workers during the construction phase of the proposed scheme; this hazard could result in health and safety concerns for workers.

There is also the risk that construction of the materials handling facility (for Options 1 and 2) and construction of the conveyor system could impact upon the existing risk of flooding to the site itself and other sites within the Tees estuary.

5.13.3 Approach to the EIA for all options

It is considered that flood risk and coastal defence impacts for the proposed scheme can be informed through the FRAs undertaken for the NGCT and the QEII developments, as well as professional judgement regarding the potential impacts. Such previous assessments would be used as context to inform an FRA specific to the proposed scheme.

Discussions will be held with the Environment Agency at commencement and during the development of the FRA to ensure that the deliverable is informed by the latest information for the Tees estuary and meets with their technical requirements. The development areas will be reviewed in relation to the latest Environment Agency flood zones. Work was completed in 2011 on updating the flood zones within the Tees estuary and the Environment Agency has confirmed that this information could be made available for use within the FRA.

In accordance with the current National Planning Policy Framework, the proposed scheme will be assessed in relation to flooding and any potential implications to adjacent areas will be assessed. It is proposed that the FRA report will be included as an appendix to the ES. The results of the FRA will be used to inform the coastal protection and flood defence section of the ES.

5.13.4 Potential mitigation measures for key issues

In order to reduce the risk to workers during the construction phase, it may be necessary to enforce site induction training. This is likely to include those actions required in the event of a number of emergency incidents, including that of flood risk. The requirement for mitigation measures to be implemented will be fully investigated during the EIA.

5.14 Infrastructure and land drainage

This section describes the infrastructure and land drainage systems within, or in close proximity to, the proposed scheme footprint. To inform the identification of these systems and an appropriate approach for the EIA, information has been obtained from the NGCT ES (Royal Haskoning, 2006) and the Tees Dock No. 1 Quay ES (Royal Haskoning DHV, 2012a), both of which provide information of relevance to the proposed scheme.

5.14.1 Overview of the baseline environment and receptors

The Tees estuary is bordered by industrial developments including chemical, petrochemical and steel works, sites of former industry and open areas of ground originally intended for industrial use. There is a concentration of oil-related industry near the river mouth including a large petrochemical works and an oil refinery at Seal Sands. There is a large titanium pigment plant south of Seaton Carew, on the north side of Teesmouth, and a second oil refinery and chemicals processing plant is located next to Teesport on the south side of the estuary, adjacent to the major steelworks at Bran Sands. Hartlepool nuclear power station is located on the east side of Seaton Channel. Further upstream in the Tees estuary, there is a former ICI agrochemical plant at Billingham which was a sister to the former ICI chemical plant at Wilton (now owned by Sembcorp). There are also several ship repair yards and large port facilities, including Tees Dock, on the south shore.

NWL's Bran Sands Sewage Treatment Works (STW), which incorporates the Regional Sludge Treatment Centre (RSTC), is located directly adjacent to the footprint of the proposed scheme. This is the largest STW (Ofwat size band 5) in the Northumbria area of NWL's activities. It is presumed that the STW discharges directly into Dabholm Gut through an outfall.

Dabholm Gut is a locally important drainage channel whose catchment includes the Wilton Estate and which discharges into the Tees estuary. It is a partly culverted, partly canalised channel 1.35km long with a weir at its end which maintains the level in the Gut above that of the estuary at times when the tide is below the crest level of the weir. Historically this channel received untreated domestic sewage and industrial effluents.

A small jetty and pumping station are located at the confluence of Dabholm Gut and the Tees estuary. This infrastructure is owned by NWL and was historically used for the import of sludge to their sewage treatment works.

Bran Sands Lagoon is directly adjacent to the footprint of the proposed marine terminal. This is the sole remaining area left un-reclaimed from a series of lagoons that were created using slag material in this area. It is approximately 700m x 500m surrounded on

all sides by bunds formed from locally derived slag fill. The land is reasonably level with a lagoon bed level of approximately 0m OD and bund levels of between 4m OD and 5m OD. Access tracks run for most of the length along the bunds surrounding the lagoon.

There are two 'spits' of slag visible at the western and eastern ends of the lagoon. The water level in the lagoon varies due to the presence of an approximately 800mm diameter concrete pipe which links the lagoon to the river (Figure 5.9). The invert level of the pipe is approximately -0.95m OD (+1.9m CD). This pipe allows limited tidal exchange of the water level; and the lagoon level does not vary by the full tidal range. Low water level in the lagoon is at approximately +0.42m OD (+3.27m OD). The bed of the lagoon is understood generally to be at approximately 0m OD hence the minimum depth of water in the lagoon is generally less than 0.5m.

Figure 5.9 Pipe connecting Bran Sands Lagoon to the Tees estuary

At the eastern end of the lagoon the land rises at a gradient of approximately 1 in 3 to a level track at approximately +11m OD before rising again at a gradient of approximately 1 in 20 to a top level of approximately +16m OD.

The northern side of the lagoon is close to the boundary fence with the steel plant site. The steel plant land beyond the fence forms a coal stockyard.

Along its western side, the lagoon is separated from the estuary by a slag bund. The bund has been formed behind a training wall towards the edge of the main estuary channel. The foreshore between the bund and the training wall is exposed at low tide

and comprises rubble and slag. The masonry remains of a navigation marker are visible to delineate the line of the training wall.

