9 MARINE AND COASTAL ORNITHOLOGY

9.1 Introduction

9.1.1 This section of the ES describes the existing environment in relation to marine and coastal ornithology and assesses the potential impacts of the construction, operational and decommissioning phases of the proposed scheme. Where relevant, mitigation measures are detailed and a discussion of the residual impacts presented.

9.1.2 This section of the ES satisfies the Regulation 5(2)(l) of the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulations 2009.

9.2 Guidance and consultation

Policy and guidance

National Policy Statement for Ports

9.2.1 The assessment of potential impacts to marine and coastal ornithology has been made with reference to the NPS for Ports. The particular assessment requirements relevant to marine and coastal ornithology, as presented within the NPS for Ports, are summarised in **Table 9-1**.

Table 9-1 Summary of NPS for Ports requirements with regard to marine and coastal ornithology

NPS requirements	NPS reference
Where the development is subject to EIA, the application should ensure that the ES clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological interests.	Section 5.1.4
The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.	Section 5.1.5
The ES should include an assessment of the effects on the coast. In particular, the applicant should assess the effects of the proposed project on marine ecology, biodiversity and protected sites.	Section 5.3.5
The applicant should be particularly careful to identify any effects on the integrity and special features of Marine Conservation Zones, Special Areas of Conservation (SAC) and candidate SACs, Special Protection Areas (SPA) and potential SPAs, Ramsar sites, actual and potential Sites of Community Importance and Sites of Special Scientific Interest (SSSI).	Section 5.3.7

Marine Policy Statement

9.2.2 The UK MPS (HM Government, 2011) (adopted in March 2011) provides the framework for marine planning and decisions affecting the UK marine area. The MPS will facilitate and support the formulation of marine plans, ensuring that marine resources are used in a sustainable way in high level marine objectives, thereby:

- promoting sustainable economic development;

- enabling the UK to move towards a low carbon economy, in order to mitigate the causes of climate change and ocean acidification and adapting to their lives;
- ensuring a sustainable marine environment which promotes healthy, functioning marine habitats, species and our assets; and,
- contributing to the societal benefits of the marine area, including the sustainable use of marine resources to address local and social economic issues.
- The MPS requires that all public authorities taking authorisation or enforcement decisions that affect, or might affect, the UK marine area do so in accordance with the MPS, unless relevant considerations indicate otherwise.

Redcar and Cleveland Borough Council Local Plan

9.2.3 RCBC adopted its Core Strategy in July 2007 and this provides the development framework for the Borough over the plan period to 2021. 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 objective of the Core Strategy.

9.2.4 Development Plan Document policies of relevance when considering the proposed scheme in relation to marine and coastal ornithology include:

- Policy CS24 (Biodiversity and geological conservation): the Borough's biodiversity and geological resource will be protected and enhanced. Priority will be given to:

  - protection of the integrity of the European sites in and near the Borough; and,
  - conserving and enhancing biodiversity and geodiversity sites and features in line with PPS9.

Stockton Borough Council Core Strategy Development Plan Document

9.2.5 Stockton Borough Council (SBC) adopted its Core Strategy in March 2010 and this provides the development framework for the Borough over the plan period to 2026.

9.2.6 Policy CS4 safeguards land along the north bank of the River Tees. The policy states that no port or river based development will be permitted on, or on land immediately adjacent to, the North Tees Mudflat component of the Tees and Hartlepool Foreshore and Wetlands SSSI.

9.2.7 Policy CS10 outlines SBC's policy with regard to environmental protection and enhancement. The policy states that proposals will need to demonstrate that there will be no adverse impacts on the integrity of the Teesmouth and Cleveland Coast SPA and Ramsar site, or other European sites, either alone or in-combination with other plans, programmes and projects. The policy also states that development throughout the Borough will be integrated with the protection and enhancement of biodiversity, geodiversity and landscape.

Consultation

Statutory consultation

9.2.8 A summary of the comments provided in the PINS Scoping Opinion and through consultation under Section 42 of the Planning Act 2008 that are of relevance to marine and coastal ornithology is presented in **Table 9-2**.

Table 9-2 Summary of comments in the PINS Scoping Opinion and received during consultation under Section 42 of the Planning Act 2008 of relevance to marine and coastal ornithology

Consultation comment	Response / Section of the ES in which the comment is addressed
Scoping Opinion (January 2014)	
Secretary of State	
The study area is intended to be informed by analysing data sources including WeBS data. The applicant should ensure the data used to inform the assessment is up to date and specific to the proposed development. Where data is not recent, justification should be provided in the ES to demonstrate it remains valid.	**Section 9.3**
The Secretary of State agrees with the intention to use hydrodynamic and sedimentary assessment data that is due to be gathered by the applicant to inform the assessment of impacts upon waders and wildfowl and the potential effects on feeding resources of birds.	**Sections 9.5** and **9.6**
It is important that the assessment includes the effects of noise and vibration on water bird populations. The assessment should also consider whether there would be any potential disturbance and displacement of bird species for example, due to increased sea traffic and dredging works during construction and operation.	**Sections 9.5** and **9.6**
Environment Agency	
The development is in close proximity to national and internationally designated sites for nature conservation. On this basis, any piling works may disturb migratory fish, marine mammals and bird populations.	**Section 9.5**; impacts to migratory fish and marine mammals are considered in **Section 11** and **Section 8** respectively
MMO	
The MMO considers that the EIA must assess potential impacts from noise and vibration on marine receptors during both construction and operation.	**Section 9.5** and **9.6**
Natural England	
Bran Sands lagoon is used by many birds for feeding, not just roosting as stated in the scoping report.	**Section 9.4**
Natural England noted that waterbird interest will be evaluated by desk based assessment. However, the terrestrial ecology section of the Environmental Scoping Report refers to fortnightly bird counts at various states of the tide for Bran Sands lagoon and Dabholm Gut. More information on the survey and survey effort is required to determine whether this is sufficient. This data should include recent information (preferably within the last 3 years – the breeding bird survey for NGCT was undertaken in 2005).	**Section 9.3**

Consultation comment	Response / Section of the ES in which the comment is addressed
Section 5.5.1 of the scoping report refers to breeding sandwich tern. This should read common tern as these breed extensively in the Tees estuary whereas sandwich tern is only an occasional breeder.	**Section 9.4**
Section 42 comments	
Environment Agency	
Both options show significant loss of available intertidal habitat. Intertidal habitats are highly productive and support large areas of predatory birds and fish. They provide feeding and resting areas for populations of migrant and wintering waterfowl.	**Noted**
Natural England	
The impact on intertidal habitat needs to be considered in the context of bird declines on Teesside and also the loss of intertidal within the estuary.	**Sections 9.5** and **9.6**
Natural England noted that further lighting assessment, noise and sediment quality assessment are to be undertaken which are essential for a proper understanding of impacts.	**Sections 9.5** and **9.6**
Natural England notes acoustic barriers are proposed. More detail on this mitigation measure will be required. Piling has only been considered for the port terminal with no information provided on the conveyor construction. Natural England would expect to see seasonal restrictions on construction scheduling to avoid impacts on wintering SPA birds.	**Sections 9.5** and **14.5**
Parking, storage and lay down areas immediately adjacent to the lagoon will need to be properly screened to minimise disturbance during operation. During construction, the most disturbing activities should be scheduled outside the winter period.	**Section 9.6**
As the narrow spits either side of Seaton Channel are designated as an SPA, further consideration should be given to the long term impacts of an increase in wave height of up to 0.1m to the structural integrity of the spits.	**Section 9.6**
The indirect impacts on SPA birds on Bran Sands through loss of sediments from dredging should be considered.	**Section 9.6**
Construction of the harbour will lead to a number of negative impacts on bird populations and potential indirect impacts related to changes in coastal processes. Uncertainties remain on the scale of some impacts, and since no positive works are currently proposed, the likely outcome will be negative on SPA birds of unknown magnitude.	**Section 9.6**
Natural England would welcome a commitment to the beneficial management of the site for SPA birds during the lifetime of the proposal, including the adoption of measures to monitor and control management of the site.	**Section 9.6**

Consultation comment	Response / Section of the ES in which the comment is addressed
Other measures outside the site which Natural England would welcome and which would be a benefit to SPA birds include beneficial use of dredged material from the capital dredge for habitat creation. This could be used to create roost islands at Bran Sands.	**Sections 3** and **9.6**
Further clarity is required regarding the infill rates.	**Section 9.6**
A full assessment of impacts due to dredging will be needed in the ES.	**Sections 9.5** and **9.6**
MMO	
It will be necessary to assess whether the works will affect any other part of the Tees estuary in terms of sedimentation or increased erosion.	**Sections 5** and **9.6**

9.3 Methodology

Study area

9.3.1 The study area for this section of the ES comprises the area which has the potential to be both directly and indirectly impacted by the proposed scheme. 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 (**Section 1.4**).

Existing environment

9.3.2 Baseline data to inform this ES with regard to the assessment of potential impact to waterbirds comprises Wetlands Bird Survey (WeBS) counts for the most recent five years available from the BTO (i.e. 2008/09 to 2012/13) and monthly bird counts undertaken by INCA from 2009 to 2014 at Bran Sands lagoon, Dabholm Gut and the intertidal area at the proposed terminal location. The monthly bird surveys undertaken by INCA were carried out during various states of the tide.

9.3.3 Bird distribution plots produced by INCA showing bird usage at Bran Sands lagoon, Dabholm Gut and the intertidal area immediately adjacent to the footprint of the proposed port terminal (from January 2012 to March 2014) have also been used to inform this section of the ES (see **Appendix 9.1**). A summary of the bird data is presented within this section of the ES, with the full data set included in **Appendix 9.2**.

9.3.4 The bird data collected by INCA from Bran Sands lagoon, Dabholm Gut and the intertidal area in front of the proposed terminal location has been used to determine the significance of these areas as supporting habitat for waterbirds, by comparing the data with that of the corresponding monthly WeBS count data for the Tees WeBS site sector.

9.3.5 The bird use of the foreshore along the Vopak land (approximately 650m from the footprint of the proposed port terminal, on the opposite bank of the estuary) was monitored from June 2013 to March 2014 inclusive. The location, species, behaviour and number of birds was recorded onto maps approximately every two weeks throughout that period.

Methodology for assessment of potential impacts

9.3.6 Potential impacts to waterbird species have been assessed in accordance with the guiding principles set out both the Guidelines for Ecological Impact Assessment (EcIA) (IEEM, 2006) and the Guidelines for Ecological Impact Assessment – Marine and Coastal (IEEM, 2010), with emphasis being placed upon species of particular conservation importance. The importance of habitats which have the potential to be impacted by the proposed scheme have also been assessed according to the same principles, both in terms of their intrinsic ecological value and the role they play as supporting habitats for waterbirds that form part of the populations of the SPA and Ramsar site.

9.3.7 For this section of the ES, potential impact significance was ascribed according to the combination of the value / sensitivity of receptor and the magnitude of the potential effect, as defined in **Table 9-3**.

Table 9-3 Approach adopted to the assessment of the significance of potential impacts on waterbird populations

Significance of impact	Magnitude of effect and value / sensitivity of receptor
High adverse	Permanent or long-term adverse and / or large scale / high magnitude adverse effect on integrity and / or conservation status of a feature of county or greater value (e.g. receptors of medium, high or very high sensitivity).
Moderate adverse	Temporary and / or small scale / low magnitude adverse effect on integrity and / or conservation status of a feature of national or greater value (e.g. receptors of high or very high sensitivity). Short or medium term and / or moderate scale / medium magnitude adverse effect on integrity and / or conservation status of a feature of county or greater value (e.g. receptors of medium, high or very high sensitivity). Permanent or long-term and/or large scale / high magnitude adverse effect on integrity and / or conservation status of a feature of district value (e.g. receptors of low sensitivity)
Low adverse	Temporary and / or small scale / low magnitude adverse effect on integrity and / or conservation status of a feature of district or county value (e.g. receptors of low sensitivity). Adverse effects on integrity and / or conservation status of a feature of local / Site value (e.g. receptors of low sensitivity).
Negligible	Negligible effect on integrity and / or conservation status.
Low beneficial	Temporary and / or small scale / low magnitude beneficial effect on integrity and/or conservation status of a feature of district or county value (e.g. receptors of low sensitivity). Beneficial effects on integrity and / or conservation status of a feature of local / Site value (e.g. receptors of low sensitivity)
Moderate beneficial	Temporary and / or small scale / low magnitude beneficial effect on integrity and / or conservation status of a feature of national or greater value (e.g. receptors of high or very high sensitivity). Short or medium term and / or moderate scale / medium magnitude beneficial effect on integrity and / or conservation status of a feature of county or greater value (e.g. receptors of medium, high or very high sensitivity). Permanent or long-term and / or large scale / high magnitude beneficial effect on integrity and / or conservation status of a feature of district value (e.g. receptors of low sensitivity).
High beneficial	Permanent or long-term and / or large scale / high magnitude beneficial effect on integrity and / or conservation status of a feature of County or greater value (e.g. receptors of medium, high or very high sensitivity).

