12 MARINE AND COASTAL ORNITHOLOGY

12.1 Introduction

The proposed scheme footprint is located within and adjacent to sensitive areas for seabirds and waterbirds, namely the Teesmouth and Cleveland Coast SPA, Ramsar site and SSSI (see **Figure 12.1**).

A desk-based assessment has been combined with site-specific bird survey data to provide a description of the baseline environment on which the impact assessment can be based.

Potential impacts on waterbirds and seabirds assessed in this section of the EIA Report are broadly categorised into the following:

- direct and indirect impacts on supporting habitat;
- impacts on prey resources; and,
- acoustic and visual disturbance of birds.

The assessment of potential impacts has been informed by the following sections of this EIA Report:

- hydrodynamic and sedimentary regime (**Section 6**);
- marine sediment and water quality (**Section 7**);
- marine ecology (**Section 9**);
- fish and fisheries (**Section 13**);
- noise (**Section 17**); and,
- air quality (**Section 18**).

12.2 Policy and consultation

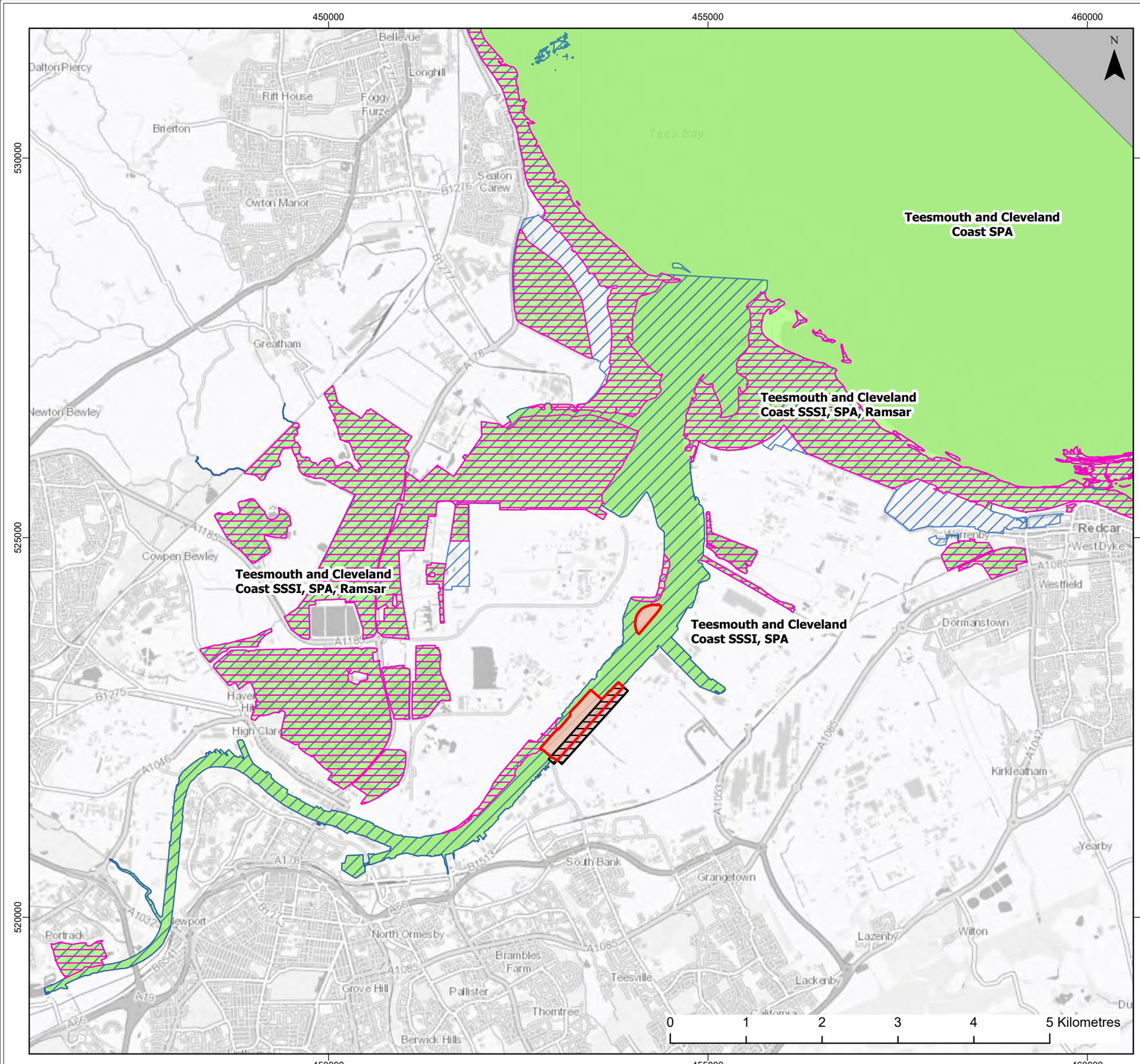
12.2.1 Policy

National Policy Statement for Ports

The assessment of potential impacts to marine and coastal ornithology has been made with reference to the policy guidance contained within the NPS for Ports (Department for Transport, 2012). The assessment requirements relevant to marine and coastal ornithology, as presented in the NPS for Ports, are summarised in **Table 12.1**.

Table 12.1 Summary of NPS for Ports requirements with regard to marine and coastal ornithology

NPS requirement	NPS reference	Section of EIA report where requirement has been addressed
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	**Section 12.4**.
The applicant should be particularly careful to identify any effects on the integrity and special features of MCZs, SACs and candidate SACs, SPAs and potential SPAs, Ramsar sites, actual and potential Sites of Community Importance and Sites of Special Scientific Interest (SSSI).	Section 5.3.7	**Section 29** presents the HRA (note that there are no MCZs relevant to the assessment).



Legend

- Proposed Dredge and Excavation Envelope (including side slopes)
- Proposed Quay Envelope
- Proposed Demolition Area
- Special Protection Area (SPA): Teesmouth and Cleveland Coast
- Sites of Special Scientific Interest (SSSI): Teesmouth and Cleveland Coast
- Ramsar Site: Teesmouth and Cleveland Coast

Client:	Project:
Tees Valley Combined Authority	South Bank Quay

Title:

Nature conservation designations for birds

Figure: 12.1

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
0	29/10/2020	TC	BH	A3	1:50,000

Co-ordinate system: British National Grid

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Enhancing Society Together

ROYAL HASKONINGDHV
Marlborough House
Marlborough Crescent
Newcastle-upon-Tyne, NE1 4EE
+44 (0)191 211 1300
www.royalhaskoningdhv.com

Marine Policy Statement and the North East Draft Inshore and Offshore Marine Plan

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 facilitates and supports 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.

Full details of the draft North East Inshore and Offshore Marine Plan are provided in **Section 4.9**. **Table 12.2** signposts relevant objectives and policies within the draft Marine Plan when considering the potential effects of the proposed scheme on ornithological receptors.