A track which runs along the edge of Dabholm Gut gives access to the NWL jetty, to pipelines and to the eastern end of the pipe tunnel that runs beneath the bed of the estuary. The following infrastructure runs between the track and the lagoon:

- A pipe track carrying pipes which pass through the pipe tunnel beneath the estuary (Pipe Tunnel No. 2). At the head of the tunnel is a brick head house. The centreline of the pipe track is approximately 20m from the edge of Dabholm Gut.
- A buried natural gas pipeline which takes gas from the south side of the river via a second pipe tunnel to the north side of the estuary (BP AMOCO CATS Pipeline).
- A buried natural gas pipeline which brings gas from the north side of the estuary to the south side via a third under river crossing (Teesside Power Gas Pipeline – formerly referred to as the Enron Pipeline).
- Three pipes associated with the treatment and transfer of sludge from the NWL jetty to the Bran Sands sewage treatment plant.

The outlet of the culverted Kinkerdale Beck is located slightly further upstream of Tees Dock, adjacent to the existing QEII quay.

Two surface water abstractions are located within the vicinity of the proposed scheme. The first is located in Tees Dock (NZ 546 235) and is held by Tees Bulk Handling Ltd. The second is located within the main navigable channel (NZ 547 259) and is held by Corus UK Ltd. A third abstraction licence located further outside of the vicinity of the scheme is held by Hartlepool nuclear power station. The nuclear power station is licensed to abstract 35.5 $m^3 s^{-1}$ of surface water from Seaton Channel for cooling water.

Five main tributaries flow into the Tees estuary: Old River Tees, Lustram Beck, Ormesby Beck, Billingham Beck and Greatham Creek.

5.14.2 Potential environmental issues associated with construction and operation of all options

The potential impacts associated with the proposed scheme can be summarised as follows:

- Potential impact on existing infrastructure – existing outfalls, abstraction inlets, pipes, tunnels or cables in the study area could be affected during the construction works. This could be caused by construction of the quay, conveyor system, materials handling facility (Options 1 and 2), storage facilities or the capital dredging. Impacts could also arise during the operational phase due to changes in hydrodynamic and sedimentary processes.
- Potential impact on existing water abstraction processes – total suspended solids in the water column in the vicinity of water abstraction points could increase as a consequence of construction activities (e.g. piling) or, in particular, dredging activities for the approach channel and berth pocket.
- Potential impact on existing discharge processes – changes in the hydrodynamics of the estuary or the morphology of the bed due to the scheme could affect the hydrodynamic mixing of discharged water with estuary water flows, thereby affecting water quality.

- Potential impact on surface water drainage – surface water from the proposed development site will be collected, transferred and discharged through existing drainage systems during its operational phase. This includes the role and function of Dabholm Gut.
- Infilling of the lagoon with dredged material – this may partially affect the hydraulic connectivity between the estuary and the lagoon (via a pipe). There are unlikely to be significant consequences of this on the estuary, but the extent and mixing status of the lagoon could be affected.

5.14.3 Approach to the EIA for all options

It is proposed that this section of the ES principally will be informed by a desk assessment of potential conflicts between the proposed scheme and the existing infrastructure. Modelling results provided within the assessments to determine the potential impact on the hydrodynamic and sedimentary regime and results of any intrusive investigations will also be used to inform the assessments. Issues relating to water quality will be fully addressed within the appropriate section of the ES.

5.14.4 Potential mitigation measures for key issues

The requirement for mitigation measures to be implemented as part of the proposed scheme will be fully addressed within the EIA.

Potential mitigation measures could include ensuring contractors are aware of the presence of any underground services, ensuring service drawings are present on site at all times and limiting the dredge footprint to reduce the potential for impacts on surface water abstractions. Such mitigation measures are considered likely to effectively manage the potential impacts to infrastructure and land drainage arising from the options for the port facility.

5.15 Socio-economics

5.15.1 Overview of the baseline environment and receptors

The Northern Way Growth Strategy identified a total of eight ‘city regions’ in the north of England. Almost 50% of the Tees Valley City Region population (876,000) live within the Teesside conurbation. The economy of the Tees Valley City Region is dominated by industry based on petrochemicals, chemicals, steel and port activities.

There are a number of socio-economic issues facing the local area (the local area is defined as the Scarborough Borough and Redcar and Cleveland Borough), (ERS, 2013), including:

- An ageing population – the median age of the population is 43 in Redcar and Cleveland, which is much higher than the national average of 39. This trend towards an increasingly ageing population is predicted to continue.
- Substantial net out-migration of young people – the local area has experienced substantial net out-migration of people aged between 15 and 39.
- Lack of jobs in the local economy – nationally, there are 0.77 jobs in the economy for each working age person. In Redcar and Cleveland, there are only 0.50 jobs for each working age person.

- High unemployment and pockets of severe deprivation – job seekers allowance claimant count is high, particularly for 18 to 24 year olds. In Redcar and Cleveland, youth unemployment is more than double the national average.
- Low employment growth – within Redcar and Cleveland, employment has decreased by 5% since 2003, whilst nationally employment has risen 4%.
- Low skill levels – 26% of adults in the local area have no qualifications at all. There is some evidence of a local shortage of the skills required by YPL.
- Low paid, part-time employment – these employment sectors are associated with low wages. Locally, earnings are approximately 13% lower than the national average.

5.15.2 Potential environmental issues associated with construction and operation of all options

The construction phase would result in a direct rise in temporary employment; however, based on the results of the socio-economic study undertaken in 2013 for the minehead ES (Turley Associates, 2013), all roles may not be able to be undertaken by local residents given the potential skill shortage identified. It should be noted that the socio-economic study, as well as the ES, produced in 2013 for the minehead are in the process of being updated.

There is also potential for an increase in permanent employment within the area during the operation phase of the proposed scheme, as staff would be required to operate and service machinery including the ship loader and conveyor system, as well as the materials handling facility (for Options 1 and 2). However, as noted above, the skill shortage within the region may mean that these roles may not be occupied by residents from the region.