Cross references to other technical areas to assist with the identification of impacts

9.3.8 To inform the assessment of potential impacts to marine and coastal ornithology, reference has been made to the results of the hydrodynamic and sedimentary regime studies (**Section 5**) and the impact assessments for noise and vibration, water and sediment quality (**Section 7**), marine ecology (**Section 8**) and lighting (**Appendix 20.4**). The noise and vibration assessment (**Section 14**) has drawn conclusions regarding the potential impact of construction and operational phase noise on waterbird populations based on published research on waterbird behaviour / response to noise disturbance. The conclusions drawn in **Section 14** are a key input to the assessment of potential impacts on waterbirds.

9.4 Existing environment

9.4.1 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 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 common terns and shelduck, the latter of which can be found nesting in Bran Sands lagoon.

Designated conservation sites

9.4.2 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 scheme are presented in **Table 9-4** and illustrated in **Figure 8-8**.

Table 9-4 Designated sites of ornithological interest relative to the proposed port options

Designated site	Distance from proposed port 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

9.4.3 Details of the waterbird interest features of these designated sites are described in the following sections.

South Gare and Coatham Sands SSSI

9.4.4 Natural England's citation report for the South Gare and Coatham Sands SSSI states that the site is of considerable environmental interest for its flora, invertebrate fauna and bird life. The range of habitats

present includes extensive tracts of intertidal sand and mud, sand dunes, saltmarsh and freshwater marsh which have all developed since the construction of South Gare breakwater during the 1860s.

9.4.5 Areas of mud and sandflat at Bran Sands (on the southern bank at the mouth of the Tees estuary) provide important winter feeding grounds for bar-tailed godwit, curlew, redshank, dunlin and grey plover. The intertidal areas at Coatham Sands support an internationally important population of sanderling (1,200 birds equating to approximately 8% of the West European population). The Coatham Sands intertidal areas also support turnstone, purple sandpiper and oystercatcher.

Teesmouth and Cleveland Coast SPA

9.4.6 Teesmouth and Cleveland Coast SPA includes a range of coastal habitats, including sand-and mud-flats, rocky shore, saltmarsh, freshwater marsh and sand dunes. Together these habitats provide feeding and roosting opportunities for important numbers of waterbirds in winter and during passage periods. In summer little tern *Sterna albifrons* breed on beaches within the site, while sandwich tern *Sterna sandvicensis* are abundant on passage.

9.4.7 The Teesmouth and Cleveland Coast SPA is of European importance because it is used regularly by at least 1% of the Great Britain population of the following species listed on Annex I of the Birds Directive (79/409/EC), as illustrated in **Table 9-5**.

Table 9-5 Annex I species of the Teesmouth and Cleveland Coast SPA

Annex I species	5 year peak mean	% of GB population
Little tern *Sterna albifrons*	40 pairs (1995-1998)	1.7
Sandwich tern *Sterna sandvicensis*	1,900 birds (1988-1992)	6.8

9.4.8 In addition, the SPA is used regularly by 1% or more of the biogeographical population of the migratory species (other than those listed in Annex I) in any season, as presented in **Table 9-6**.

Table 9-6 Non-Annex I migratory species

Non-Annex I migratory species	5 year peak mean	% of population
Knot *Calidris canutus*	5,509 (1991/92-1995/96)	1.6 (NE Canada/Greenland/Iceland/ UK)
Redshank *Tringa totanus*	1,648 (1987-1991)	1.1 (Eastern Atlantic wintering)

9.4.9 The SPA further qualifies as it is used regularly by over 20,000 waterbirds or 20,000 seabirds in any season; the SPA supported a peak mean of 21,312 individuals over the period 1991/92 to 1995/96.

9.4.10 In addition to the above, the SPA also supports nationally important populations of cormorant *Phalacrocorax carbo*, shelduck *Tadorna tadorna*, teal *Anas crecca*, shoveler *Anas clypeata*, ringed plover *Charadrius hiaticula* and sanderling *Calidris alba*.

9.4.11 In addition to the cited SPA features (as above), ringed plover (non-breeding) were identified in the 2001 SPA Review as being present in numbers which would qualify them for further consideration as a new and additional feature of the SPA. An extension to encompass little tern and, potentially, common tern foraging is also being considered. Natural England has advised that through this review process,

the SPA boundaries may also be proposed to be extended to encompass the wintering waterbird assemblage that uses habitats within and adjacent to the DCO application site. The entire lagoon at Bran Sands and the adjacent Dabholm Gut are being considered in the proposed SPA Review in the context of supporting habitat for the SPA wintering waterbird assemblage.

9.4.12 Natural England has also advised that it is currently drafting advice for Government which proposes that these additional features and boundary extensions are formally added to the SPA (public consultation on this has not yet commenced). However, as a matter of law and Government policy, ringed plover are not currently protected as an SPA feature.

9.4.13 Given that advice to Government on the designation of these features is being prepared, with regard to the consideration of likely impacts on these additional features and boundary extension, Natural England has recommended that the best way to take account of this would be to follow the same assessment process for them as if they were SPA interest features. Natural England has further advised that having particular regard to these species, boundaries and any likely effects on them would also be in accordance with the broad objectives of the Wild Birds Directive and help the competent authority to fulfil their duty under regulation 9A(8) of the 2010 Habitats Regulations (as amended) to use all reasonable endeavours (so far as they lie within their powers) to avoid any pollution or deterioration of wild bird habitat when exercising statutory functions.

9.4.14 The above advice on the approach to the assessment has been reflected in the approach taken to the assessment of potential impacts on waterbirds in the EIA process (this section of the ES) and the HRA (**Document 6.3**).

Teesmouth and Cleveland Coast Ramsar site

9.4.15 The Teesmouth and Cleveland Coast Ramsar site is of international importance due to ability to support a bird assemblage of international importance with peak counts in winter (Ramsar criterion 5), as well as its ability to support species / populations occurring at levels of international importance (Ramsar criterion 6). The qualifying species under Ramsar criterion 6 comprise:

- Common redshank *Tringa totanus totanus* (species peak counts in spring/autumn): 833 individuals representing an average of 0.7% of the GB population (5 year peak mean 1998/9 to 2002/3).
- Red knot *Calidris canutus islandica* (species with peak counts in winter): 2,579 individuals, representing an average of 0.9% of the GB population.

Seal Sands SSSI

9.4.16 The extensive mudflats within the Seal Sands SSSI are of great ornithological importance, attracting large numbers of migratory wildfowl (approximately 4,000) and wading birds (approximately 24,000) especially during the winter months. Of particular note are the internationally important concentrations of shelduck (approximately 3,200 during peak counts) which feed on Seal Sands. The shelduck population which uses the Seal Sands SSSI represents approximately 2% of the total Western European population.

9.4.17 In addition, sizeable flocks of mallard, teal and wigeon, as well as diving duck such as pochard, goldeneye and tufted duck congregate on Seal Sands to roost and feed, particularly during periods of cold weather.

9.4.18 The most important species of wading birds using Seal Sands as their main feeding ground during the winter months of the year are knot (approximately 10,000 birds at peak counts) and redshank (approximately 1,050 birds at peak counts), which both occur in internationally significant numbers.

9.4.19 The mudflats are also used as feeding grounds by other species of wading birds including dunlin, oystercatcher, ringed plover, curlew, bar-tailed godwit, lapwing, grey plover and turnstone. When the mudflats are inundated at high tide their use as a feeding ground is complemented by adjacent areas of reclaimed land which also serves as roosting sites. The reclaimed enclosures with shallow lagoons in the southern sector of the site and the developing sand-dunes on the Seal Sands peninsula are particularly important in this respect.

Teesmouth NNR

9.4.20 The Teesmouth NNR covers two main areas, namely Seal Sands and North Gare. Seal Sands is a large area of intertidal mud and sand-flats with populations of common and grey seals as well as nationally and internationally important bird populations. North Gare comprises sand dune and saltmarsh habitat supporting a wide variety of plants and birds, including large populations of knot and birds of prey, such as merlin, which hunt over the dunes.

Seaton Dunes and Common SSSI

9.4.21 Seaton Dunes and Common is an area of importance for its flora, invertebrate fauna, and bird life. The range of habitats present include sandy, muddy and rocky foreshore, dunes, dune slacks and dune grassland, as well as relict saltmarsh, grazed freshwater marsh with dykes, pools and seawalls.

9.4.22 Seaton Sands, North Gare Sands and Seaton Snook dunes provide important winter feeding grounds and roost sites for various species of wading birds including sanderling, knot, ringed plover, turnstone, oystercatcher, dunlin and grey plover. The Teesmouth population of sanderling exceeds internationally important levels and up to half of the 1,200 birds (5.7% of the W. European population) feed and roost within the SSSI.

9.4.23 Similarly, the site support large populations of knot during winter, when up to 10,000 birds (3% of the W. European population) may roost on Seaton Snook Dunes during high tide. The populations of other species of wading birds reach nationally significant levels, with up to 200 ringed plover (about 1% of the W. European population) and approximately 250 turnstone (2.4% of the UK wintering population) present within the site prior to migration. Large numbers of common, arctic and sandwich terns (3,500 at peak counts) also frequent the Seaton Snook area on migration.

Tees and Hartlepool Foreshore and Wetlands SSSI

9.4.24 The site comprises several coastal areas which are an integral part of the complex of wetlands, estuarine and maritime sites supporting the internationally important populations of wildfowl and waders on the Tees estuary. In winter the site supports nationally important numbers of purple sandpiper,

sanderling and shoveler. Parts of the site also support a nationally important assemblage of breeding birds, including shoveler, pochard, little ringed plover, great crested grebe and little grebe.

Cowpen Marsh SSSI

9.4.25 Cowpen Marsh includes the largest saltmarsh between Lindisfarne and the Humber Estuary and together with adjacent coastal grazing marshes and mudflats it provides an important wintering site for migratory wildfowl and wading birds.

9.4.26 Greatham Creek and Cowpen Marsh together provide important roosting and feeding grounds for large numbers of migratory wildfowl and wading birds which also feed on intertidal mudflats around the Tees estuary. Species feeding and roosting at this site include wigeon, teal, curlew, redshank, bar-tailed godwit, lapwing, golden plover, dunlin, mallard, moorhen, coot, snipe, reed bunting and yellow wagtail.

Redcar Rocks SSSI

Redcar Rocks represent the finest exposures of rock in the Lower Lias north of the Market Weighton Swell (i.e. in the Yorkshire Basin). When exposed at low tide, the rocks and sands provide an important feeding ground for several species of wading birds (e.g. knot, turnstone, sanderling and purple sandpiper), especially during the winter months. These compliment other areas of rocky foreshore within South Gare and Coatham Sands SSSI.