Table 12.2 Marine plan policies relevant to ornithological receptors

Marine Policy Statement / Marine Plan Objectives	- *Biodiversity is protected, conserved and, where appropriate, recovered, and loss has been halted;* - *Healthy marine and coastal habitats occur across their natural range and are able to support strong, biodiverse communities and the functioning of healthy, resilient and adaptable ecosystems;* - *Our oceans support viable populations of representative, rare, vulnerable, and valued species.*	
Marine policies relevant to this chapter		Where addressed in this Chapter
NE-MPA-1	*Proposals that may have adverse impacts on the objectives of marine protected areas must demonstrate that they will, in order of preference:* *a) Avoid;* *b) Minimise;* *c) Mitigate significant adverse impacts, with due regard given to statutory advice on an ecologically coherent network.*	**Sections 12.5** and **12.6**, with an HRA provided in **Section 29**.
NE-BIO-1	*Proposals that may have significant adverse impacts on the distribution of priority species must demonstrate that they will, in order of preference:* *a) Avoid;* *b) Minimise;* *c) Mitigate;* *d) Compensate for significant adverse impacts.*	As above.
NE-BIO-2	*Proposals that may cause significant adverse impacts on native species adaptation or connectivity, or native species migration must demonstrate that they will, in order of preference:* *a) Avoid;* *b) Minimise;* *c) Mitigate;* *d) Compensate for significant adverse impacts.*	As above.
NE-BIO-3	*Proposals must take account of the space required for coastal habitats where important for ecosystem functioning and provision of ecosystem services, and demonstrate that they will, in order of preference:* *a) Avoid;* *b) Minimise;* *c) Mitigate;*	As above.

Marine Policy Statement / Marine Plan Objectives	- *Biodiversity is protected, conserved and, where appropriate, recovered, and loss has been halted;* - *Healthy marine and coastal habitats occur across their natural range and are able to support strong, biodiverse communities and the functioning of healthy, resilient and adaptable ecosystems;* - *Our oceans support viable populations of representative, rare, vulnerable, and valued species.*	
Marine policies relevant to this chapter		Where addressed in this Chapter
	d) Compensate for net habitat loss and deliver environmental net gain.	

12.2.2 Consultation

A summary of the comments relevant to ornithological receptors that were received during the EIA scoping process are detailed in **Table 12.3**, which also signposts to the relevant section where the comment has been addressed.

Table 12.3 Relevant ornithology-specific comments received from stakeholders during the scoping process

Consultee	Comment	Response / section of the EIA Report where the comment is addressed
MMO (Scoping Opinion issued to a third party in 2019)	Incorrect reference to the Tees and Hartlepool Foreshore and Wetlands Site of Special Scientific Interest (SSSI), as this site has been subsumed into the newly designated Teesmouth and Cleveland Coast SSSI.	Reference in this Section is made to Teesmouth and Cleveland Coast SSSI.
	There should be particular interest in the vicinity of intertidal mudflat opposite the proposal site. Birds feeding here are particularly sensitive to noisy activities, particularly during winter months and consideration should be given to suitable mitigation. The river channel is also important for foraging common tern from the Saltholme colony.	Impacts on wintering birds using the North Tees Mudflat and common terns using the Tees are assessed in **Sections 12.5** and **12.6**.
	The environmental impacts of noise generated during construction should be carefully considered, especially in relation to the impact of noise on birds, fish and marine mammals. Noise modelling at sensitive locations should be included in the ES, for both construction and operation.	Impacts of construction noise disturbance, with reference to noise levels at modelled ecological receptors, are assessed in **Section 12.5.4**.
	The visual disturbance caused by the project (on site staff, vessels and equipment (including cranes)), must be considered for sensitive bird species. This should also include the impact of lighting during construction and operation.	Impacts of construction- and operation-phase visual disturbances are assessed in **Sections 12.5.4** and **12.6.2**.
Natural England (informal consultation outside of the formal scoping process during August 2020)	Natural England have identified the North Tees Mudflat as a potential significant site for wintering waterbirds foraging on the intertidal mudflat. Survey of the wintering bird usage of the site is recommended since low tide count data from WeBS is outdated.	Given the timescales for submission of the marine licence and planning application (November 2020), it has not been possible to recover a full year of wintering bird data at the North Tees Mudflat. Liaison with Natural England in August 2020 confirmed that in lieu of up-to-date low tide count data for North Tees Mudflat, the assessment can proceed using the assumption that the mudflat provides supporting habitat for a number of SPA / Ramsar site species and other waterbirds.

12.3 Methodology

12.3.1 Study area

The study area for this section of the EIA Report comprises the area within the Tees estuary that has the potential to be directly and/or indirectly influenced by the proposed scheme. In this case, the study area is limited to the areas that may be affected by noise and visual disturbance during the construction and operational phase of the proposed scheme, and the intertidal/subtidal areas that may be affected by morphological or hydrodynamic changes.

The North Tees Mudflat represents an important area of intertidal within the study area; the mudflat is approximately 1.5km in length and the most downstream section of mudflat, approximately 300m in length, is located directly adjacent to the proposed scheme footprint.

12.3.2 Existing environment

Wetland Bird Survey

Information on waterbird populations within the Tees estuary is available from the Wetland Bird Survey (WeBS) counts. WeBS is a partnership between the British Trust for Ornithology (BTO), the Royal Society for the Protection of Birds (RSPB) and the Joint Nature Conservation Council (JNCC) in association with the Wildfowl and Wetlands Trust (WWT). Data from WeBS are routinely used when assessing the ornithological interest of estuarine areas such as the Tees estuary.

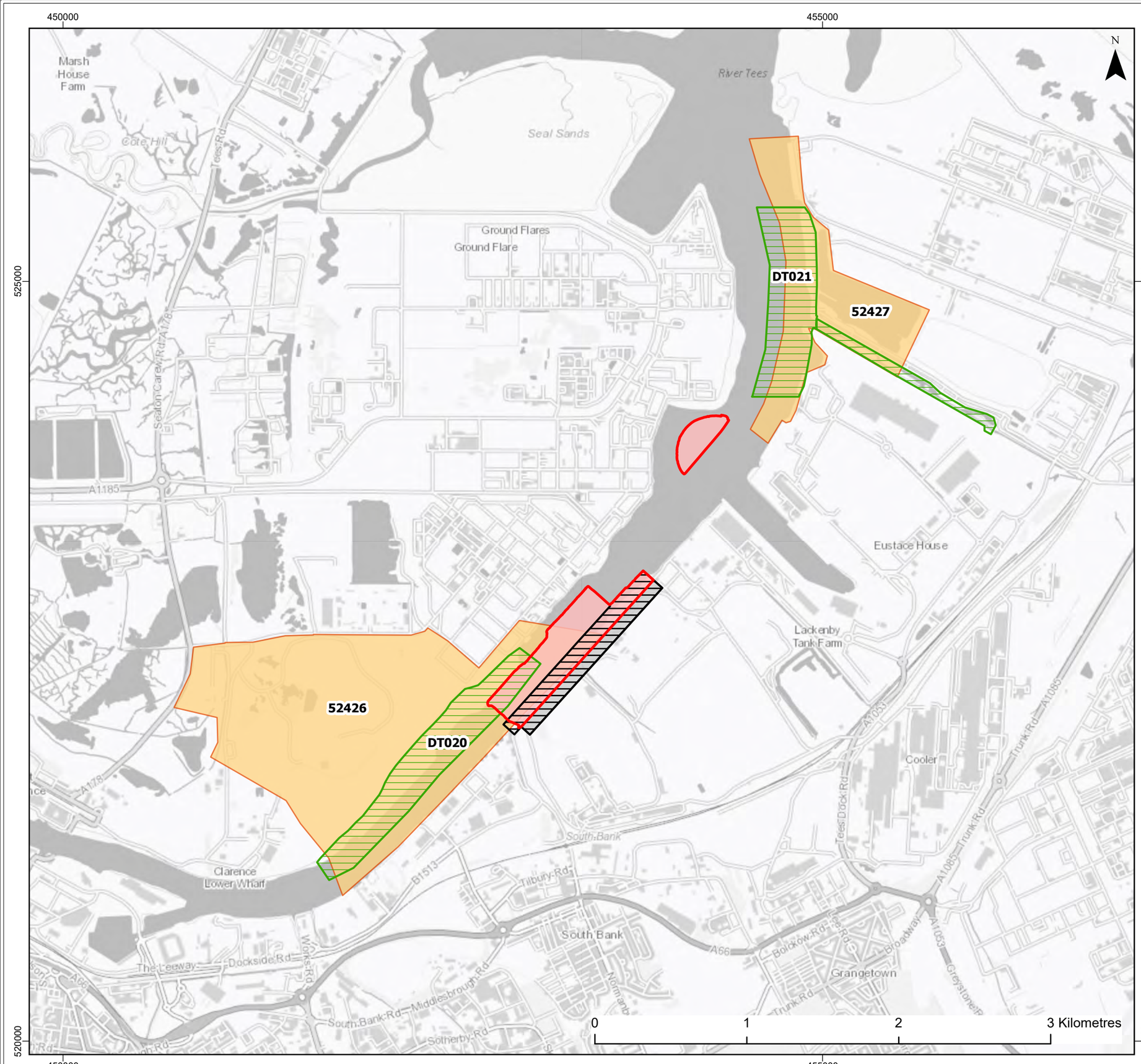
WeBS core counts are population counts undertaken within a given site, usually on a monthly basis but with particular focus on winter months when waterbird populations are at a peak. Core counts are typically undertaken over a high tide, when birds are most easily counted at roosts (BTO, 2010). The following WeBS core count data has been used to describe the existing environment (see **Section 12.4.2**):