5.15.3 Approach to the EIA for all options

The socio-economic impacts of all proposed scheme options are beneficial in nature and will be fully described within the ES using existing information. A desk-based assessment will be undertaken to inform the ES. Tees Valley Unlimited and RCBC will be consulted to ensure accurate and informed baseline data. A socio-economic assessment of the wider project (as discussed within Section 1.4) will also inform this section of the ES. No further specific studies or assessments are considered necessary.

5.15.4 Potential mitigation measures for key issues

Given the largely beneficial nature of the predicted impacts with regard to socio-economics, it is considered that mitigation measures are unlikely to be required. However, in order to increase the likelihood of local residents occupying a greater percentage of the available roles during the construction and operation phases, relevant training courses could be provided.

5.16 Landscape and visual character

5.16.1 Overview of the baseline environment and receptors

The landscape character of the Tees estuary and its immediate surroundings has been shaped by industrial development. The low lying areas surrounding the estuary, and large expanses of reclaimed land, support substantial industrial complexes. Movements within the estuary are generally limited to relatively slow moving cargo and pilot vessels.

Flare stacks and chimneys are also a characteristic visual feature of the industrial elements of the estuary, particularly in the mid to lower Tees estuary.

Given the industrialised nature of the Tees estuary, it is considered that the existing landscape conditions of the site do not generally represent significant areas of landscape character with significant value. The site contains little natural green spaces with significant areas of hardstanding and disrupted surfacing on which there is little established / developed landscape character of note. The site is not covered by any specific landscape designations.

Any 'green' landscape areas in between the industrial built complexes and infrastructure (roads and railways) are predominantly rough grassed/ scrubland areas with minimal areas of significantly well vegetated spaces. Woodland belts are narrow and concentrated along infrastructure routes.

With regard to potential visual receptors, the majority of the adjacent receptors are existing industrial users and users accessing these industrial sites via road and rail links.

5.16.2 Potential environmental issues associated with construction and operation of all options

The potential effects that could arise during the construction phase include the presence of lighting during night-time working, movement of construction equipment and the presence of construction plant (including marine plant). Given the condition of the existing landscape, the likely significance of the potential impacts is predicted to be negligible.

Any small landscape features lost as part of the schemes (such as tree and woodland belt losses for access entry points) will be identified and accommodated for during the design phase.

As the nature of the proposed scheme is in keeping with the current industrial landscape character of the area, the proposed scheme will not introduce a new element to the landscape character.

The most significant aspect of the proposed development in terms of operational issues on the landscape and visual environment will be the presence of ship loaders and lighting that will be required for the proposed scheme. These features would be expected to be visible from surrounding areas, but are considered to be compatible with the existing landscape character. In addition, the potential effects of lighting, including sky glow, light spill, glare and general light pollution, will be minimised as far as possible.

The proposed materials handling facility associated with Options 1 and 2 and the conveyor system would be visible to recreational users of Public Rights of Way (PRoW) in the area. Given that the visual backdrop for these views is currently comprised of the Tees estuary, there is potential for impacts to the existing local landscape character.

The partial in-filling of Bran Sands Lagoon has the potential to impact upon the landscape character at a local scale through the partial removal of a surface water body which is a feature of the local landscape character. It is considered, however, that the wider landscape would not be adversely impacted upon given the heavily industrialised

nature of the Tees estuary and presence of industrial properties within the majority of the study area.

5.16.3 Approach to the EIA for all options

Given the potential for impacts to the local landscape character and visual amenity value as a result of the proposed scheme, it is proposed that a proportionate Landscape and Visual Impact Assessment (LVIA) is undertaken. The assessment will be undertaken in accordance with recently published *Guidelines on Landscape and Visual Impact Assessment* (3rd Edition, The Landscape Institute and the Institute for Environmental Management and Assessment, 2013)). The scope of the assessment will be agreed with Natural England and RCBC.

5.17 Recreation and access

5.17.1 Overview of the baseline environment and receptors

Recreation

The Tees estuary supports a range of land and water based recreational activities, many of which are highly seasonal and the majority of which are outside the areas of main river and port operations.

The main recreational activities include dog walking, walking, beach recreation and bird watching. There is also some sailing activity, power-boating, jet-skiing, sand-racing and windsurfing although this is considered to be predominantly confined to the open coast or at the estuary mouth due to the currently heavily industrialised nature of the estuary and busy commercial use of the river. Some of the important sites for nature conservation within the Tees estuary are also used for education, research and recreational purposes, particularly at the Teesmouth Field Centre.

Access

In terms of access, much of the land bordering the estuary is owned privately by PD Ports and, therefore, there are few PRoWs within the immediate scheme footprint. There are, however, PRoWs in the vicinity of the proposed scheme including:

- PRoW (footpath) located to the immediate north of the Steel Works at Wilton (route codes 102/2A/2, 102/2/3, 116/31/3, 116/31/1), which heads in a north-easterly direction.
- PRoW (bridleway) (route code 116/9/1) located directly adjacent to the PRoW (footpath) identified above.

PRoWs within the vicinity of the proposed scheme are illustrated on Figure 5.10. The Teesdale Way is also located in the immediate vicinity of these PRoWs (Figure 5.10).

Formal non-statutory access arrangements exist between organisations or individuals and landowners. For example, access permits are issued by some landowners for bird watching. These agreements and permits stipulate strict conditions and permission can be withdrawn at any time.