Waterbird populations at high water

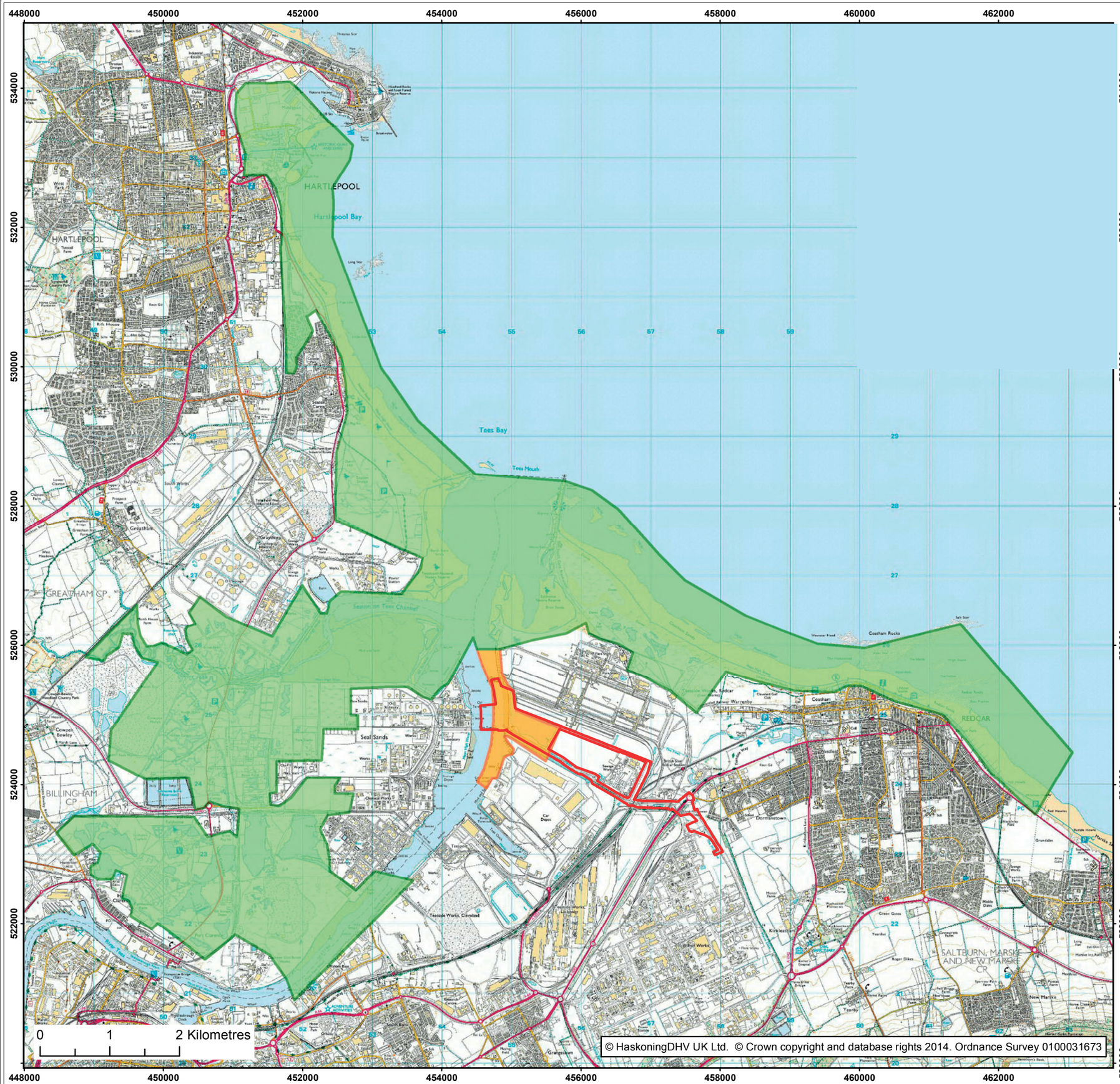
9.4.27 WeBS is a partnership between the BTO, the Royal Society for the Protection of Birds (RSPB) and the JNCC in association with the Wildfowl and Wetlands Trust (WWT). Data from WeBS are routinely used when assessing the ornithological interest of estuarine areas potentially affected by development.

9.4.28 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 (BTO, 2010). Core Count data was obtained for the most recent five available years (i.e. 2008/09 to 2012/13) for the following sites (illustrated on **Figure 9-1**):

- Tees estuary (sector 52901); and,
- Bran Sands South (sector 52427, in which the proposed scheme is located).

9.4.29 Five year peak means for waterbird species within the Tees estuary and the Bran Sands South sector are presented in **Table 9-7** and **Table 9-8** respectively.

9.4.30 The data shows that the highest usage of waterbirds within both count sectors is during the winter periods. In the Tees estuary sector, the area is used by a wide range of birds, however, the predominant species include mute swan, greylag goose, Canada goose, shelduck, wigeon, gadwall, teal, mallard, shoveler, tufted duck, golden eye, cormorant, coot, oystercatcher, ringed plover, golden plover, grey plover, lapwing, knot, sanderling, dunlin, curlew, redshank, turnstone, herring gull, great black-backed gull, sandwich tern and common tern. The predominant species using the Bran Sands South count sector include shelduck, teal, mallard, goldeneye, red-breasted merganser, cormorant and lapwing.



Legend:

DCO Order Limits

Wetland Bird Survey

Bran Sands South (52427)

Tees Estuary (52901)

DCO Order Limits as of 24/02/15

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

Title:

Environmental Statement: Wetland Bird Survey Core Count Sectors Near Harbour Facilities

Part:	Figure:	Drawing No:
HF	9.1	9Y0989-HF-9-001

Rev:	Date:	Drawn:	Checked:	Size:	Scale:
1	04/03/2015	JE	SC	A3	1:55,000
0	09/12/2014	JE	SC	A3	1:55,000

Co-ordinate system: British National Grid

Royal HaskoningDHV
Enhancing Society Together

ROYAL HASKONINGDHV
INDUSTRY, ENERGY & MINING
RIGHTWELL HOUSE
BRETTON
PETERBOROUGH
PE3 8DW
+44 (0)1733 33 44 55
www.royalhaskoningdhv.com

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Waterbird populations at low water

9.4.31 Consultation with the British Trust for Ornithology (BTO) during November 2014 identified that the most recent WeBS low water count data for the count sector in which the proposed scheme is located (section DT021) was gathered during 1996/97. It was, therefore, considered that this data would not be representative of the present day usage of the area given its age, and was not used to inform this section of the ES. In the absence of WeBS low water count data, the results of INCA's bird surveys and distribution plots have been used to describe low water usage of the area; this data is of significantly greater value to the impact assessment given it is highly site-specific and spans several years.

Table 9-7 Summary of peak monthly totals and seasonal peaks in waterbird populations in the Tees estuary (sector 52901) over the period 2008/09 to 2012/13

Year	Month	Tees estuary (sector 52901)			
		Peak monthly total[1]	Seasonal peak[2]		
			Autumn	Winter	Spring
2008/09	December	17,396	16,237	22,218	6,820
2009/10	December	20,802	19,873	28,157	7,403
2010/11	December	18,033	18,422	25,969	8,283
2011/12	January	16,669	15,216	23,905	6,659
2012/13	January	17,593	15,439	22,541	8,523
MEAN		18,099	17,037	24,558	7,538

1 Peak monthly total = maximum of the sum of the counts of all species within each month
2 Seasonal peak = sum of the maximum counts of all species within each season

Table 9-8 Summary of peak monthly totals and seasonal peaks in waterbird populations in the Bran Sands South sector (sector 52427) over the period 2008/09 to 2012/13

Year	Month	Bran Sands South (sector 52427)			
		Peak monthly total[1]	Seasonal peak[2]		
			Autumn	Winter	Spring
2008/09	January	832	794	1,256	330
2009/10	February	725	560	944	496
2010/11	February	906	752	1,352	429
2011/12	March	583	480	941	232
2012/13	December	890	460	1,489	432
MEAN		787	609	1,196	384

1 Peak monthly total = maximum of the sum of the counts of all species within each month

2 Seasonal peak = sum of the maximum counts of all species within each season

9.4.32 As illustrated on the bird distribution plots presented in **Appendix 9.1**, the intertidal area at the footprint of the proposed scheme is used by a range of waterbirds, including shelduck, teal, lapwing, redshank, turnstone, curlew and common tern.

9.4.33 However, the distribution plots presented within **Appendix 9.1** (which illustrate usage between January 2012 and March 2014) show that the number of birds using the intertidal area within the footprint of the proposed scheme is very low. The waterbird count data is presented and discussed below.

Bird survey data from Dabholm Gut, Bran Sands lagoon and the river frontage area

9.4.34 This sub-section summarises the waterbird data for Dabholm Gut, Bran Sands lagoon and the river frontage for the period 2009 to 2013. **Appendix 9.2** contains the full waterbird dataset.

9.4.35 **Table 9-9** presents the annual peak counts for key bird species within Bran Sands lagoon from 2009 to 2013. This data has been used to calculate a five year average of usage within Bran Sands lagoon, which has been compared to the WeBS five year average data for the Tees WeBS site. This approach has also been used for the data from Dabholm Gut and the river frontage area, which are presented in **Table 9-10** and **Table 9-11** respectively.

9.4.36 Recording of birds on Dabholm Gut, Bran Sands lagoon and the river frontage was carried out sequentially. This means that there may have been some interchange of birds between sites during the survey period and, therefore, aggregating the waterbird data from these areas will result in double counting of waterbirds. However, **Appendix 9.2** presents a table of aggregated waterbird data in response to a request made by Natural England to present the data in this way. It is not appropriate to sum the total number of birds counted at the three sites as one population.

Table 9-9 Peak counts and five year averages (2009 to 2013) within Bran Sands lagoon, compared against five year average data for the Tees WeBS site (source: INCA, 2014)

Species	Peak Counts					5-year average	WeBS 5-year average 2009 -2013	% WeBS 5-year average
	2009	2010	2011	2012	2013			
Mute Swan	13	7	12	4	2	8	85	9%
Canada Goose	24	-	-	-	-	5	823	< 1%
Shelduck	189	104	106	68	73	108	451	24%
Gadwall	9	21	2	13	3	10	407	2%
Teal	97	176	185	32	194	137	1661	8%
Mallard	28	37	72	13	16	33	304	11%
Pochard	-	33	8	17	-	12	94	13%
Tufted Duck	-	2	1	-	-	1	266	< 1%
Scaup	-	3	-	-	-	1	2	50%
Long-tailed Duck	-	-	-	-	2	< 1	2	< 1%
Goldeneye	22	31	80	63	24	44	84	52%
Red-breasted Merganser	9	16	70	25	43	33	64	52%

Species	Peak Counts					5-year average	WeBS 5-year average 2009 -2013	% WeBS 5-year average
	2009	2010	2011	2012	2013			
Little Grebe	3	6	19	14	15	11	65	17%
Great Crested Grebe	-	2	3	-	-	1	42	2%
Cormorant	-	-	-	-	17	3	298	1%
Grey Heron	-	-	-	1	4	1	44	2%
Little Egret	-	-	-	-	11	2	30	7%
Oystercatcher	-	-	1	-	-	< 1	1262	< 1%
Lapwing	24	37	6	-	30	19	4218	< 1%
Dunlin	-	-	4	-	-	1	767	< 1%
Curlew	2	5	4	8	3	4	1195	< 1%
Redshank	82	86	30	13	99	60	1235	5%
Turnstone	13	-	7	1	7	6	233	3%
Common Tern	-	34	-	-	19	11	509	2%
Sandwich Tern	-	-	-	-	18	4	177	2%

Table 9-10 Peak counts and five year averages (2009 to 2013) within Dabholm Gut, compared against five year average data for the Tees WeBS site (source: INCA, 2014)

Species	Peak Counts					5-year average	WeBS 5- year average 2009 - 2013	% WeBS 5-year average
	2009	2010	2011	2012	2013			
Mute Swan	-	-	18	-	-	4	85	5%
Canada Goose			22	-	2	5	823	1%
Shelduck	18	67	83	74	74	63	451	14%
Gadwall	8	37	45	48	26	33	407	8%
Teal	120	314	275	422	241	274	1661	16%
Mallard	18	19	64	30	38	3	304	11%
Pochard	-	-	1	-	-	< 1	94	< 1%
Tufted Duck	-	-	6	-	2	2	266	1%
Red-breasted Merganser	-	-	5	-	-	1	64	2%
Cormorant	-	-	-	1	3	1	298	< 1%
Grey Heron	-	-	-	3	11	3	44	7%
Moorhen	-	-	-	2	2	1	71	1%
Oystercatcher	-	3	-	2	2	1	1262	< 1%

Species	Peak Counts					5-year average	WeBS 5- year average 2009 - 2013	% WeBS 5-year average
	2009	2010	2011	2012	2013			
Lapwing	47	40	1	17	68	35	4218	1%
Dunlin	-	6	20	-	5	6	767	1%
Bar-tailed Godwit	-	-	-	1	-	< 1	142	< 1%
Curlew	2	4	6	2	3	3	1195	< 1%
Redshank	79	132	111	89	156	113	1235	9%
Common Sandpiper	-	5	-	-	-	1	5	20%
Turnstone	11	56	9	17	20	23	233	10%
Common Tern	-	-	-	-	4	1	509	< 1%

Table 9-11 Peak counts and five year averages (2009 to 2013) along the river frontage (including intertidal area) north from Dabholm Gut to the boundary with the adjacent steel works site, compared against five year average data for the Tees WeBS site (source: INCA)

Species	Peak Counts					5-year average	WeBS 5-year average 2009 -13	% WeBS 5-year average	Note
	2009	2010	2011	2012 Note1	2013 Note 1				
Shelduck	5	6	6	2	6	5	451	1.1	
Gadwall	9	-	-	-	-	2	407	0.5	
Teal	13	4	5	-	-	4	1661	0.2	
Mallard	2	2	-	-	-	<1	304	<0.3	
Pochard	-	-	5	-	-	1	-	-	2
Tufted Duck	-	-	12	-	-	3	-	-	2
Eider	-	-	-	1	1	<1	-	-	2
Goldeneye	3	-	-	-	-	<1	-	-	
Red-breasted Merganser	4	-	17	-	2	5	-	-	2
Cormorant	106	2	4	11	15	28	298	9.4%	
Grey Heron	-	-	4	-	7	2	-	-	
Oystercatcher	12	8	11	12	11	11	-	-	
Lapwing	-	-	4	-	90	19	4218	0.5	
Curlew	3	2	10	3	6	5	1195	0.4	
Turnstone	3	2	2	1	10	4	233	1.7	
Common Sandpiper	-	-	-	-	1	<1	-	-	

Species	Peak Counts					5-year average	WeBS 5-year average 2009 -13	% WeBS 5-year average	Note
	2009	**2010**	**2011**	**2012 Note1**	**2013 Note 1**				
Redshank	59	10	5	8	3	17	1235	1.4	

Notes:
1. Considerable disturbance during this period due to site maintenance work.
2. Birds on river adjacent to mudflats.