- Data from the Tees estuary WeBS core count site (2014/15 to 2018/19), which is comprised of individual sectors and encompasses the coastline from Hartlepool Bay to Redcar plus estuarine, intertidal and wetland areas within (and in close proximity to) the lower Tees, as far upstream as Saltholme Nature Reserve.
- Data from the individual sectors 52426 (Tees Estuary opposite Smith Dock and Hargreaves Quarry) (2012/13 to 2016/17) and 52427 (Bran Sands South) (2014/15 to 2018/19), both of which are located within 1km of the proposed scheme and contribute towards the overall site count for the Tees estuary.

Low tide counts are also undertaken periodically in large estuaries, generally over at least one winter in six, and are designed to complement the core count data and illustrate the distribution of birds within the estuary, thus helping to identify specific parts of the estuary, inlets or bays that are of notable importance for bird activity (see **Section 12.4.2**). Low tide counts are of particular importance for understanding how water bird species use intertidal areas, such as those present within and adjacent to the footprint of the proposed scheme. The most recent WeBS low count data for the Tees estuary has been sourced and summarised below. The data comprises that from:

- Low count sector DT021 (2018/19), which incorporates Bran Sands South and encompasses intertidal areas just north of the turning circle.
- Low count sector DT020 (2012/13), which incorporates the North Tees Mudflat.

The locations of the WeBS core count and low count sectors referred to above are presented in **Figure 12.2**.



Legend

- Proposed Dredge and Excavation Envelope (including side slopes)
- Proposed Quay Envelope
- Proposed Demolition Area
- WeBS low count sector
- WeBS core count sector

Client:	Project:
Tees Valley Combined Authority	South Bank Quay

Title: **WeBS count sectors**

Figure: 12.2

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Marlborough House
Marlborough Crescent
Newcastle-upon-Tyne, NE1 4EE
+44 (0)191 211 1300
www.royalhaskoningdhv.com

Site-specific surveys

Given that the most recent low tide count data from the North Tees Mudflat (WeBS low count sector DT020) was from the winter of 2012/13, INCA commenced a site-specific non-breeding estuarine bird survey in July 2020 which will continue until March 2021 (see **Section 12.4.3**). The scope of the survey was agreed through discussion with Natural England in June 2020 and comprises two low tide counts and two high tide counts per month at each of the following four sectors (see **Figure 12.3**):

- Sector 1: South Bank Wharf (i.e. the site of the timber quay demolition and new quay construction);
- Sector 2: on and over the subtidal river adjacent to the site of the proposed quay;
- Sector 3: North Tees Mudflat (north); and,
- Sector 4: North Tees Mudflat (south).

Given the requirement to submit the marine licence application and planning application in November 2020, it was not possible to recover low tide count data from the above sectors across the full 2020/2021 over winter period. It was therefore agreed with Natural England that, for the purpose of this EIA, the assessment would be based on the assumption that the North Tees Mudflat is used by a significant proportion of the overall Tees estuary wintering population. With this in mind, a precautionary approach has been taken to the assessment of impacts on waterbird activity at North Tees Mudflat.

As well as the non-breeding waterbird survey, INCA conducted a tern species survey at South Bank during July and August 2020 (see **Section 12.4.4**). The survey covered an area within a 300m semi-circular arc from a point on the South Bank within the footprint of the proposed scheme, approximately 100m downstream of the existing wharf (near to the jetty structures due for demolition). It should be noted that this did not encompass the entire study area, but it was considered to be sufficient to capture the majority of movements up- and downstream by commuting or foraging terns.

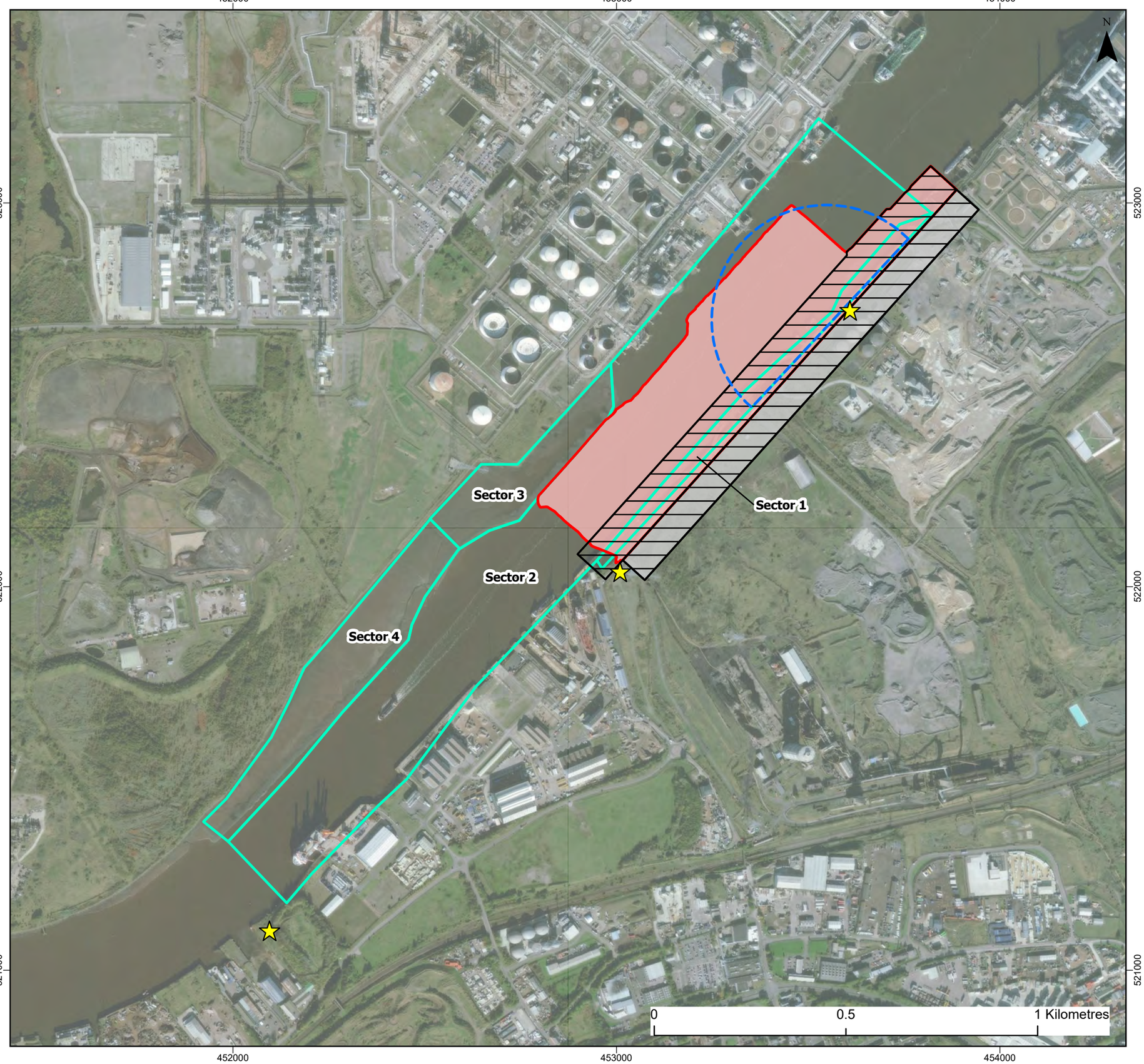
Other data sources

Data from the following surveys within the Tees estuary were also reviewed to inform the understanding of the existing environment (see **Section 12.4.5**):