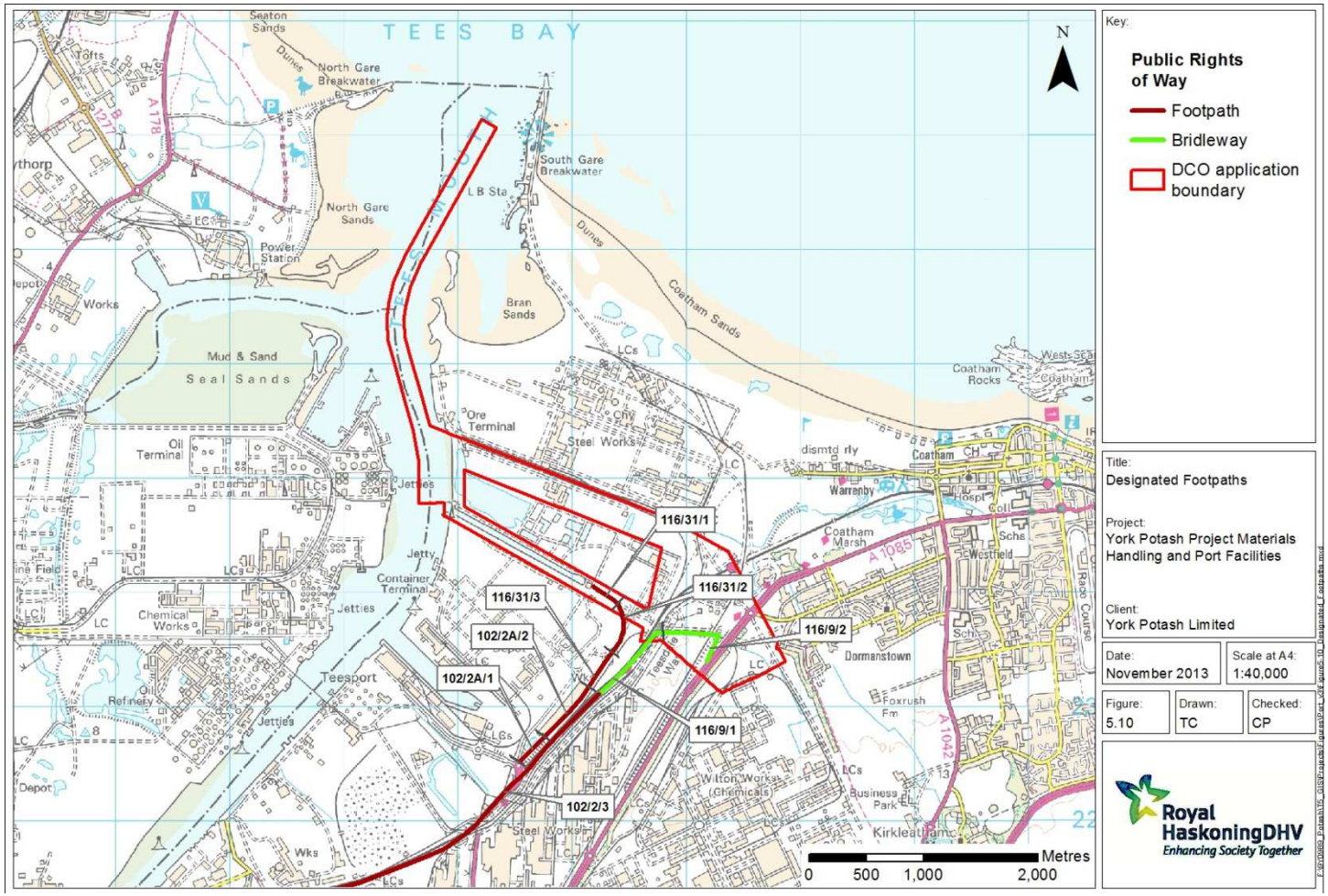


Figure 5.10 Public Rights of Way adjacent to and within the boundaries of the port facility options

5.17.2 Potential environmental issues associated with construction and operation of all options

Noise, air quality and visual impact on recreation and access

The potential impacts of the construction and operational phase of the proposed scheme on noise and air quality and the landscape and visual environment are relevant to this aspect of the EIA. These effects will be assessed separately within the EIA process and the implications for recreation and access reported in the ES.

Disturbance to water based recreational activities

There is limited potential for the proposed scheme to impact upon water-based recreation activities during the construction phase due to the presence of the dredger and other construction plant used during the construction works. Water based recreational activity generally does not take place within the proposed construction area given the heavily industrialised nature of the development along the banks of the Tees estuary and use of the navigation channel by large ships.

During operation, there would be a change to commercial shipping patterns with an increase in frequency of movement of vessels navigating in the lower estuary and an overall increase in shipping traffic. However, vessels would be confined to the existing dredged approach channel and, therefore, this does not represent a significant change from the current situation. Consequently it is not anticipated that there would be a change in the risk of a conflict over and above that which exists at present.

Disturbance to recreational users using PRoWs

The land side works for the materials handling facility and conveyor route for Options 1 and 2 would take place on privately owned land and, therefore, would not impact on access to land or land-based pursuits.

For Option 3, the proposed conveyor route from the materials handling facility at Wilton to the marine terminal intercepts the route of PRoWs. As such, there is potential for direct impacts to land based recreational users, including health and safety risks associated with moving plant within the vicinity of footpaths.

5.17.3 Approach to the EIA for Option 1 and Option 2

It is considered that this topic can be scoped out of the EIA for Options 1 and 2 given that recreational activities do not take place within the construction footprints.

5.17.4 Approach to the EIA for Option 3

Given the location of PRoWs within the immediate vicinity and across the route of the proposed conveyor route to the marine terminal, the EIA will assess the routes and access points that may be impacted upon by the construction phase of the proposed scheme. Consultation will be undertaken with the relevant parties to determine the requirement for footpath diversions and/or temporary closures.