9.4.37 The NWL jetty is used as a regular roost site by cormorants. Cormorants resting on jetty were counted from 2010 until October 2014. The maximum counts together with the corresponding WeBS data are shown in **Table 9-12**.

Table 9-12 Maximum counts for cormorants NWL Jetty

Year	Month	Peak count	WeBS Count	% of WeBS Count
2010	September	68	192	35%
2011	February	10	106	9%
2012	November	17	122	14%
2013	February	61	28	218%
2014	February	37	109	34%

9.4.38 The data in **Table 9-10** to **Table 9-11** shows that there is significant waterbird use of both Bran Sands lagoon and Dabholm Gut by a variety of bird species, with a variety of species found at numbers exceeding 1% of the corresponding Tees WeBS site monthly count for at least one month. **Table 9-12** shows that the number of waterbirds present is low on the river frontage, but exceeds 1% of the Tees WeBS site counts for shelduck, turnstone and redshank. Based on the 5-year 2010-2014 peak counts of cormorants recorded on the NWL jetty, 10% of the 5-year 2009-2013 average of the peak annual Tees WeBS site count was exceeded in four of the five years.

Bird survey data from the Vopak foreshore

9.4.39 **Table 9-13** presents the data from the waterbird surveys of the Vopak foreshore. The only species using the site in any significant numbers is lapwing. The majority of these birds are roosting, recorded as loafing, with only a small number appearing to be feeding. In observations recorded on the adjacent terrestrial area at Vopak over recent years, the number of lapwing was also quite high with flocks of over 200 birds using the site for roosting. It is likely that the preferred roosting area is the Vopak landholding, but the birds move down onto the intertidal area when disturbed by activity on the adjacent site.

Table 9-13 Results of the waterbird surveys of the Vopak foreshore (f = feeding; l = loafing)

Date	Bar-tailed Godwit	Common tern	Cormorant	Curlew	Dunlin	Heron	Lapwing	Oyster-catcher	Redshank	Shelduck
24/06/13			1 l							1 l
27/06/13			2 l	1 f				1 f		
10/07/13				1 f			3 l	3 f		
23/07/13				4 f		7 l	1 l 2 f	6 f		
01/08/13		2 l		1 f			3 f 5 l	8 f		
21/08/13			5 l	3 f			25 l	4 f		
04/09/13			5 l	2 f	4 f		21 l	6 f	2 f	
20/09/13			2 l	3 f			130 l	2 f		
02/10//13	1 f		6 l	1 f			10 l	7 f		
17/10/13	5 f		2 l	5 f			22 l	4 f		
04/11/13	1 f			4 f			6 f 40 l	3 f	2 f	1 f
15/11/13			4 l	3 f			43 l	2 f		
04/12/13			2 l	5 f			140 l	5 f		
09/12/13			24 l	1 f			30 l	3 f		
18/12/13							165 l	2 f		
06/01/14			73 l				77 l	4 f		
17/01/14	1 f						14 l	5f		
17/02/14								3 f		1 f
25/02/14								2 f		2 l
03/03/14			1 l	4 f				1 f	1 f	2 l
19/03/14				1 f				2 f		

Summary of bird surveys undertaken by INCA within the wider Tees estuary during previous years

Teesport Estate

9.4.40 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

9.4.41 Counts of waterbirds using the Vopak foreshore 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.

9.4.42 Results of the waterbird counts undertaken between June 2013 and March 2014 are presented above.

Breeding birds

9.4.43 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.

9.4.44 Shelduck breed along the northern shore of Bran Sands lagoon, despite the proximity of this area to the neighbouring steel works.

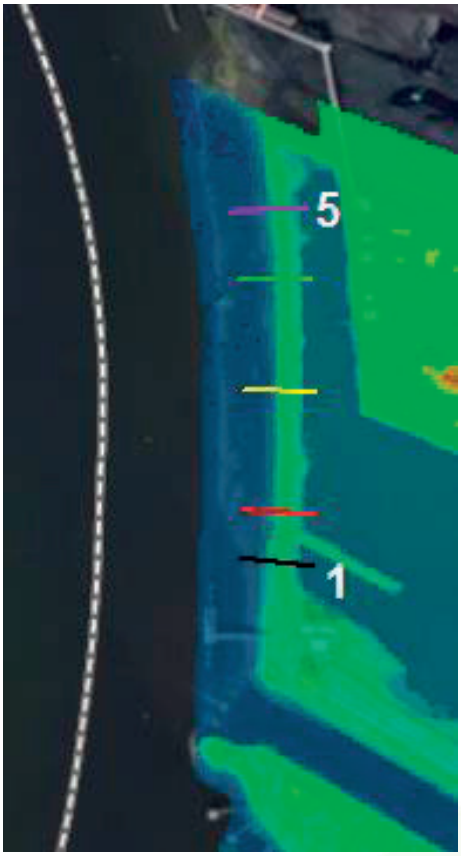
Nature and functioning of the intertidal area at the site of the proposed port terminal

9.4.45 A description of the nature of the intertidal area at the site of the proposed port terminal is provided in **Section 8.4**. In summary, the intertidal area is considered to be of low value for feeding waterbirds due to the nature of the substratum present. The waterbirds counts undertaken along this intertidal frontage confirm that the waterbird interest is limited.

9.4.46 The PER made reference to the intertidal area being exposed on spring tides only. In response to comments received from Natural England during the Section 42 consultation process on this point (i.e. in response to the PER), further analysis has been undertaken of the functioning of the intertidal in terms of its exposure / inundation cycle and availability for feeding waterbirds.

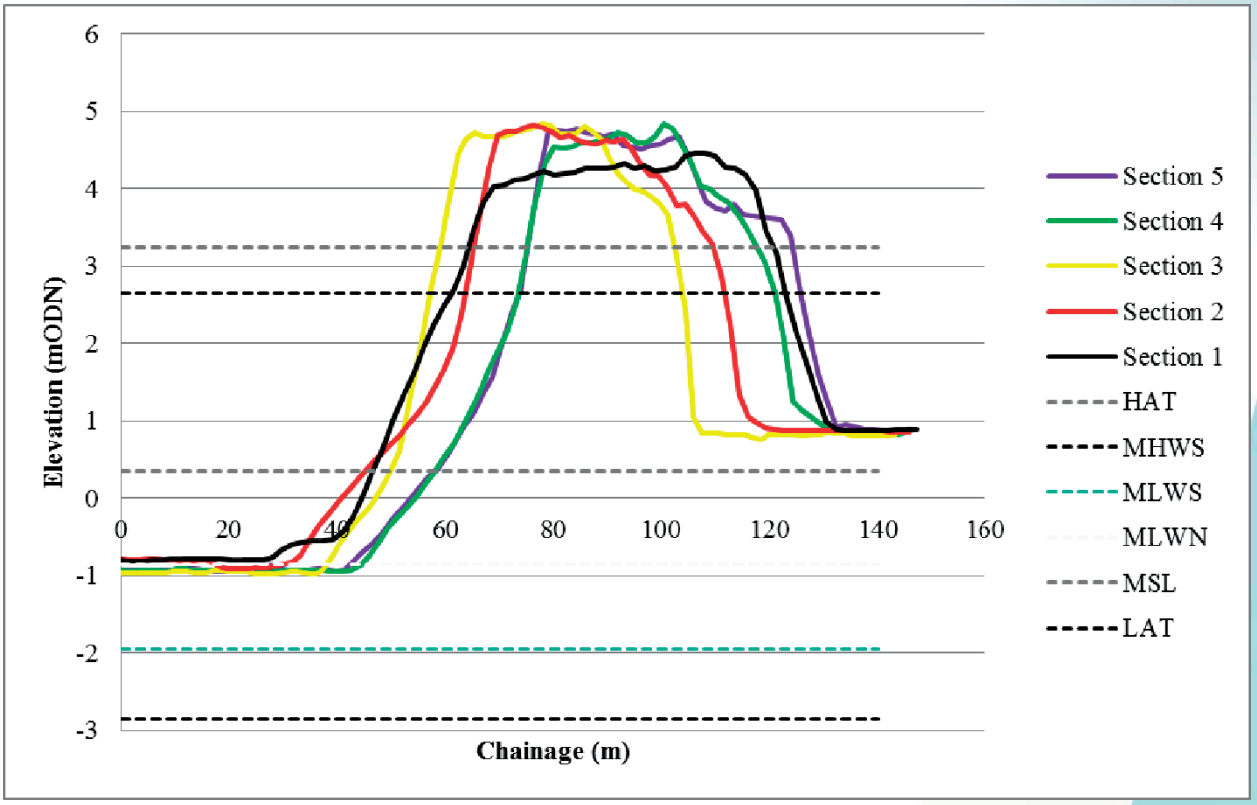
9.4.47 **Figure 9-2** shows the location of a series of sections across the embankment between Bran Sands lagoon and the Tees estuary. **Figure 9-3** shows the elevation (from LIDAR data) across each of the sections shown on **Figure 9-2**.

Figure 9-2 Locations of cross section where elevation data (LIDAR) has been extracted (and presented in Figure 9-3)



9.4.48 The level of the intertidal is shown on the left hand side of **Figure 9-3**, which indicates that the level is relatively uniform across the length of the intertidal area. The elevation of the intertidal area is at 1.85m above LAT.

Figure 9-3 Elevation (LIDAR) data from sections shown in Figure 9-2



9.4.49 The calculations of the exposure time of the intertidal were undertaken by the PD Ports Conservancy department. They determined that the intertidal area would be exposed on 77% of tides (and not exposed for 23% of tides), which amounts to it being continuously inundated for almost one week in four. For a full spring/neap tidal cycle, the intertidal area would be exposed for a cumulative average of 20% of the time (i.e. 131 hours out of every 28 days (or 655 hours)).

9.4.50 In addition to the tidal inundation, the outfall from Bran Sands lagoon discharges onto this intertidal area. Water discharging from the lagoon ponds behind the training wall and causes inundation of a significant part of the intertidal area during times when the level of the tide is below the level of the intertidal. Much of the intertidal is, therefore, constantly inundated.

9.5 Assessment of potential impacts during construction

Impacts to bird feeding resource due to reductions in water quality

9.5.1 As discussed in **Section 5.5**, the proposed capital dredging would cause suspension of fine sediment into the water column, causing a sediment plume which could potentially affect habitats used by waterbirds and prey that represent a feeding resource for waterbirds. Adverse impacts could arise in the form of reduced feeding resource for birds as well as reduced ability of birds to identify prey species through the water column. The proposed use of an enclosed grab for dredging contaminated sediment would result in negligible loss of contaminated material. Dredging of sand and gravel, clay and mudstone could be undertaken using a CSD, TSHD and backhoe dredger. The predicted increase in

suspended sediment concentration resulting from the use of this dredging plant is presented in **Section 5.5**.