- Wintering Bird Surveys 2014-15 at Teesside, undertaken by Ecology Consulting as part of a Natural England review of the Teesmouth and Cleveland Coast SSSI (Ecology Consulting, 2015); and,
- Vantage point monitoring survey at the Vopak Foreshore (*c.*200m north of the turning circle) undertaken by Vopak in 2013-14 (INCA, 2014).

The locations of the above survey areas with reference to the proposed scheme footprint are presented in **Figure 12.4**.

The Defra MAGIC website has also been reviewed to confirm the location of SPAs, Ramsar sites and other designated sites for ornithological interest (shown on **Figure 12.1**). The most up-to-date information on the designations within the study area, including SPA / Ramsar site reference populations, has been taken from Natural England's scientific brief to Defra *"Departmental Brief: Teesmouth and Cleveland Coast potential Special Protection Area (SPA) and Ramsar"* (Natural England, 2018a) and the site citations.



Legend

- Proposed Dredge and Excavation Envelope (including side slopes)
- Proposed Quay Envelope
- Proposed Demolition Area
- Vantage Point
- South Bank Tern Survey 2020 survey area
- Estuarine Bird Survey 2020 sectors

Client:	Project:
Tees Valley Combined Authority	South Bank Quay

Title:

Site-specific survey areas

Figure: 12.3

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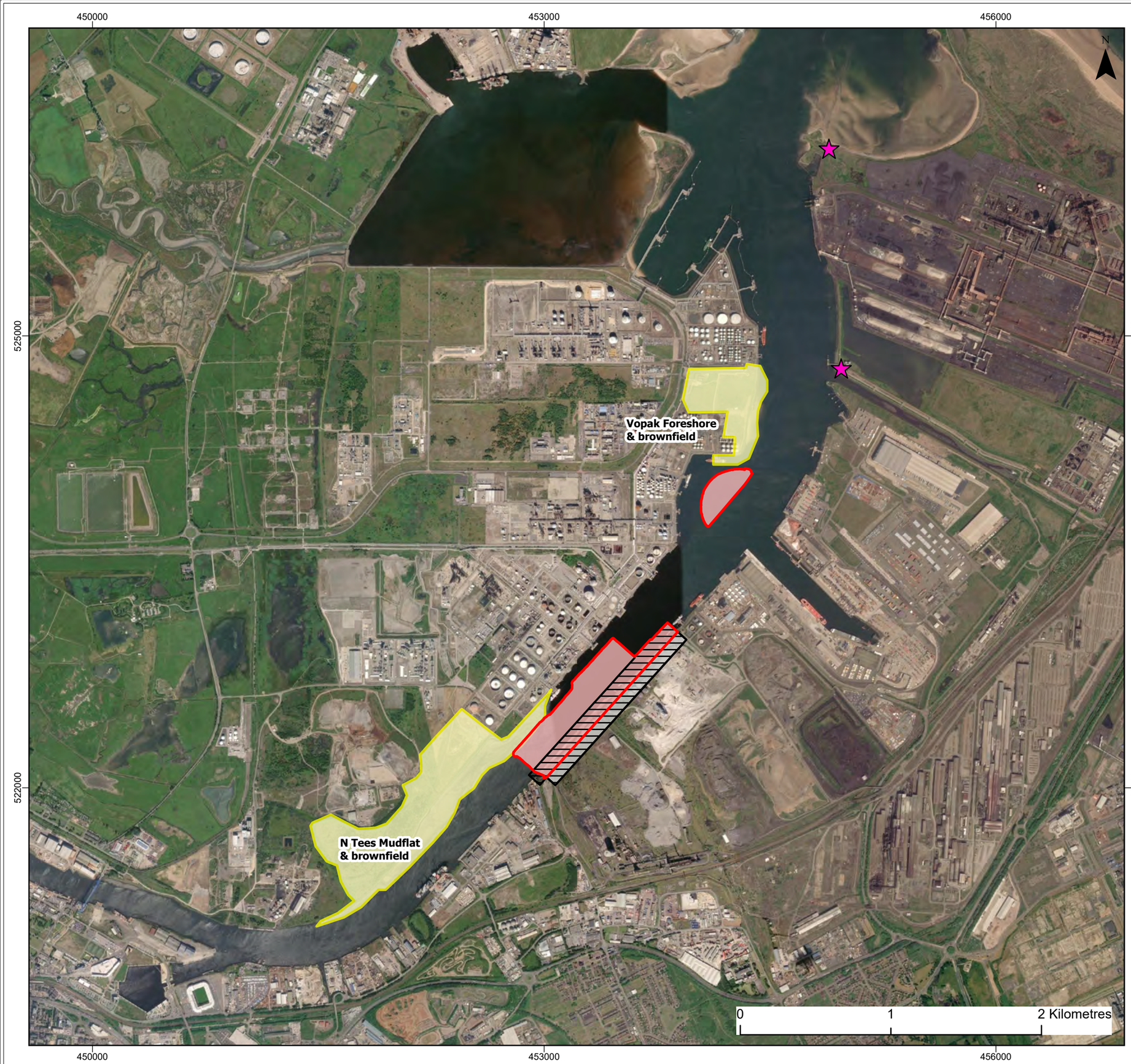
Marlborough House
Marlborough Crescent
Newcastle-upon-Tyne, NE1 4EE
+44 (0)191 211 1300
www.royalhaskoningdhv.com



Legend

- Proposed Dredge and Excavation Envelope (including side slopes)
- Proposed Quay Envelope
- Proposed Demolition Area
- Teesside Wintering Bird Survey 2014/15 survey areas (Ecology Consulting, 2015)
- Vopak Foreshore Survey 2013/14 vantage points (INCA, 2014)

Client:	Project:
Tees Valley Combined Authority	South Bank Quay

Title: **Tees Estuary survey locations**

Figure: 12.4

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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ROYAL HASKONINGDHV
Marlborough House
Marlborough Crescent
Newcastle-upon-Tyne, NE1 4EE
+44 (0)191 211 1300
www.royalhaskoningdhv.com

12.3.3 Methodology for assessment of potential impacts

The methodology used to assess potential environmental impacts on ornithological receptors follows that described in **Section 5** of this report. The overarching environmental assessment process and methodology follows a matrix approach to inform the impact assessment, using best practice, best available scientific understanding and relevant guidance (e.g. CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2016)).