It is considered that impacts to water based recreational activities can be scoped out of the EIA as no significant impacts to such activities are anticipated.

5.17.5 Potential mitigation measures for key issues

Specific mitigation measures could be implemented to avoid potential conflicts between the construction and operation of the proposed scheme, and recreational users of the PRoW network. These could comprise undertaking early consultation with the local authority to determine appropriate diversions, informing local businesses and walking groups well in advance of the proposed works, timely implementation of temporary / permanent diversion of PRoWs and use of appropriate signage to identify the diversion route. The requirement for such mitigation measures will be fully investigated during the EIA process.

5.18 Cumulative Impact Assessment

Background to Cumulative Impact Assessment

There is no legislation that specifically applies to cumulative impact assessment (CIA) or that outlines how such assessment should be undertaken. However the *Environmental Impact Assessment (EIA) Directive (85/337/EEC)* and associated EIA Regulations require consideration of direct impacts and any indirect, secondary and cumulative effects of a project. Government guidance states that: "*cumulative effects could refer to the combined effects of different development activities within the vicinity"* (Department of Environment, 1999).

CIA assesses the potential impacts of a proposed development with other past, present (current) and reasonably foreseeable (proposed) plans and projects.

With respect to 'past' projects, a useful ground rule in CIA is that the environmental impacts of schemes that have been completed should be included within the environmental baseline; as such, these impacts are already taken into account in the EIA process for a development. Consequently, generally completed projects can be excluded from the scope of CIA. However, the environmental impacts of recently completed projects may not be fully manifested and, therefore, the potential impacts of such projects should be taken into account.

Projects that are currently being constructed or that are in the planning process (where sufficient information is publically available), as well as on-going activities that have the potential to influence the same environmental parameters as the proposed development, are the focus of CIA.

Initial identification of potential projects and plans relevant to CIA

An initial list of plans and projects that should be included within the scope of a CIA has been generated using our knowledge of proposed schemes within the Tees estuary and elsewhere, gained through consultation with appropriate regulators during progression of EIAs for NGCT, No.1 Quay and QEII jetty. The initial list is provided below (noting that some of the listed plans and projects may be screened out subsequently due to lack of potential interaction with the influences of the proposed scheme):

- York Potash minehead, pipeline and materials handling facility (assuming the latter component is at Wilton), and any other ancillary development linked to the York Potash Project.
- Northern Gateway Container Terminal.
- Refurbishment of the QEII jetty.
- Redevelopment of No.1 Quay.
- ConocoPhillips LNG import/storage/re-gasification facility and CHP plant.
- Able UK Seaton port (and capital dredging of Seaton Channel).
- Environment Agency Tees Tidal Flood Risk Management Strategy.
- North and South Tees Industrial Development Framework
- Teesmouth and Cleveland Coast European Marine Site Management Scheme
- EDF Teesside Offshore Wind Farm.
- Simon Storage proposed new jetty No. 2.
- Vopak Teesside Terminal No. 4.
- Britmag Magnesia Works.
- Thor Cogeneration plant.
- National Grid Tees crossing.
- Dogger Bank Creyke Beck A and B landfall.
- Dogger Bank Teesside A and B landfall.
- Dogger Bank Teesside C and D landfall.

Potential for cumulative impacts

Of particular importance in defining likely cumulative impacts are the following aspects, all of which are important in deriving the overall cumulative impact significance:

- the temporal and geographic (spatial) boundaries of the effects of each project;
- the interactions between relevant activities of each project and the overall environment / ecosystem; and
- the thresholds of sensitivity of the existing environment.

Generally, measures to avoid or minimise significant adverse impacts at the project level will also tend to reduce or avoid the potential for any accumulation of impact with other plans or projects.

The EIA will identify whether there is the potential for cumulative impacts for each environmental parameter, as follows:

- Hydrodynamic and sedimentary processes.
- Hydrology, hydrogeology and soils.
- Marine sediment and water quality.
- Marine ecology.
- Marine and coastal ornithology.
- Terrestrial ecology.
- Natural fisheries resource.
- Transport.
- Air quality.
- Noise and vibration.
- Archaeology and heritage.
- Commercial navigation.
- Coastal protection and flood defence.

- Infrastructure and land drainage.
- Socio-economics.
- Landscape and visual character.
- Recreation and access.

5.19 Water Framework Directive

The WFD applies to all water bodies, including those that are man-made. The consideration of the proposed scheme under the WFD will, therefore, apply to all water bodies that have the potential to be impacted by the proposals for each option.

Classification schemes for surface waters out to one nautical mile have been developed in response to the WFD. The schemes classify the status of surface waters using information on the ecological, chemical and hydromorphological quality of a body of water. For surface waters there are two separate classifications for water bodies; ecological and chemical. For a water body to be in overall 'good' status, both ecological and chemical status must be at least 'good'. Groundwater bodies are classified in terms of their chemical quality and quantity.

For water bodies that have been designated as heavily modified water bodies (HMWB), the Environment Agency classifies according to their ecological potential rather than status. UKTAG has adopted the 'mitigation measures approach' for classifying HMWBs (UKTAG, 2008). This approach first assesses whether actions to mitigate the impact of physical modification are in place to the extent that could reasonably be expected. If this mitigation is in place, then the water body may be classified as achieving 'good' or 'better' ecological potential. If this level of mitigation is not in place, then the water body will be classed as 'moderate' or 'worse' ecological potential. This assessment is then cross-checked with data from biological and physico-chemical assessments.

Some areas require special protection under European legislation. The WFD therefore brings together the planning processes of a range of other European Directives, such as the revised Bathing Waters Directive and the Habitats Directive. These Directives establish protected areas to manage water, nutrients, chemicals, economically significant species and wildlife – and where possible, have been brought in line with the planning timescales of WFD.