9.5.2 The potential effect of dredging using a CSD and TSHD on suspended sediment concentration in the water column is likely to result in a temporary (displacement) impact on small fish that represent prey for some species of waterbirds. On the basis of the sediment plume dispersion modelling, no impact is predicted on intertidal areas and any effect would not extend beyond (approximately) the entrance to Seaton Channel in the downstream (seaward) direction or the entrance to Tees Dock in the upstream (landward) direction. Waterbirds would be able to continue to feed at the estuary mouth and in the near shore waters of Tees Bay during the construction phase for the proposed scheme, and would also be able to feed within the estuary, with some redistribution away from the locations of greatest increase in suspended sediment likely.

9.5.3 It is predicted that increased suspended sediment concentrations for the duration of capital dredging phase would not result in an impact on feeding waterbirds beyond the zone of the estuary between Tees Dock and the mouth of Seaton Channel, and any effect within this zone is likely to be localised, temporary and of a low magnitude. The receptor is considered to be of very high sensitivity (i.e. of International / National value), but no effect on overall population level or status would occur. Consequently the potential impact is assessed as being of **low adverse** significance.

Mitigation measures and residual impact

9.5.4 The mitigation measures that are proposed to limit sediment release during capital dredging (see **Section 7.5**) would mitigate this potential impact. These mitigation measures have been taken into account in the impact assessment presented above. Hence the residual impact would be of **low adverse** significance.

Smothering of intertidal food resource through deposition of fine sediment following dredging

9.5.5 The results of the sediment deposition modelling predict that no material disturbed during capital dredging would be deposited on the intertidal areas in the study area and, therefore, **no impact** on the intertidal food resource is anticipated.

Mitigation measures and residual impact

9.5.6 No mitigation measures are required and there would be **no residual impact**.

Loss of feeding and roosting habitat due to the construction of the port terminal

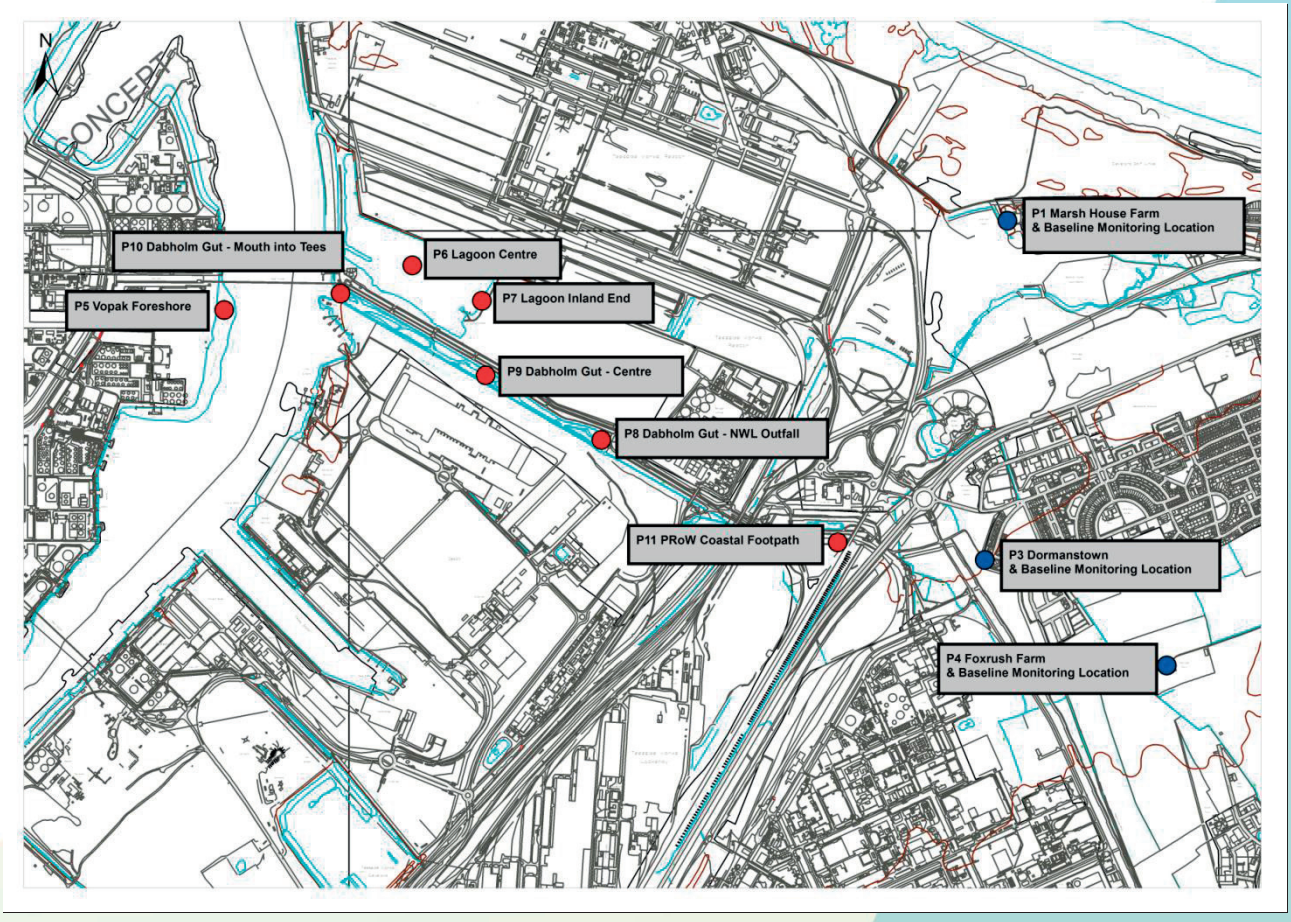
9.5.7 The construction of the port terminal would result in the loss of the intertidal area within the footprint of the terminal and - as a result of the construction of Phase 2 of the port terminal – the removal of the NWL jetty. Although this would occur (progressively) during the construction phase, the potential impact on waterbirds is manifested during the operational phase. Hence the potential impact is assessed in **Section 9.6**. The implications of the habitat enhancement measures that also form part of the proposed scheme are also assessed in **Section 9.6**.

Noise disturbance during the construction works

9.5.8 Airborne noise modelling has been undertaken to predict the noise levels due to piling and construction of the conveyor; these aspects of the construction works has the greatest potential to result in disturbance to waterbirds. The results of the modelling have been interpreted to assess the potential impact on areas that are used by waterbirds. The results show increases in noise levels extending across Bran Sands lagoon, Dabholm Gut and across the estuary, including across the intertidal area on the Vopak foreshore (see **Figure 10-10**). The noise assessment has considered piling for construction of the port terminal and the overland conveyor (piling for the latter would be undertaken using bored piling techniques; percussive piling is not possible due to the potential adverse impact on overground and buried infrastructure).

9.5.9 **Figure 9-4** shows the locations where the construction noise levels were predicted by the modelling studies.

Figure 9-4 Assessed receptor locations and baseline monitoring locations



9.5.10 The modelled predictions of piling noise emissions for a number of locations have been extracted from the model and are summarised below; the maximum predicted noise level at each receptor location during all construction works for the quay and conveyor is quoted below (noise emissions are based on 5 minutes of continuous piling):

- Vopak foreshore (receptor location P5) = 49dB LAeq 5mins.
- Centre of Bran Sands lagoon (receptor location P6) = 49dB LAeq 5mins.
- Inland end of Bran Sands lagoon (receptor location P7) = 48dB LAeq 5mins.
- Dabholm Gut at NWL outfall (receptor location P8) = 66dB LAeq 5mins.
- Dabholm Gut (centre) (receptor location P9) = 61dB LAeq 5mins.
- Dabholm Gut (mouth at confluence with the Tees) (receptor location P10) = 59dB LAeq 5mins.

9.5.11 The piling works for the terminal are expected to last for an overall duration of 13 weeks for the construction of Phase 1. There would be a second period of impact for the construction of Phase 2 of the port terminal (several years after the completion of Phase 1) which is expected to have a duration of 12 weeks. The overall construction period is expected to be 17 months for Phase 1 and a further 17 months for Phase 2.

9.5.12 Wright *et al.* (2010) investigated the effects upon waterbirds to impulsive noise and have identified ranges in noise which cause behavioural responses (based on a measured LAeq). These are:

- no observable behavioural response: 54.9 to 71.5dBA (with a high proportion of extreme outliers);
- non-flight behavioural response: 62.4 to 79.1dBA;
- flight with return: 62.4 to 73.9dBA; and,
- flight with all birds abandoning the site: 67.9 to 81.1dBA.

9.5.13 The above information highlights that below 55dBA, effects would not be significant, but when noise levels increase (particularly approaching 70dBA) there is a range of bird responses which have the potential to cause significant effects.

9.5.14 On the basis of the noise modelling predictions, it can be expected that no significant effects would occur to waterbirds on the inland half of the lagoon or on the opposite bank of the Tees estuary (the Vopak foreshore) due to the piling for the construction of the quay. For the construction of the conveyor along either the northern or southern envelope, no significant effects would occur beyond the mid-point of the lagoon (i.e. either the northern or southern half of the lagoon would be affected, depending on which conveyor route is constructed). Closer to the noise source, it would be expected that waterbirds would exhibit a non-flight behavioural response (e.g. moving away from the source of noise emission) or, in the immediate vicinity of the piling works, birds may exhibit a flight response. No significant effects, in terms of noise emissions, are predicted within the boundaries of designated sites, including North Tees Mudflat.

9.5.15 A series of noise contour plots showing predicted noise levels associated with the construction of the quay and either the northern or southern conveyor route is included in **Section 14.5**.

9.5.16 Other research (by Cutts *et al*., 2008) states that sudden, irregular noise above 50dBA should be avoided as this causes the maximum disturbance to birds. The research concludes that no effect would be expected for noise emissions below 50dBA, with head turning, scanning, reduced feeding and movement to other areas close by for noise emissions between 50dBA and 85dBA. The findings of this research would support the conclusion drawn above, in that no significant effects would be expected beyond the centre of Bran Sands lagoon, but some behavioural response would be exhibited by waterbirds exposed to higher noise levels closer to the noise emission source.

9.5.17 The significance of the potential impact of noise disturbance due to the proposed construction works would depend on the timing of the construction works relative to the period when waterbird numbers are at their highest in the Tees estuary (i.e. the overwintering period, October to March). For the purposes of the assessment and on a precautionary basis, it has been assumed that the piling works would take place over some or all of the winter period. Based on the evidence presented, the magnitude of the effect would be low and the effect would be temporary. The value of the receptor is very high (International / National). However, the effect is not considered to represent a population level impact. Nevertheless it is anticipated that there would be a disturbance effect over part of Bran Sands lagoon and Dabholm Gut but that an impact of **low adverse** significance would arise.

Mitigation measures and residual impact

9.5.18 As mitigation for the potential impact of noise disturbance, it is proposed that noise attenuation barriers would be positioned:

- along the embankment between Bran Sands lagoon and the proposed construction works for the port terminal; and
- on either side of the route of the overland conveyor should it be constructed in the southern corridor (i.e. between the lagoon and Dabholm Gut and the construction works for the conveyor); or
- between Bran Sands lagoon and the construction works for the conveyor should the conveyor be constructed in the northern corridor.

9.5.19 The use of noise reduction curtain over the hammer piling rig during percussive operations would be investigated; this can provide a minimum of 10dB attenuation.

9.5.20 The proposed locations for the acoustic barriers are shown in **Figure 9-5**. The effect of the proposed mitigation on piling noise has been modelled, and the results of the noise assessment are presented in **Tables 9-14** and **9-15** (for the south and north conveyor routes respectively) and in **Figures 9-6** and **9-7**.