Professional judgement has been used to determine potential environmental impacts which could arise during the construction and operational phases of the proposed scheme, based on our existing knowledge of the sensitivity of the Tees estuary, waterbird receptors and the conservation value of the species that may be affected. Since the proposed scheme is located within areas of conservation importance for birds and their supporting habitats, for the purpose of this assessment the conservation value of the species that may be affected is assumed to be high. Furthermore, and in consultation with Natural England (see **Table 12.2**), in the absence of a complete over-winter site-specific survey, for the purpose of this assessment it is assumed that North Tees Mudflat supports significant numbers of SPA / Ramsar and SSSI features during the important wintering months.

Cross reference has been made, where relevant, to the findings of the hydrodynamic and sedimentary regime assessment (**Section 6**), the marine water quality assessment (**Section 7**), noise and vibration assessment (**Section 17**) and the assessments on marine benthic ecology and fisheries receptors (**Sections 9 and 13**, respectively) when assessing potential impacts to ornithological receptors, to avoid duplication of information.

12.4 Existing environment

12.4.1 Statutory designated and non-statutory sites

Teesmouth and Cleveland Coast SPA and Ramsar site

The extent of the Teesmouth and Cleveland Coast SPA and Ramsar site is indicated in **Figure 12.1**. The subtidal and intertidal parts of the proposed scheme footprint are located within the Teesmouth and Cleveland Coast SPA, whilst the Teesmouth and Cleveland Coast Ramsar site is immediately adjacent to the proposed scheme footprint.

The SPA / Ramsar site is designated for its qualifying populations of the following species:

- Breeding Annex I species little tern *Sternula albifrons*, common tern *Sterna hirundo* and avocet *Recurvirostra avosetta*;
- Non-breeding Annex I species Sandwich tern *Thalasseus sandvicensis* and ruff *Calidris pugnax*; and,
- Non-breeding migratory species redshank *Tringa totanus* and knot *Calidris canutus*.

The SPA / Ramsar site is also designated for its regularly occurring assemblage of more than 20,000 waterbirds, the major component species of which are (in addition to those above) gadwall *Anas strepera*, shoveler *Spatula clypeata*, wigeon *Anas penelope*, sanderling *Calidris alba*, lapwing *Vanellus vanellus*, herring gull *Larus argentatus* and black-headed gull *Chroicocephalus ridibundus*.

The SPA includes the North Tees Mudflat, an area of intertidal foreshore directly across the river from the proposed scheme, plus other intertidal areas further downstream (e.g. Seal Sands and Bran Sands). It also incorporates grassland / wetland habitats north of the Tees and coastal habitats beyond the estuary. An extension to the SPA, classified in January 2020, encompasses subtidal areas of the Tees (and adjoining

coast), encompassing offshore areas of key importance for foraging for the qualifying tern species, plus additional terrestrial and wetland habitat suitable for supporting other qualifying species and assemblages. The Ramsar site does not extend into the subtidal marine environment but does encompass all terrestrial and intertidal areas within the SPA.

Full details of the qualifying features of the SPA / Ramsar site are summarised in **Table 12.4**, with information on the distribution of features within the site taken from the SPA and Ramsar site citations plus Natural England's scientific brief to Defra (Natural England, 2018a), which details the rationale and scientific evidence behind the January 2020 extension.

Teesmouth and Cleveland Coast SSSI

The Teesmouth and Cleveland Coast SSSI (see **Figure 12.1**) underpins the SPA and Ramsar site designations, and at North Gare Sands and Seal Sands also forms the Teesmouth National Nature Reserve (NNR). The SSSI notification (Natural England, 2018b) states that the SSSI is of special interest for the following nationally important ornithological features that occur within (and are supported by) the wider mosaic of coastal and freshwater habitats:

- breeding avocet, little tern and common tern;
- a diverse assemblage of breeding birds of sand dunes, saltmarsh and lowland open waters and their margins;
- non-breeding shelduck, shoveler, gadwall, ringed plover *Charadrius hiaticula*, knot, ruff, sanderling, purple sandpiper *Calidris maritima*, redshank and Sandwich tern; and,
- an assemblage of more than 20,000 waterbirds during the non-breeding season.

Avocets were first confirmed breeding on the Tees estuary in 2008 and numbers have subsequently increased. They nest at a range of locations within the SSSI, as described in **Table 12.4**. Little terns formerly nested in the SSSI in large numbers, but since the late 1990s they have largely relocated to a colony at Crimdon Dene, in the adjacent Durham Coast SSSI. However, small numbers of little tern have been recorded breeding at South Gare in recent years, and the SSSI site remains a foraging area for little tern and supports important pre- and post-breeding gatherings.

The majority of breeding common terns in the SSSI nest on islands and artificial rafts within the RSPB Saltholme reserve, with small numbers scattered at a number of other locations around the estuary as indicated in **Table 12.4**. Common tern feed out at sea as well as along the tidal Tees and its main tributaries.

The extensive sand dunes, saltmarsh and wetlands across the site support a diverse assemblage of breeding birds. In addition to avocet, little tern and common tern, this includes a number of scarce and declining species, such as shoveler, pochard *Aythya ferina*, ringed plover and little ringed plover *Charadrius dubius*.

The extensive areas of open water, grazing marsh and intertidal habitat provide safe feeding and roosting sites for large numbers of non-breeding waterbirds throughout the year. The SSSI is of special interest for ten species (shelduck, shoveler, gadwall, ringed plover, knot, ruff, sanderling, purple sandpiper, redshank and Sandwich tern) and an assemblage of over 20,000 waterbirds in the non-breeding season. The assemblage comprises a wide variety of waterbirds, including (in addition to the aforementioned species that are reasons for notification in their own right) large numbers of wigeon, lapwing, black-headed gull and herring gull.

Table 12.4 Status of the qualifying features of the Teesmouth and Cleveland Coast SPA / Ramsar

Qualifying feature	SPA population in 2000 (English Nature, 2000)	Current SPA population (Natural England, 2018a)	Usage of the SPA / Ramsar (Natural England, 2018a)	Approximate distance from proposed scheme
Nationally important populations of Annex I species				
Avocet (breeding)	Avocet was not an original feature of the SPA	Between 2010 and 2014, the SPA / Ramsar supported an average of 18 pairs (1.2% of the GB breeding population).	The majority of birds breed on No.4 Brinefield, mainly on the saline lagoon south of Greatham Creek, with smaller numbers on Greenabella Marsh,	Brinefield: ~2km Greenabella Marsh: ~3km
Ruff (non-breeding)	Ruff was not an original feature of the SPA	Between 2011/12 and 2015/16, the SPA / Ramsar supported an average of 19 individuals (2.4% of the GB non-breeding population).	Ruff occur at shallow waterbodies across the site, in particular on the pools at RSPB Saltholme.	RSPB Saltholme: ~1.2km
Common tern (breeding)	Common tern was not an original feature of the SPA.	Between 2010 and 2014, the SPA / Ramsar supported an average of 399 pairs (4% of the GB breeding population).	Nesting birds are typically concentrated on islands within the various waterbodies at Saltholme, with variable and smaller numbers of nests on the saline lagoon in No.4 Brinefield south of Greatham Creek, and on rafts at Cowpen Marsh. Two pairs also bred on Portrack Marsh in 2014.	RSPB Saltholme: ~1.2km Brinefield: ~2km Cowpen Marsh: ~4km Portrack Marsh: ~6.5km
Sandwich tern (passage)	When the SPA was originally extended in 2000, the site supported 1,900 individuals (1988 to 1992)	Between 2011/12 and 2015/16, the SPA / Ramsar supported an average of 134 individuals (0.3% of the GB passage population), though the reference population remains 1,900 individuals.	Highest numbers occur in mid-July to September using roosts at Coatham Sands, Seal Sands, North Gare Sands/Seaton Snook and Bran Sands. They feed in shallow inshore waters in and around the estuary mouth.	Coatham Sands: ~3.5km Seal Sands: ~1.5km North Gare Sands: ~3km Bran Sands: ~0.9km
Little tern (breeding)	When the SPA was originally extended in 2000, the site supported an average of 40 pairs (1995-1998).	Between 2010 and 2014, the SPA / Ramsar supported an average of 81 pairs (4.3% of the GB breeding population).	Virtually all breeding birds are located at Crimdon Dene, north of Hartlepool, with foraging grounds in marine areas within 5km alongshore and 3.5km offshore of the colony.	Crimdon Dene: 15km
Internationally important population of regularly occurring migratory species				
Knot (non-breeding)	At designation, the site supported an average of 5,509	Between 2011/12 and 2015/16, the SPA / Ramsar supported an average of 876 individuals	Formerly present in large numbers on the estuary at Seal Sands, the birds are now increasingly located outside the	Coatham Sands: ~3.5km Redcar Rocks: ~6.5km Hartlepool Headland: ~9km