In terms of WFD water bodies within the study area, Figure 5.11 shows the locations of the scheme (and options for the location of the materials handling facility and associated infrastructure) in the context of the water bodies in the vicinity of the site. It is necessary for undertake an assessment of the implications of the proposed scheme on the current and future potential status of water bodies classified under the WFD. This is termed a WFD compliance assessment.

The following water bodies are proposed for inclusion in the WFD compliance assessment:

- Tees (GB510302509900): an estuarine water body which is classified as a HMWB.
- Wilton (Tidal Tees) Area (GB103025072320): a riverine water body.
- Eston to Teesport (Tidal Tees) Area (GB103025076000): a riverine water body.

- Yorkshire North (GB650301500003): a coastal Water Body.
- Tees Mercia Mudstone and Redcar Mudstone (GB40302G701300): a groundwater body.

To determine which activities are of relevance to the WFD compliance assessment, all potential impacts on ecology, hydrodynamic parameters, water quality and any mitigation measures in place (for heavily modified water bodies) would need to be considered. The following bullet points summarise the activities that could potentially impact WFD compliance parameters:

For the construction phase:

- Dredging to create a berthing pocket and deepen the approach channel (potential hydrodynamic, water quality impacts, marine ecology, mitigation measures in place).
- Construction works for the marine terminal (potential underwater noise impacting on fish, hydrodynamic impacts, water quality, marine ecology).
- Working in and around water bodies, surface water discharges (water quality, ecology, quantity and quality for groundwater).
- Partial infilling Bran Sands Lagoon (quantity/quality of groundwater and surface waters).

During the operational phase:

- Presence of a new marine terminal and berthing pocket within water body (hydrodynamic effects, mitigation measures in place).
- Surface water drainage (water quality, quantity and quality of groundwater).
- Maintenance dredging required (water quality, mitigation measures in place).

Subject to consideration of alternative uses, all material dredged from the seabed would be disposed offshore at one or both of the disposal sites in Tees Bay. As neither of the offshore disposal sites fall within a WFD water body and are located at least 2.5km from the nearest boundary of a water body, it is proposed that offshore disposal is screened out of the WFD compliance assessment.

In order to assist in the assessment of the potential impacts of the proposals, the guidance considered to be the most relevant to project proposals are the documents *Clearing the Waters* (Environment Agency, 2012) - which has been produced to assist in the assessment of the potential impact of dredging and disposal on the requirements of the WFD - and *Assessing new modifications for compliance with WFD* (NEAS Operational Instruction 488_10) (Environment Agency, 2010), an Environment Agency internal operational instruction which has been produced to guide WFD assessment of new modifications to surface waters.

5.20 Habitats Regulations Assessment

Given the location of the proposed scheme in close proximity to the Teesmouth and Cleveland Coast SPA and Ramsar site, and areas used by waterbirds that form part of the SPA populations, it is envisaged that it will be necessary to provide information within the ES for the purposes of informing a HRA under the requirements of the Habitats Regulations.