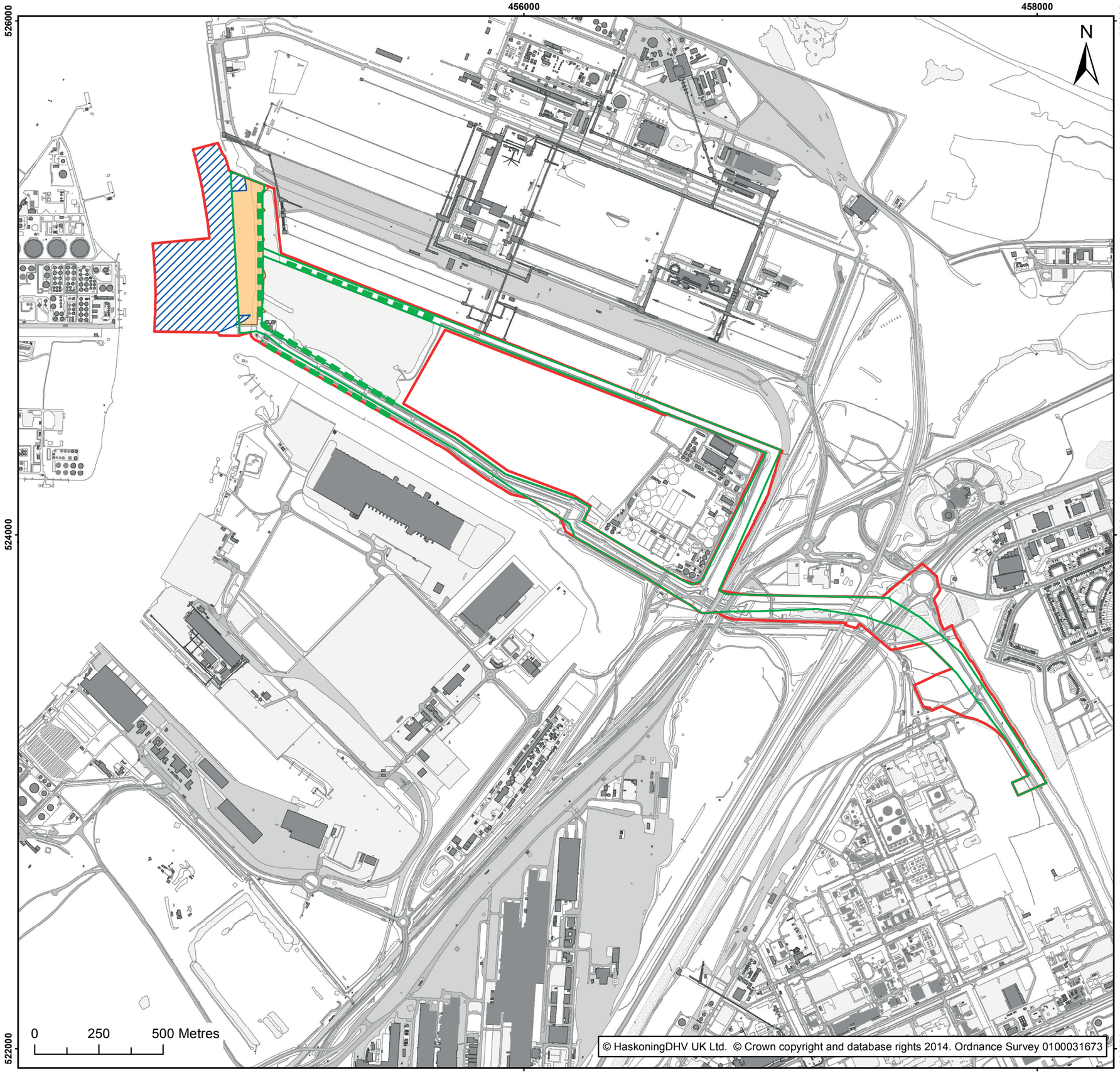
Table 9-14 Mitigated day noise impacts at ecologically sensitive receptor locations during quay percussive piling and south conveyor option construction (auger piling)

Receptor Location	Calculated (pre-mitigation) construction noise level dB	Mitigated construction noise level dB	Mitigated effect magnitude	Residual impact significance (i.e. mitigated)
P5	43 $L_{Aeq,5min}$	40 $L_{Aeq,5min}$	No impact	Negligible
P6	49 $L_{Aeq,5min}$	40 $L_{Aeq,5min}$	No impact	Negligible
P7	48 $L_{Aeq,5min}$	44 $L_{Aeq,5min}$	No impact	Negligible
P8	66 $L_{Aeq,5min}$	47 $L_{Aeq,5min}$	No impact	Negligible
P9	61 $L_{Aeq,5min}$	48 $L_{Aeq,5min}$	No impact	Negligible
P10	59 $L_{Aeq,5min}$	50 $L_{Aeq,5min}$	Low	Negligible

Table 9-15 Mitigated day noise impacts at ecologically sensitive receptor locations during quay percussive piling and north conveyor option construction (auger piling)

Receptor Location	Calculated (pre-mitigation) construction noise level dB	Mitigated construction noise level dB	Mitigated effect magnitude	Residual impact significance (i.e. mitigated)
P5	42 $L_{Aeq,5min}$	35 $L_{Aeq,5min}$	No impact	Negligible
P6	49 $L_{Aeq,5min}$	45 $L_{Aeq,5min}$	No impact	Negligible
P7	48 $L_{Aeq,5min}$	41 $L_{Aeq,5min}$	No impact	Negligible
P8	40 $L_{Aeq,5min}$	36 $L_{Aeq,5min}$	No impact	Negligible
P9	42 $L_{Aeq,5min}$	35 $L_{Aeq,5min}$	No impact	Negligible
P10	44 $L_{Aeq,5min}$	40 $L_{Aeq,5min}$	No impact	Negligible

Figure 9-6 Noise contour plot of mitigated quay percussive piling and south conveyor construction piling



Legend:

- DCO Order Limits
- Dredge Area Envelope
- Quay Area Envelope
- Conveyor Route Envelope
- Acoustic Barriers

DCO Order Limits as of 24/02/15

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

Title: Environmental Statement: Location of Acoustic Barriers

Part:	Figure:	Drawing No:
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Royal HaskoningDHV
Enhancing Society Together

ROYAL HASKONINGDHV
INDUSTRY, ENERGY & MINING
RIGHTWELL HOUSE
BRETTON
PETERBOROUGH
PE3 8DW
+44 (0)1733 33 44 55
www.royalhaskoningdhv.com

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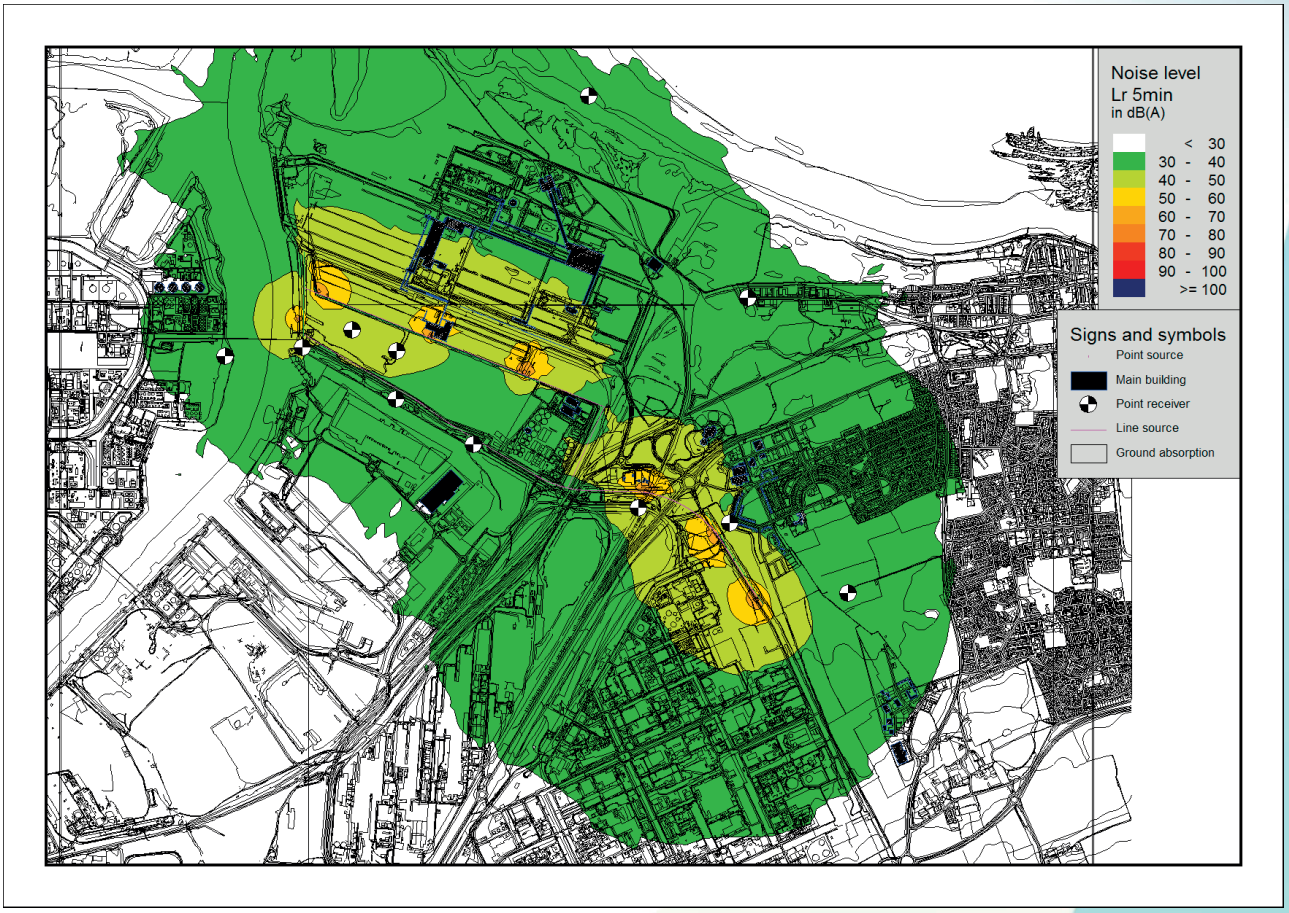
Figure 9-7 Noise contour plot of mitigated quay percussive piling and north conveyor construction piling



9.5.21 Based on the outcome of the noise assessment undertaken in Section 14.5, it is concluded that the mitigation would reduce construction noise levels at the modelled ecologically sensitive locations to a negligible level.

Visual disturbance (movements of construction plant and personnel and construction lighting)

9.5.22 It is envisaged that the following personnel would be employed during the construction phase:

- Staff (management and technical specialists / engineers).
- Labour and plant operatives.
- Mechanical and electrical engineers.
- Operatives for dredging works.

9.5.23 Construction plant would be present throughout the construction phase, with the focus of activity being along the corridor for the construction of the overland conveyor and along Tees frontage for the construction of the port terminal. For the works within the conveyor corridor (and construction traffic travelling to the Tees frontage), existing infrastructure (e.g. pipelines) and landforms would screen the

works from a direct line of sight to waterbirds present in Bran Sands lagoon and Dabholm Gut that are closest to the works and significant visual disturbance to waterbirds is not envisaged for these works.

9.5.24 The construction works on the Tees frontage would be more visible to areas used by significant numbers of waterbirds, specifically the Bran Sands lagoon, and there is the potential for disturbance throughout the 17 month construction phase for both Phases 1 and 2 of the construction of the port terminal. It should be noted that the structures for the overland conveyor would be constructed as part of Phase 1.

9.5.25 The effect of visual disturbance cannot be assessed in quantitative terms (in the same way as for the effect of noise emissions). It is considered likely that waterbirds would exhibit a behavioural response to visual disturbance and redistribute away from the immediate vicinity of the disturbance, but would be likely to become habituated to the visual disturbance over time. It is unlikely that the zone of effect of visual disturbance would be greater than the zone of effect due to increased noise emissions and, as a worst case, it is envisaged that birds within the seaward (western) half of the lagoon would experience disturbance initially, with habituation occurring over time. However, visual disturbance has the potential to occur over a longer period of time than noise disturbance, which is only likely to be of significance when piling is taking place.

9.5.26 Working hours during the construction phase are planned to be during the day time only, with night time working available as a contingency. There is, therefore, the potential for lighting to be required during the construction phase should there be any night time working. In addition, lighting is also likely to be required during day time working hours when natural light levels are low, such as over the autumn and winter seasons.

9.5.27 The fundamental considerations for temporary lighting schemes during construction are:

- To satisfy Health and Safety requirements.
- To minimise the potential effect of lighting upon the surrounding area by minimising sky glow, glare and light spillage.