Qualifying feature	SPA population in 2000 (English Nature, 2000)	Current SPA population (Natural England, 2018a)	Usage of the SPA / Ramsar (Natural England, 2018a)	Approximate distance from proposed scheme
	individuals (1991/92 to 1995/06).	(0.2% of the NE Canada and Greenland/Western Europe population), though the reference population remains 5,509 individuals.	estuary, on Coatham Sands, Redcar Rocks and around Hartlepool Headland.	
Redshank (non-breeding)	At designation, the site supported an average of 1,648 individuals (1987 to 1991).	Between 2011/12 and 2015/16, the SPA / Ramsar supported an average of 881 individuals (0.3% of the Iceland & Faroes/Western Europe population), though the reference population remains 1,648 individuals.	Within the site, birds feed on intertidal mudflats including Seal Sands, North Tees Mudflat, Bran Sands and Hartlepool Bay, saltmarsh areas at Greatham Creek and intertidal rocky shores at Hartlepool Headland, Redcar and Coatham.	Seal Sands: ~1.5km North Tees Mudflat: <100m Bran Sands: ~0.9km Hartlepool Bay: ~4km Hartlepool Headland: ~9km Redcar Sands: ~6.5km Coatham Sands: ~3km
Waterbird assemblage of more than 20,000				
Waterbird assemblage	At designation, the average assemblage was 21,312 individuals (1991/92 to 1995/96).	During the period 2011/12 to 2015/16, the SPA / Ramsar supported an average of 26,014 individuals.	The assemblage includes a range of breeding, passage and wintering water bird species, including those species listed above plus nationally important numbers of gadwall, shoveler, sanderling, wigeon and significant numbers of lapwing, herring gull and black-headed gull.	

Shoveler, gadwall and ruff are predominantly associated with the extensive freshwater wetlands of the site, while ringed plover, knot, sanderling, purple sandpiper and Sandwich tern mostly use the open coast. Redshank are widespread across the site, but the greatest foraging concentrations occur, along with the largest numbers of shelduck, on the intertidal mud of Seal Sands and Greatham Creek. Seal Sands and Bran Sands are also regularly used by ringed plover and knot.

12.4.2 Review of WeBS core count and low tide count data

WeBS core counts in the Tees estuary

Table 12.5 presents a summary of the most recent core counts from the Tees estuary WeBS count site (2014/15 to 2018/19). As reported below, the highest abundance of waterbirds in the estuary occurs during the winter months, with a mean seasonal peak (i.e. the five year mean of the sum of the maximum counts in a given season) of 21,801 individuals in winter. Each year, the highest monthly counts across the estuary were in either December or January, ranging between around 14,000 and 20,800 individuals.

Table 12.5 WeBS count totals of all species at Tees estuary WeBS core count site, 2014/15 to 2018/19

Year	Peak monthly total*	Autumn peak	Winter peak	Spring peak
2014/15	14,659 (Dec)	15,790	19,198	8,994
2015/16	17,339 (Jan)	18,635	22,851	8,579
2016/17	20,765 (Dec)	18,935	23,553	8,246
2017/18	14,044 (Jan)	16,657	19,329	8,681
2018/19	18,066 (Jan)	16,689	24,074	9,710
Mean	**16,963**	**17,341**	**21,801**	**8,842**

*Peak monthly total is the peak count of all individuals (of all species) in a single month

Table 12.6 presents the five-year annual peak counts of all SPA / Ramsar site qualifying features / assemblage component species and notifying features of the SSSI in the Tees estuary core site.

Table 12.6 Five-year annual peak counts from WeBS core counts at Tees estuary core count site

Species	2014/15	2015/16	2016/17	2017/18	2018/19	Mean peak
Shelduck	426	473	418	452	519	**458**
Shoveler	208	169	123	163	113	**155**
Gadwall	480	740	826	722	707	**695**
Wigeon	2,230	3,562	4,059	4,002	4,060	**3,583**
Avocet	47	116	117	131	92	**101**
Lapwing	3,066	3,938	4,363	2,405	4,571	**3,669**
Ringed plover	105	172	243	505	251	**255**
Knot	760	491	694	250	230	**485**
Ruff	21	45	33	17	12	**26**
Sanderling	204	283	200	190	420	**298**
Purple sandpiper	61	36	45	26	55	**45**
Redshank	765	940	929	657	915	**841**
Black-headed gull	2,888	1,291	2,082	1,892	2,218	**2,074**
Herring gull	3,307	2,595	1,715	1,334	1,751	**2,140**

Species	2014/15	2015/16	2016/17	2017/18	2018/19	Mean peak
Sandwich tern	176	204	235	662	290	**313**
Little tern	6	3	1	89	10	**34**
Common tern	317	280	584	743	343	**497**

WeBS core counts at sectors within or adjacent to the footprint of the proposed scheme, 2012/13 to 2018/19

The Teesmouth and Cleveland SPA / Ramsar site scientific brief (Natural England, 2018a) derived population counts of qualifying features from sectors within the Tees estuary WeBS core count site (as well as Durham Coast sector 1a).

The Tees estuary core count sectors used in the scientific brief include two within 1km of the footprint of the proposed scheme, namely:

- Sector 52426 (Tees Estuary opposite Smith Dock and Hargreaves Quarry), which overlaps with the proposed channel dredge, berth pocket and wharf demolition footprint and includes the North Tees Mudflat; and,
- Sector 52427 (Bran Sands South), which is located downstream of the Tees Dock turning circle and includes Bran Sands lagoon and Dabholm Gut (although it excludes Vopak foreshore).

Tables 12.7 and **12.8** present a summary of the most recent core counts from sector 52426 (2012/13 to 2016/17) and sector 52427 (2014/15 to 2018/19), respectively, which were procured from the BTO in 2020. In sector 52426, the highest mean seasonal peak was in autumn (301 individuals, representing 1.7% of the autumn peak across the entire Tees estuary count site), whereas in sector 52427 the highest mean seasonal peak was in winter (2,377 individuals, representing 10.9% of the winter peak across the entire Tees estuary count site). In all cases, seasonal peaks were higher at sector 52427 than at 52426, meaning that sector 52427 supported more waterbirds regardless of the season.