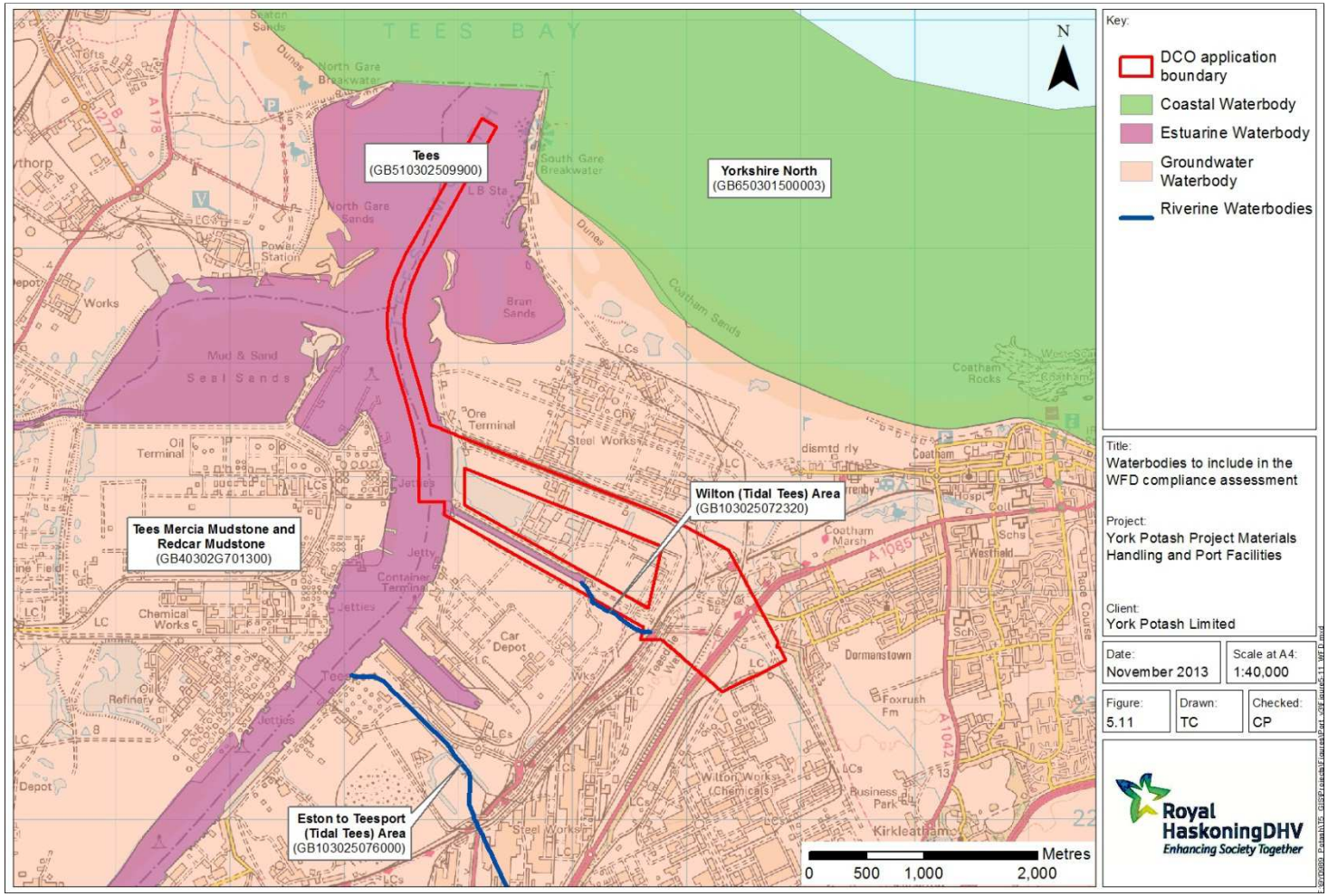


Figure 5.11 Waterbodies proposed for inclusion as part of a WFD compliance assessment

6 SUMMARY AND WAY FORWARD

The information in this Environmental Scoping Report is provided to support YPL's formal request to PINS for a Scoping Opinion in relation to the potential impacts of the proposed scheme (including relevant options for the configuration of the materials handling facility, conveyor route and marine terminal), and the scope of the EIA and ES. YPL currently does not have a preferred option and. as such, is requesting a Scoping Opinion for all options (with the exception of materials handling at Wilton).

This Environmental Scoping Report represents the first reporting stage in the EIA process and sets out the proposed way forward for the assessment of the environmental impacts which have potential to arise due to construction and operation of the proposed scheme.

The process of EIA is an iterative and evolutionary one that builds up layers of data as the assessment progresses. Many of the surveys and investigations necessary to provide the baseline data for the assessment of potential impacts have already been undertaken or are in progress. Information on these studies is presented in Section 5, along with an outline of the key environmental issues likely to be associated with the construction and operation of the proposed scheme options.

Once a preferred option has been selected, the ES will build on the work undertaken to date and present a comprehensive account of the potential environmental and socio-economic impacts of the proposed scheme, both adverse and beneficial, and will identify measures to prevent, reduce, offset or enhance the potential impacts of the proposed scheme where appropriate.

Based upon current understanding of the proposed scheme options, Table 6.1 presents a summary of the envisaged environmental impacts associated with the scheme and the proposed approach to the EIA associated with progression of Options 1, 2 and 3.

Table 6.1 Summary of potential environmental impacts and proposed approach to the EIA for each scheme option

Topic	Potential impacts	Proposed approach to EIA
Hydrodynamic and sedimentary regime	• Creation of a sediment plume during dredging and piling works. • Changes in estuarine hydrodynamics due to presence of proposed quay structure and deepened berth pocket and approach channel. • Changes to sediment regime including sedimentation into the dredged berth pockets and approach channel.	• Use of TELEMAC-3D flow model to examine the impact on local flow regime and to show the footprint of any effects. • Use of SEDPLUME model to demonstrate the fate of fine materials released during capital dredging. • Desk assessment of sedimentation rates at the proposed quay.
Hydrology, hydrogeology and soil	• Construction of the conveyor system, storage facilities and materials handling facility may lead to the release of pollutant associated with the anticipated presence of made ground. • Creation of pollution linkages which could lead to pollution of the underlying aquifer. • Potential for build-up of ground gas within any excavations given the presence of landfill sites in the vicinity of the proposed works. • Potential for significant impacts to hydrology, hydrogeology and soils. • Potential creation of pollution linkages and preferential pathways for contaminants between geological strata due to piling. • Potential for degradation of construction materials over time due to potential presence of aggressive ground conditions.	• The proposed port facility works will not comprise any landside works beyond the quayside; therefore it is proposed that these aspects are scoped out of the EIA. • Desk based assessment of available data and preliminary risk assessment. • Subject to consultation, it may be necessary to undertake a site investigation with recovery of samples for chemical analysis. • Assessments would be undertaken in accordance with CLR11 and will identify pollutant linkages through a risk assessment process.
Marine sediment and water quality	• Reduced water quality associated with dredging, piling and construction works. • Reduced water quality due to offshore disposal of dredged material. • Reduced water quality due to accidental spillage of oils, fuels and chemicals.	• Recovery of sediment samples at the surface and at depth within the proposed dredge footprints. • Sediment quality results would be compared to Cefas guideline action levels. • Desk based assessment of existing water quality data. • Numerical modelling and any existing sediment quality data for the material to be dredged will inform this assessment.