9.5.28 As part of the construction phase lighting design, the strategies set out below would be adopted to ensure that the effect of construction phase lighting on the surrounding environment is minimised as far as possible and minimises the lighting effect on Bran Sands lagoon and Dabholm Gut:

- Artificial lighting during the construction phase would only be used during the hours of darkness, during low levels of natural light or during specific construction methods or tasks.
- Lighting would be directed to focus inwards to the site wherever possible to reduce external glare.
- The luminaires to be mounted on lighting columns would comprise of a flat glass construction, appropriate to the nature and location of the installation. The aiming angle of the peak intensity of the luminaire would be limited to maintain the light output from the luminaire within five degrees from the downward vertical. This would control the lighting of the area and minimise any potential glare, sky glow and obtrusive lighting to the surrounding areas. The luminaires to be mounted on the lighting columns would incorporate the appropriate photometry reflectors to control the distribution of light from the luminaires and maintain the illumination within the construction development areas, boundary or task area. The proposed horizontal lighting

illuminance levels (minimum and average levels) would comply with the lighting standard and guidance documents relevant to the method and construction work being undertaken (as set out in **Appendix 20.4**).

- During low levels of activity, public holidays or lulls in construction, the contractors would be required to maintain only appropriate minimum levels of illumination around the proposed development.
- HGVs and other site traffic during the construction phase, during the hours of darkness, would be subject to a travel plan strategy that limits traffic and, therefore, vehicle lighting during hours of darkness.

9.5.29 The value of the receptor is International / National and the magnitude of the effect would be very low and temporary; the zone of visual disturbance would be limited to the seaward end of the lagoon. Moreover, habituation would occur over the construction phase. Hence the potential impact of visual disturbance is predicted to be of low adverse significance (disturbance would be dominated by the noise impact when piling is taking place) and no effect on population levels of waterbirds would occur.

Mitigation measures and residual impact

9.5.30 The mitigation described above in relation to minimising construction noise would also mitigate the effect of visual disturbance during construction. It is expected that the proposed works could be almost entirely screened from areas used by waterbirds (i.e. with the exception of works at height, such as installation of the shiploaders and the main body of the conveyor).

9.5.31 As part of the construction process, contractors would be required to monitor the lighting levels and spillage, and records of lighting levels would be retained on site. Where lighting levels are found to be inadequate or excessive, mitigation strategies to remedy the effects would be implemented.

9.5.32 It is anticipated that the residual impact would be of **negligible** significance.

9.6 Assessment of potential impacts during operation

Implication of the proposed scheme for waterbird feeding habitat

9.6.1 As discussed within **Section 8**, both forms of quay construction would result in the direct loss of intertidal habitat due to reclamation (solid quay) and the construction of a revetment over the re-graded intertidal habitat (open quay).

9.6.2 The construction of the conveyor within either the northern or southern conveyor envelopes would be accommodated on existing land areas. It is, however, envisaged that there would be a need for the installation of up to three piled supports in the upstream (inland) section of Dabholm Gut for the construction of a conveyor within the southern envelope. Bird distribution plots (included within **Appendix 9.1**) show that the whole length of Dabholm Gut is used by waterbirds. The construction of a conveyor in the northern envelope would require a conveyor support to be located in Bran Sands lagoon.

9.6.3 The piled supports would each have a direct footprint of approximately $1m^2$ and, therefore, the direct impact in Dabholm Gut would be approximately $3m^2$ and direct impact in the lagoon would be approximately $1m^2$.

9.6.4 The bird distribution plots (**Appendix 9.1**) and 5 year average waterbird counts for the river frontage (**Table 9-13**) show that the area of intertidal habitat that would be directly impacted by the proposed port terminal is used by a range of species (albeit in low numbers). **Table 9-13** shows that based on 5 year data for the period 2009 to 2013, three species are present in numbers representing greater than 1% of the Tees WeBS site population, namely shelduck (1.1%), turnstone (1.7%) and redshank (1.4%), equating to a 5 year average of 5, 4 and 17 individuals of these species. In total, 17 species were recorded using the frontage over the period 2009-2013 (refer to **Table 9-13** for data). The loss of this habitat as a result of the construction of the port terminal would represent loss of feeding habitat for waterbirds of approximately 3.6ha (worst case) although, as noted above, the intertidal would be exposed for a cumulative average of 20% of the time for a full spring/neap tidal cycle (and a significant area is exposed for less time due to the effect of the discharge from Bran Sands lagoon causing ponding of water behind the training wall at the lower end of the intertidal).

9.6.5 Although the numbers of waterbirds recorded as using the intertidal area along the frontage are low in the context of the waterbird populations of the estuary (i.e. the intertidal area does not represent a significant contributory habitat to the SPA and Ramsar site), the fact that intertidal habitat is scarce within the Tees (in the context of the significant historic losses that have occurred) makes further loss of intertidal habitat proportionately more significant. However, the functionality of the intertidal area is a key consideration when assessing the significance of the potential impact. Given the (poor) functionality of this intertidal area as a feeding habitat for waterbirds, the effect associated with its loss is predicted to be of a low magnitude. However the receptor is of International / National value. The loss of the intertidal area would have some effect on the conservation status of waterbird populations; although it is considered that this would be minimal in light of the functioning of this area of intertidal. It is, therefore, concluded that the significance of the potential impact on waterbird feeding would be of **moderate adverse** significance (in isolation), according to the criteria in **Table 9-4**.

9.6.6 As described in **Section 3**, habitat enhancement measures are incorporated into the design of the proposed scheme. One of the objectives of the proposed measures is to provide additional feeding habitat in Bran Sands lagoon. The measures proposed would provide shallow water areas with intertidal fringes and would be designed to enable waterbird feeding across the area throughout the tidal cycle. It is proposed that a feeding habitat of up to 50% greater than the area lost due to the construction of the port terminal would be created (see **Drawing PB1586-SK467**). The use of maintenance dredged material would mean that benthic invertebrates would be already present within the sediment (from the point of establishment of the new habitat), and the exchange of water between the lagoon and the estuary would bring invertebrate larvae into the lagoon, thereby ensuring that a sustainable habitat is created. The creation of the new shallows / intertidal areas is expected to represent a significant enhancement to the waterbird interest of the lagoon and to the functioning of the Tees estuary.

9.6.7 When the scheme is considered a whole, it is concluded that there would be a net gain in the area and quality of habitat available for waterbird feeding, in addition to the habitat being available for significantly more time in the tidal cycle compared with the existing intertidal area. The habitat would be created during Phase 1 of the construction of the Harbour facilities, several years in advance of the loss the whole area of intertidal that eventually would be within the footprint of the port terminal.

9.6.8 The value of the receptor is very high (International / National) and the magnitude of the effect (in isolation) is considered to be high in that the habitat created would represent a permanent, large scale

beneficial effect that would contribute positively to the conservation status of designated waterbird populations. This would result in an impact of **high beneficial** significance, in isolation. However, this has to be offset against the moderate adverse impact predicted due to the loss of the intertidal foreshore. On balance, therefore, it is predicted that a **moderate beneficial** impact for waterbirds would arise.

Mitigation measures and residual impact

9.6.9 It is concluded that no further mitigation measures are required and the residual impact would be of **moderate beneficial** significance.

Implications of the proposed scheme for waterbird roosting habitat

9.6.10 INCA waterbird counts have confirmed that the NWL jetty is an important structure for roosting cormorant, supporting a significant percentage of the Tees WeBS population of this species over the period 2010 to 2014 (**Table 9-15**). The removal of the NWL jetty as a result of the construction of Phase 2 of the port terminal would result in the loss of this roosting site. Cormorant form part of the overall waterbird assemblage of the Teesmouth and Cleveland Coast SPA and Ramsar site. In addition, waterbirds use the embankment between the lagoon and the estuary for roosting, including the crest of the embankment and the slope of the embankment on the estuary side.

9.6.11 Given that the NWL jetty regularly supports a significant proportion of the waterbird population of the Tees, the removal of the NWL jetty would cause the loss of a valuable roost site. It is likely that cormorant would roost elsewhere on other riverfront structures (which are numerous along the Tees) and the removal of the jetty is unlikely to result in an impact on cormorant population of the wider Tees. However, the loss of the NWL jetty (and the loss of roost sites at the port terminal) represents a loss of roosting opportunity for waterbirds. This may be offset to some extent by the new structures of the port terminal, which may be used by roosting waterbirds (particularly an open piled structure).

9.6.12 The value of the receptor is International / National due to the fact that waterbirds using the area for roosting form part of the waterbird assemblage of the SPA and Ramsar site. The magnitude of the effect is predicted to be low and it is concluded that the significance of the potential impact would be **moderate adverse** (in isolation).

9.6.13 The proposed habitat enhancement measures include the creation of a series of islands in Bran Sands lagoon to create roosting and nesting opportunities for waterbirds. The creation of this habitat would occur several years in advance of the loss of the NWL jetty and loss of roosting habitat along the whole of the port terminal frontage, which would occur during the construction of Phase 2 of the proposed Harbour facilities. The magnitude of this effect would also be low. Hence it is concluded that the potential impact would be of **moderate beneficial** significance (in isolation).

9.6.14 Overall, it is predicted that the net effect of the losses and gains in roosting habitat would be neutral, and a **negligible** impact is predicted on balance.

Mitigation measures and residual impact

9.6.15 It is concluded that no further mitigation measures are required and the residual impact would be of **negligible** significance.

Noise disturbance to birds from operational activities at the Harbour facilities

9.6.16 The noise impact assessment has included predictions of noise generated due to the operation of the Harbour facilities. The findings of this assessment have informed a prediction of the potential disturbance effect to waterbirds, particularly those using Bran Sands lagoon and Dabholm Gut given the proximity of these areas to the proposed facilities. During the operational phase, there would be no change to the maintenance dredging method or frequency and, therefore, there would be no significant underwater noise effect associated with maintenance dredging for the proposed berth pocket.

9.6.17 The most significant sources of disturbance to feeding and roosting waterbirds could occur due to operation of port (including vessel movements) and conveyor system. The noise modelling predicted that at all sensitive ecological receptor locations in Dabholm Gut and Bran Sands lagoon, the predicted noise level would be below the background level, with the exception of the mouth of Dabholm Gut where a predicted operation noise level of 50dB LAr(16h) is predicted, which is a 7dB exceedance of background level.

9.6.18 It can be concluded that the downstream section of Dabholm Gut would be expected to experience an increase in noise during the operational phase, but the magnitude of this effect is predicted to be low (based on the assessment included in **Section 14.6**) and would not be expected to result in a behavioural effect on waterbirds. Birds would habituate to the change in noise level of the order and nature that is predicted, and this should to be reflected in the assessment of the significance of the potential impact. Hence it is concluded that the impact would be of negligible significance.

Mitigation measures and residual impact

9.6.19 The operational noise is mitigated as far as possible in that conveyor drives would be enclosed and no further mitigation can be applied to the operational activities at the port that would result in noise generation (i.e. the ship loading operations). The residual impact would be of **negligible** significance.

Visual disturbance (movements of vehicles and personnel and operational lighting)

9.6.20 Operational phase staffing requirements would be significantly reduced in comparison with the construction phase. It is predicted that there would be an operational staff of six per shift during Phase 1, and eight staff per shift during Phase 2. Such movements are not considered significant and no significant visual disturbance is predicted during the operational phase.

9.6.21 Following discussion with Natural England, mitigation measures have been investigated and built into the design as embedded mitigation to minimise the potential for any significant disturbance to areas used by waterbirds during the operational phase. Such embedded mitigation is described below.

9.6.22 It is proposed that parking and office areas immediately adjacent to quay would be screened (by fencing). With regard to mitigating the potential impact of lighting, the same principles to minimise the potential for significant effects on the waterbirds utilising Bran Sands lagoon and Dabholm Gut as described for the construction phase, as described in **Section 9.5**, also apply in operation.

9.6.23 Based on the above, it is concluded that there would be **no impact** associated with visual disturbance during the operational phase.

Mitigation measures and residual impact

9.6.24 No mitigation measures are required in excess of those outlined above, which are proposed to be built into the scheme design as embedded mitigation. It is concluded that there would be **no residual impact**.

Shipwash disturbance to waterbirds from operational activities

9.6.25 Shipwash can be a source of disturbance to feeding waterbirds in that it propagates across intertidal areas and causes birds to take flight. This disturbance, especially if it is repeated, minimises the time that birds can feed within the tidal cycle and can reduce the overall feeding efficiency. This can be critical during the winter months and during periods of particularly severe weather when maximising available feeding time is of paramount importance. An increase in shipping activity, or a change in the characteristics of vessels, can be a source of disturbance to feeding waterbirds in that shipwash can propagates across intertidal areas and causes birds to take flight with consequences for feeding efficiency.