Table 12.7 Total core counts of all species at WeBS sector 52426 (Tees Estuary opposite Smith Dock and Hargreaves Quarry)

Year	Peak monthly total*	Autumn peak	Winter peak	Spring peak
2012/13	240 (Dec)	101	274	93
2013/14	204 (Feb)	143	238	65
2014/15	265 (Mar)	171	400	230
2015/16	609 (Sep)	632	132	70
2016/17	418 (Aug)	456	N/C	N/C
Mean	**347**	**301**	**261**	**115**

Table 12.8 Total core counts of all species at WeBS sector 52427 (Bran Sands South)

Year	Peak monthly total	Autumn peak	Winter peak	Spring peak
2014/15	2,120 (Mar)	883	2,932	1,685
2015/16	1,205 (Dec)	1,712	1,667	486
2016/17	946 (Nov)	905	1,491	278
2017/18	1,911 (Jan)	652	2,387	615
2018/19	1,989 (Jan)	1,222	3,408	324

Year	Peak monthly total	Autumn peak	Winter peak	Spring peak
Mean	**1,634**	**1,075**	**2,377**	**378**

Table 12.9 lists the five-year annual peak counts for individual species in sector 52426 (2012/13 to 2016/17) and sector 52427 (2014/15 to 2018/19), respectively. The values reported represent the highest count of a given species recorded in a single month for the year in question. In sector 52426, herring gull (mean peak of 175 individuals) and black-headed gull (130 individuals) were the most abundant species recorded over the period 2012/13 to 2106/17, and the only species with a mean peak count of more than 26 individuals.

In general, species counts were considerably higher in sector 52427, with the most abundant species being common gull *Larus canus* (mean peak 570 individuals) and herring gull (mean peak 536 individuals) over the period 2014/15 to 22018/19. Other species with a mean peak of over 100 individuals at sector 52427 (Bran Sands South) included lapwing (mean peak 370 individuals), black-headed gull (354 individuals), teal (303 individuals), redshank (174 individuals) and great black-backed gull *Larus marinus* (115 individuals).

Table 12.9 Five-year annual peak counts (i.e. highest count in a single month) from WeBS core counts at sectors 52426 and 52427

	Sector 52426 Tees Estuary opp. Smith Dock and Hargreaves Quarry						Sector 52427 Bran Sands South					
Species	**12/13**	**13/14**	**14/15**	**15/16**	**16/17**	**Mean**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**Mean**
Canada goose	0	2	0	0	0	**<1**	0	3	5	12	0	**4**
Greylag goose	0	0	0	1	0	**<!**	0	0	0	0	0	**0**
Mute swan	0	4	0	0	0	**1**	1	0	0	0	0	**<1**
Shelduck	8	25	15	22	0	**14**	124	118	61	51	94	**90**
Gadwall	0	0	2	4	0	**1**	14	4	2	7	13	**8**
Wigeon	0	0	0	0	0	**0**	0	2	7	0	0	**2**
Mallard	2	0	1	4	0	**1**	21	14	12	13	8	**14**
Teal	0	4	0	0	0	**1**	248	126	171	145	827	**303**
Pochard	0	0	0	0	0	**0**	0	0	0	1	0	**<1**
Tufted duck	0	1	0	0	0	**<1**	0	0	1	0	0	**<1**
Scaup	0	0	0	0	0	**0**	0	0	1	0	0	**<1**
Eider	0	0	0	2	0	**<1**	1	2	0	1	4	**2**
Long-tailed duck	0	0	0	0	0	**0**	0	0	1	0	0	**<1**
Goldeneye	0	1	1	0	0	**<1**	26	33	29	22	29	**28**
Goosander	0	0	0	0	0	**0**	0	0	0	0	1	**<1**
Red-breasted merganser	4	1	3	0	0	**2**	42	52	52	34	43	**45**
Red-throated diver	0	0	0	0	0	**0**	2	0	0	1	0	**1**
Little grebe	0	0	0	0	0	**0**	13	14	26	23	18	**19**
Great crested grebe	0	0	0	0	0	**0**	1	1	1	11	0	**3**

	Sector 52426 Tees Estuary opp. Smith Dock and Hargreaves Quarry						Sector 52427 Bran Sands South					
Species	**12/13**	**13/14**	**14/15**	**15/16**	**16/17**	**Mean**	**14/15**	**15/16**	**16/17**	**17/18**	**18/19**	**Mean**
Grey heron	1	1	1	2	0	**1**	10	9	9	6	3	**7**
Little egret	0	0	0	0	0	**0**	14	19	6	11	7	**11**
Shag	2	0	0	0	0	**<1**	0	0	0	1	0	**<1**
Cormorant	39	13	16	25	36	**26**	112	56	63	58	34	**65**
Moorhen	0	0	0	0	0	**0**	6	2	2	2	2	**3**
Oystercatcher	4	2	2	4	2	**3**	3	18	2	3	2	**6**
Lapwing	0	1	2	0	0	**1**	620	190	32	370	640	**370**
Grey plover	0	0	0	0	0	**0**	0	1	0	0	0	**<1**
Ringed plover	5	0	1	0	0	**1**	1	0	0	0	0	**<1**
Whimbrel	0	0	4	0	0	**1**	0	0	0	0	0	**0**
Curlew	15	35	25	36	19	**26**	3	1	5	3	2	**3**
Bar-tailed godwit	0	2	0	0	0	**<1**	0	0	0	0	0	**0**
Turnstone	4	0	1	0	0	**1**	13	11	6	8	2	**8**
Dunlin	0	0	0	0	0	**0**	0	47	2	7	6	**12**
Woodcock	0	0	0	0	0	**0**	0	0	0	0	1	**<1**
Snipe	0	0	0	0	0	**0**	1	0	1	0	0	**<1**
Common sandpiper	0	0	2	2	0	**1**	3	1	2	3	1	**2**
Redshank	12	22	11	9	46	**20**	180	190	180	160	160	**174**
Greenshank	0	0	0	0	0	**0**	0	1	3	0	0	**1**
Kittiwake	0	0	0	0	0	**0**	9	31	16	30	9	**19**
Black-headed gull	160	94	94	140	163	**130**	360	180	270	390	570	**354**
Common gull	2	18	16	1	0	**7**	440	440	470	700	800	**570**
Great black-backed gull	13	3	3	15	18	**10**	6	28	60	270	210	**115**
Herring gull	46	33	238	394	164	**175**	1,450	740	190	160	140	**536**
Lesser black-backed gull	1	0	1	5	4	**2**	2	5	2	8	7	**5**
Sandwich tern	0	0	0	0	0	**0**	0	4	12	6	0	**4**
Common tern	5	4	6	5	4	**5**	14	30	4	9	11	**14**
Arctic tern	0	0	0	0	0	**0**	1	0	0	0	0	**<1**
Kingfisher	0	0	0	0	0	**0**	0	1	0	1	0	**<1**

Of the SPA / Ramsar site qualifying features, those recorded in one or both sectors (i.e. listed in **Table 12.9**) were Sandwich tern, common tern and redshank. Additionally, major component species of the SPA / Ramsar site assemblage recorded included gadwall, wigeon, lapwing, herring gull and black-headed gull. Additional SSSI species present during the counts included shelduck and ringed plover.

Seasonality of the SPA / Ramsar site and SSSI features varied from species to species. Winter months (i.e. December to February) generally saw peak counts of redshank, gadwall, shelduck and lapwing. Summer and early autumn (notably July through September) saw peak counts of common tern, Sandwich tern and ringed plover. Herring gulls and black-headed gulls were generally present throughout the year, with peak counts occurring across all seasons.

Table 12.10 indicates the proportion of the SPA / Ramsar site populations (as per the SPA / Ramsar site citation and Natural England, 2018a) represented by the mean annual peak counts in Sectors 52426 and 52427, plus the proportion of the overall Tees estuary WeBS core site counts over the same period.

Table 12.10 Mean peak count of SPA / Ramsar site and SSSI assemblage species at WeBS sectors 52426 (2012/13 to 2016/17) and 52427 (2014/15 to 2018/19). Species in bold are those that qualify as features of the SPA / Ramsar site in their own right.