Topic	Potential impacts	Proposed approach to EIA
Marine ecology	• Direct loss of benthic habitat due to dredging and piling. • Direct loss of habitat within Bran Sands Lagoon due to reclamation. • Release of sediment into the water column leading to increased biological oxygen demand. • Potential for smothering of seabed following dredging and disposal. • Noise and vibration disturbance to marine ecological receptors.	• Benthic invertebrate surveys proposed, involving benthic grab samples and epibenthic beam trawl surveys. • Results of the hydrodynamic and sedimentary regime assessment will also inform this section of the EIA.
Marine and coastal ornithology	• Disturbance from vehicle, plant and personnel movements, dust and construction lighting. • Increased total suspended solids may affect food resources for birds, in addition to potential smothering of intertidal feeding areas following dredging. • Disturbance to feeding and roosting during operation due to ship wash and noise. • Reduction of available habitat within Bran Sands Lagoon.	• Desk based assessment proposed of available information, including WeBS data and low tide count sectors. • Use of hydrodynamic and sedimentary modelling results to predict effects on intertidal morphology that supports waders and wildfowl.
Terrestrial ecology	• Indirect impacts on designated nature conservation sites, land take requirements and associated loss of habitat, noise and presence disturbance to protected species.	• Extended Phase 1 habitat survey • Surveys for reptiles, water voles, waterbirds, otter and bats
Natural fisheries resource	• Direct uptake and disturbance of fish during dredging • Reduced area of benthic feeding resource due to quay construction and capital dredging.	• A desk based assessment is proposed using Environment Agency data and consultation with NEIFCA. • A requirement to collect new primary data is not envisaged.
Transport	• Increased traffic movements along the existing road network. • Disturbance to existing road users, including increased risk of collision and delays to journeys.	• A Transport Assessment is proposed which will be used to inform the EIA.
Air quality	<u>Options 1 and 2</u> • Emission to air comprising products of combustion from HGV, cars and NRMM. • Fugitive dust emissions from earthworks. • Dust emissions from loading and storage of product. • Emissions from dryers and filter bags within the materials handling facility. <u>Option 3</u> • Emission to air comprising products of combustion from HGV, cars and NRMM. • Fugitive dust emissions from earthworks.	<u>Options 1 and 2</u> • Air quality assessment proposed in accordance with Defra's Local Air Quality Management, Technical Guidance document. • Operational phase assessment of emissions from product dryer bag filters and heat exchangers. <u>Option 3</u> • Air quality assessment proposed in accordance with Defra's Local Air Quality Management, Technical Guidance document. • Construction phase assessment proposed using guidance provided by IAQM, including human receptors within 350m and designated sites within 100m.

Topic	Potential impacts	Proposed approach to EIA
	• Dust emissions from loading and storage of product.	• Operational phase assessment proposed to identify impacts from vehicle exhausts and fugitive dust emissions.
Noise and vibration	<u>Option 1 and 2</u> • Disturbance impacts to marine ecological species from piling and dredging (e.g. fish, marine mammals, birds). • Disturbance to terrestrial ecological interests (e.g. reptiles, water voles, otter, bats). • Disturbance impact to local communities (i.e. noise, general construction activities and traffic movements). • Noise emissions from marine vessels and the conveyor system during operation. • Noise emissions associated with operation of the materials handling facility, conveyor system and traffic movements. <u>Option 3</u> • Disturbance impacts to marine ecological species from piling and dredging (e.g. fish, marine mammals, birds). • Disturbance to terrestrial ecological interests (e.g. reptiles, water voles, otter, bats). • Disturbance impact to local communities (i.e. noise, general construction activities and traffic movements). • Noise emissions from marine vessels and the conveyor system during operation.	<u>All options</u> • Construction noise assessment proposed using BS5228. • Assessment of road traffic noise impact proposed using the calculation in CRTN. • Operational phase noise assessment proposed using BS4142.
Archaeology and heritage	• Disturbance to any surviving prehistoric/historic land surfaces, in-situ archaeological remains, maritime finds and wreck material and setting effects on known heritage assets.	• Utilisation of existing archaeological desk based assessments. • Walkover / site visit proposed as part of the archaeological desk based assessment. • Consideration of any potential setting effects that the proposed scheme may have on the historic industrialised landscape. • No intrusive investigation work envisaged at this stage.
Commercial navigation	• Temporary disturbance to existing vessel movements during construction due to presence of dredger and construction vessels. • Disturbance to vessel traffic during operation due to increased numbers of vessels.	• A Marine Navigation Risk Assessment is proposed. • Findings of the potential effects on the hydrodynamic regime will be considered in the context of navigational safety.

Topic	Potential impacts	Proposed approach to EIA
Coastal protection and flood defence	• Flood hazard to workers. • Flood risk to the site and other areas within the estuary. • Effects on the hydrodynamic and sedimentary regime could consequently impact upon flood risk.	• Discussions will be held with the Environment Agency at commencement to ensure the deliverable is informed by the latest information and meets with their technical requirements. • An FRA (specific to the proposed scheme) is proposed. Previous FRA's undertaken for NGCT and QEII would be used as context.
Infrastructure and land drainage	• Impacts on existing infrastructure (including pipes and cables) caused by excavations during the construction phase. • Impacts on water quality at abstraction points during dredging.	• Desk based assessment and consultation with stakeholders proposed. • Results of any intrusive investigations will also be used to inform this section.
Socio-economics	• Direct rise in temporary employment during construction and operation. • Project as a whole important in terms of safeguarding supplies of potash.	• Desk based assessment and consultation with stakeholders proposed, without the need for specialist survey or assessments.
Landscape and visual	• Potential for impacts upon the existing local landscape character through partial infilling of Bran Sands Lagoon which could affect views of the wider Tees estuary from adjacent PRoWs.	• The EIA will be informed by a proprtionate LVIA, the scope of which would be agreed with Natural England and RCBC.
Recreation and access	<u>Options 1 and 2</u> • No adverse impacts anticipated to recreational users or access points. <u>Option 3</u> • Direct disturbance to users of PRoWs during construction and operation of the conveyor system (the route of which intercepts PRoWs).	<u>Options 1 and 2</u> • It is considered that this topic can be scoped out of the EIA for Options 1 and 2 given that no significant impacts to such receptors are anticipated. <u>Option 3</u> • The EIA will assess the routes and access points that may be impacted upon by the construction phase.

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