9.6.26 The Tees estuary currently experiences high levels of shipping activity, with approximately 1000 vessel movements per month. The increase in vessel numbers that is predicted to result during the operational phase (approximately 190 per year) is not considered significant in the context of existing overall vessel movements in the estuary. In addition, the Tees currently accommodates vessels of up to 350m in length, including large tankers which berth at the Tees North Sea Oil Terminal and large bulk carriers bringing coal and ore to Redcar Ore Terminal.

9.6.27 Given the above, and with relevant controls in place (such as speed limits), disturbance due to shipwash is not predicted to be an issue with respect to the proposed scheme, and **no impact** is predicted.

Mitigation measures and residual impact

9.6.28 Maximum permitted vessel speed in the Tees is controlled and managed by PD Ports and no mitigation measures are required. There would be **no residual impact**

Effect on sedimentary regime (budget) of the Tees estuary and consequences for intertidal morphology

9.6.29 The predicted effects of the proposed scheme on tidal propagation, the wave climate and current speeds integrate to result in an effect on the sediment budget of the estuary (as described in **Section 5.6**).

9.6.30 The largest sediment input to the Tees estuary is from offshore and given that the proposed scheme does not include any changes to the outer sections of the approach channel, there would be no effect on the supply of material into the Tees estuary from offshore. In addition, no changes to sediment transport in the predominantly sandy areas around Teesmouth are expected and so no effect on sand transport is anticipated.

9.6.31 Sediment transport modelling has been undertaken to predict the increases in infill in the berth pocket, new dredged approaches and extended area of -14.1m CD channel. This modelling predicted a

change in the pattern of distribution of sediment deposition in the subtidal zone, with a small increase in fine sediment infill in Chart area 9 (approximately 1%) (see **Figure 5-14**), associated with a small decrease in fine sediment infill in Chart area 8 (approximately 2 to 3%).

9.6.32 In terms of maintenance dredging requirement of the proposed berth pocket and approach channel, average infill rates are predicted to be 5,100m^3 per year for the solid quay structure and 5,900m^3 per year for the open quay structure. Overall, therefore, the effect of the scheme is to result in a localised redistribution of locations of sediment deposition in response to predicted changes in current speeds as a result of the proposed works. It is predicted that this very small change in the overall fine sediment regime would not alter the present frequency of, or methodology used for, maintenance dredging and no effect on sediment supply to intertidal areas throughout the Tees estuary would occur. Consequently, **no impact** on the morphology of the intertidal areas is predicted.

9.6.33 As discussed within **Section 5**, the results from the wave propagation modelling indicate a relatively localised effect of the port terminal (either quay option) with regard to its influence on significant wave heights. No increases in wave energy over the intertidal areas at Teesmouth are predicted by the modelling, although there is potential for minor increase in wave energy on the narrow spits located either side of the Seaton Channel. The magnitude of the predicted change is, however, of very low magnitude and no effect on the spits would arise.

Mitigation measures and residual impact

9.6.34 In light of the lack of predicted effect, no mitigation measures are considered necessary. **No residual impact** is predicted.

Interruption to sightlines and overshadowing

9.6.35 The proposed scheme comprises the construction of structures around the perimeter of Bran Sands lagoon and this has the potential to affect sightlines of waterbirds that use the lagoon as a feeding and roosting habitat. The most significant structures (and maximum heights) are shown on the Drawings in **Section 3** and referred to in the Parameters Table (**Table 3-1** in **Section 3**).

9.6.36 It can be seen that some of the above structures are of significant height, but they are not of significant mass and the number of structures adjacent to the lagoon is minimal given that transfer towers and surge bins would not be located at every location indicated on the Drawings.

9.6.37 Given the above, the proposed scheme would not minimise sightlines in any direction. In terms of overshadowing, the most significant effect would be the presence of the conveyor in the northern conveyor corridor (if this route is progressed) as it crosses the finger of the lagoon and the presence of the structure at this location would result in some potential fragmentation of the lagoon habitat, but this is not likely to result in significant behavioural effects on waterbirds or significantly detract from the potential of this area of lagoon to support feeding and roosting waterbirds. It should also be noted that there is an existing elevated conveyor that runs parallel to the eastern side of the finger of the lagoon and no effect on the waterbird populations would be expected to occur with respect to conservations status. Given the minor area of habitat that would be affected, the magnitude of the effect is predicted to be very low. The value of the receptor is International / National and, consequently, a potential impact of low adverse significance is predicted.

Mitigation measures and residual impact

9.6.38 The potential impact is not possible to mitigate and the residual impact would be of **low adverse** significance, if the northern conveyor is progressed.

9.7 Assessment of potential impacts during decommissioning

Noise and visual disturbance to waterbirds

9.7.1 A description of the works envisaged to be required during decommissioning is provided in **Section 3.3**. The decommissioning of the overland conveyor (and most likely the surge bins and shiploaders) has the potential to result in noise and visual disturbance to waterbirds feeding and roosting in Bran Sands lagoon and Dabholm Gut. The nature of the potential impact would be similar to that described during the construction phase, but the noise impact would be of a lower magnitude given that no percussive or auger piling would be necessary. However, mechanical plant would be required for removal of the conveyor and supports. The decommissioning phase would involve some works in the lagoon and in the upper part of Dabholm Gut to cut off support piles for the conveyor, but these would be very short term based on the minimal works required in these locations for the construction of the conveyor.

9.7.2 A Decommissioning Plan would be developed to manage the proposed works and this would include screening as proposed for the construction phase (described in **Section 9.5**) to provide a barrier between the works, Bran Sands lagoon and Dabholm Gut. The Decommissioning Plan may also have to incorporate other mitigation measures to respond to additional sensitivities that may need to be considered at the time of decommissioning.

9.7.3 The value of the receptor is International / National and the magnitude of the effect (based on the noise assessment included in **Section 14.7**) would be very low (with mitigation embedded as described). Hence the potential impact is predicted to be of **negligible** significance.

Mitigation measures and residual impact

9.7.4 Mitigation has been incorporated into the assessment of the potential impact and further mitigation may need to be included in the Decommissioning Plan depending on the site-specific circumstances at the time of decommissioning. The residual impact is predicted to be of **negligible** significance.

9.8 Monitoring

9.8.1 It is proposed that a programme of monitoring would be implemented for the habitat enhancements in Bran Sands lagoon. The objectives of the monitoring would be to assess the functioning of the enhancements measures and identify whether there was a requirement to modify the proposals to improve the ecological value of the measures,

9.8.2 The monitoring programme would be developed through discussion and agreement with YPL, Natural England, the Environment Agency and the RSPB. However, it is envisaged that the programme would include monitoring of the following measures:

- Water level fluctuation in the lagoon over a tidal cycle (spring/neap tides).
- Elevation and profile of the habitat enhancements (shallows/intertidal and islands).

- Benthic communities (species richness, diversity, abundance and community type) of the shallows/intertidal).
- Waterbird populations and activity (i.e. feeding, loafing, roosting, nesting), including mapping distribution). This monitoring would extend across the whole of Bran Sands lagoon and Dabholm Gut to enable the waterbirds using the habitat enhancements to be put in context with the wider lagoon and Dabholm Gut; this data can then be compared with the wider Tees WeBS site counts.

9.8.3 The findings of the monitoring would be fed back to the relevant parties.

9.8.4 Depending on the findings of the monitoring programme, interventions could be made to the habitat enhancement proposals such as actively adjusting the rate of water exchange between the Tees and the lagoon, recharging the shallow water area with additional maintenance dredged material and vegetation management (e.g. on the islands, should vegetation develop that is considered detrimental through reducing sight lines or impacting on ability to nest or roost).

9.9 Summary

9.9.1 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.

9.9.2 The bird count data collected by INCA shows that there is significant waterbird use of both Bran Sands lagoon and Dabholm Gut by a variety of bird species, with a number of species found at numbers exceeding 1% of the corresponding Tees WeBS site monthly count for at least one month. Bird surveys of the intertidal area at the site of the proposed quay show that the use of this area is limited. In terms of functionality, the intertidal area is inundated for the majority of the tidal cycle.

9.9.3 The assessment has identified that the proposed scheme has the potential to result in a number of impacts to waterbird populations. Potential construction phase impacts include:

- impacts to the feeding resource due to reduced water quality (associated with capital dredging); and,
- disturbance to feeding and roosting waterbirds, particularly during piling for the conveyor and port terminal.

9.9.4 Potential plume effects on the feeding resource and disturbance during the construction phase would be temporary. The effect of disturbance would be mitigated through the use of acoustic screening between the works and Bran Sands lagoon and Dabholm Gut. With mitigation, these potential impacts are considered to be, at worst, of minor significance.

9.9.5 There would be a reduction in the feeding resource due to the loss of the intertidal habitat on the foreshore. However, the proposed scheme includes measures in Bran Sands lagoon to enhance habitats for feeding and roosting waterbirds and it is predicted that there would be a net benefit in this respect as a result of the project as a whole.

9.9.6 Other potential operational phase impacts include an increase in background noise levels in the downstream section of Dabholm Gut, which is predicted to be of negligible significance given the low magnitude of the change in noise level relative to background.

9.9.7 Should the conveyor be constructed in the northern conveyor corridor, overshadowing of Bran Sands lagoon would occur. However, the effect would be limited to part of the finger of the lagoon. No effect on sightlines is predicted due to the presence of structures associated with the Harbour facilities.

9.9.8 The hydrodynamic and sediment transport modelling predicts that there would be no impact on intertidal morphology throughout the Tees estuary and, therefore, no indirect effect on intertidal areas used by waterbirds during the operational phase.

9.9.9 A summary of the impacts predicted with regard to waterbird populations is presented in **Table 9-16**.

9.9.10 A monitoring regime for the habitat enhancement scheme would be agreed and put in place.

Table 9-16 Summary of impacts with regard to waterbird populations

Impact	Sensitivity of receptor	Magnitude of effect	Significance of impact	Mitigation	Residual impact
Construction					
Impacts to bird feeding resource due to reductions in water quality	Very high	Low	Low adverse	None required. However controls would be implemented during dredging as outlined below. Limiting re-suspension during TSHD can be achieved by optimising the trailing velocity, position of the suction mouth and discharge of the pump with respect to each other, and directing the flow lines of the suction stream to the actual point of excavation. Reduction of sediment plumes during backhoe dredging can be achieved by using an experienced operator and limiting the swing of the backhoe over water. Re-suspension of sediment during CSD can be reduced through optimising the cutter speed, swing velocity and suction discharge, shielding the cutter head and optimising the design of the cutter head.	Low adverse
Smothering of intertidal food resource through deposition of fine sediment following dredging	-	-	No impact	-	No impact
Noise disturbance during the construction works	Very high	Low	Low adverse	Use of noise attenuation barriers between the propose works, Bran Sands lagoon and Dabholm Gut	Negligible
Visual disturbance (movements of construction plant and personnel and construction lighting)	Very high	Very low	Low adverse	Use of noise attenuation barriers between the propose works, Bran Sands lagoon and Dabholm Gut would also mitigate the visual impact	Negligible

Impact	Sensitivity of receptor	Magnitude of effect	Significance of impact	Mitigation	Residual impact
Operation					
Implication of the proposed scheme for waterbird feeding habitat	Very high	Loss of intertidal area: Low (negative) Habitat enhancement; High (positive)	Moderate beneficial	None required	Moderate beneficial
Implication of the proposed scheme for waterbird roosting habitat	Very high	Loss of roosting habitat: Low (negative) Gain in roosting habitat : Low (positive)	Negligible	None required	Negligible
Noise disturbance to birds from operational activities at the port facility	Very high	Very low	Negligible	The potential impact is mitigated as far as possible in that conveyor drives would be enclosed.	Negligible
Visual disturbance (movements of vehicles and personnel and operational lighting)	-	-	No impact	No mitigation is required in addition to that embedded into the design (screening of operational parking and storage areas)	No impact

Impact	Sensitivity of receptor	Magnitude of effect	Significance of impact	Mitigation	Residual impact
Shipwash disturbance to waterbirds from operational activities	-	-	No impact	None required	No impact
Effect on sedimentary regime (budget) of the Tees estuary and consequences for intertidal morphology	-	-	No impact	None required	No impact
Interruption to sightlines and overshadowing	Very high	Very low	Low adverse	None possible	Low adverse
Decommissioning					
Noise and visual disturbance to waterbirds	Very high	Very low	Negligible	In addition to the embedded mitigation, a Decommissioning Plan would be developed and further mitigation may be recommended if necessary depending on site-specific circumstances at the time of decommissioning	Negligible