		Mean peak count by WeBS count sector and proportion of the Tees Estuary WeBS count site mean peak and SPA / Ramsar citation population					
		Tees Estuary opp. Smith Dock and Hargreaves Quarry (52426)			Bran Sands South (52427)		
Species	**SPA mean**	**Mean peak count 12/13-16/17**	**% of Tees Estuary mean peak**	**% of SPA population**	**Mean peak count 14/15-18/19**	**% of Tees Estuary mean peak**	**% of SPA population**
Shelduck	N/A	14	3.3	N/A	90	19.6	N/A
Gadwall	428	1	0.2	0.2	8	1.2	1.9
Wigeon	2,660	0	0.0	0.0	2	<0.1	<0.1
Lapwing	3,892	1	<0.1	<0.1	370	10.1	9.5
Ringed plover	N/A	1	0.5	N/A	<1	<0.1	N/A
Redshank	**1,648**	**20**	**2.3**	**1.2**	**174**	**20.7**	**10.6**
Black-headed gull	2,273	130	5.7	5.7	354	17.0	15.5
Herring gull	3,243	175	7.7	5.4	536	25.0	16.5
Sandwich tern	**1,900**	**0**	**0.0**	**0.0**	**4**	**1.3**	**0.2**
Common tern	**798**	**5**	**1.4**	**0.6**	**14**	**2.8**	**1.8**

Sector 52426 supported a significant[9] proportion of the SPA / Ramsar site assemblage component population of black-headed gull (~6% of the population) and herring gull (~5%), as well as a significant proportion of the overall Tees estuary counts over the same period.

Sector 52427 supported an important proportion of the SPA / Ramsar site population of redshank (~11%), as well as the assemblage component species lapwing (~10%), black-headed gull (~16%) and herring gull (~17%). Additionally, sector 52427 supported a significant proportion (~20%) of the overall Tees estuary count of shelduck, a SSSI notification feature.

[9] *A 5% threshold was used to determine significant populations within the Teesmouth and Cleveland Coast pSPA/Ramsar Departmental Brief, which is consistent with assessments of the importance of prospective extensions to other sites in England (Natural England, 2018a)*

Notably, neither sector supported significant populations of the qualifying features Sandwich tern, common tern, little tern and knot, nor other SPA / Ramsar site component species (i.e. gadwall, shoveler and wigeon) and SSSI features.

WeBS low tide counts in the Tees estuary

WeBS low tide count data provides information on the relative importance of intertidal feeding areas of UK estuaries for wintering waterbirds. Low tide count data in the Tees estuary provides more of an understanding of the use of intertidal areas and other habitats within the Tees estuary, including by SPA / Ramsar and SSSI qualifying features. Sector DT021, which encompasses Bran Sands South and intertidal areas just north of the turning circle, and Sector DT020, which encompasses the North Tees Mudflat, are the most relevant sectors to the proposed scheme.

Tables 12.11 and **12.12** present the species recorded during the most recent low tide counts in the Tees estuary from sector DT021 and DT020, undertaken during the winters of 2018/19 and 2012/13, respectively.

Table 12.11 Peak and mean densities recorded in WeBS low tide counts at sector DT021 (18/19)

Species	Preferred habitat	Area (ha) of preferred habitat	Peak count	Peak density	Mean count (ind./ha)	Mean density (ind./ha)
Mute swan	Subtidal	33	2	0.06	1	0.02
Shelduck	All habitats	40	138	3.45	129	3.23
Gadwall	All habitats	40	43	1.08	21	0.52
Mallard	All habitats	40	13	0.33	9	0.23
Teal	All habitats	40	848	21.20	677	16.92
Red-breasted merganser	Subtidal	33	2	0.06	1	0.02
Grey heron	Intertidal & non-tidal	7	5	0.71	4	0.50
Cormorant	All habitats	40	11	0.28	3	0.08
Moorhen	All habitats	40	2	0.05	1	0.02
Oystercatcher	Intertidal	7	13	1.86	8	1.14
Lapwing	Intertidal & non-tidal	7	548	78.29	227	32.36
Curlew	Intertidal & non-tidal	7	8	1.14	7	1.04
Turnstone	Intertidal	7	3	0.43	1	0.18
Redshank	Intertidal & non-tidal	7	134	19.14	86	12.21
Black-headed gull	All habitats	40	80	2.00	60	1.50
Common gull	All habitats	40	1	0.03	1	0.01
Great black-backed gull	All habitats	40	1	0.03	1	0.01
Herring gull	All habitats	40	61	1.53	31	0.78

Table 12.12 Peak and mean densities recorded in WeBS low tide counts at sector DT020 (12/13)

Species	Preferred habitat	Area (ha) of preferred habitat	Peak count	Peak density (ind./ha)	Mean count	Mean density (ind./ha)
Shelduck	All habitats	45	12	0.27	4	0.09
Teal	All habitats	45	47	1.04	12	0.26
Cormorant	All habitats	45	7	0.16	2	0.05
Oystercatcher	Intertidal	21	4	0.19	2	0.11
Lapwing	Intertidal & non-tidal	21	75	3.57	19	0.89
Ringed plover	Intertidal	21	2	0.10	1	0.02
Curlew	Intertidal & non-tidal	21	33	1.57	22	1.06
Turnstone	Intertidal	21	1	0.05	1	0.02
Redshank	Intertidal & non-tidal	21	121	5.76	44	2.11
Black-headed gull	All habitats	45	60	1.33	15	0.33
Great black-backed gull	All habitats	45	19	0.42	5	0.11
Herring gull	All habitats	45	123	2.73	31	0.68

The above tables suggest that population density is generally considerably lower at North Tees Mudflat than at Bran Sands South and areas downstream. The densest populations at North Tees Mudflat are those of curlew (mean of 1.06 individuals per hectare of suitable habitat) and redshank (2.11 ind./ha), indicating low usage of the site over the survey period. However, as mentioned, the WeBS low tide data from sector DT020 is dated winter 2012/13 and is not considered to be recent.

12.4.3 Site-specific estuarine bird survey

Given that the WeBS low tide data for North Tees Mudflat is old, a site-specific non-breeding water bird survey has been conducted by INCA. The survey commenced in July 2020 and will continue until March 2021. This survey has been undertaken, in agreement with Natural England, to provide an indication of the abundance of birds within the footprint of the proposed scheme and at the adjacent areas indicated in **Figure 12.3**, and the manner in which the site is used.

Available data at the time of writing are reported below. The survey gives an indication of the usage of the site by SPA / Ramsar site features and assemblage component species and can be set into the context of the SPA / Ramsar site populations. Low tide counts in particular are useful for understanding the importance of the intertidal zones (notably North Tees Mudflat) for foraging.

Results of the outstanding survey visits (i.e. those from October 2020 to March 2021), which will incorporate the key wintering period in the Tees estuary will be made available in the form of a post-submission supplementary report.

High tide counts

The results of the high tide counts (up to the time of writing) at each of the four sectors are presented in **Table 12.13**. As of the survey visit on 22nd September 2020, birds seen in Sector 1 (i.e. the intertidal zone and artificial structures at South Bank) were defined as either using the existing wharf structure or the South Bank riverbank / intertidal.

Table 12.13 Site survey high tide peak counts, July to September 2020

Survey visit	28/07				11/08				25/08				02/09				22/09			
Sector	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Cormorant	0	16	0	0	0	4	0	6	1	6	1	4	1	1	0	0	0	1	0	0
Curlew	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	2	0	1	0
Grey heron	0	0	0	7	0	0	5	0	1	0	10	0	1	0	2	0	2	0	7	5
Oystercatcher	2	0	0	0	0	0	0	2	0	0	4	0	2	0	2	0	0	0	0	0
Redshank	1	0	0	0	0	0	7	0	1	0	0	0	5	0	0	0	1	0	6	0
Turnstone	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3	0
Total	**3**	**16**	**0**	**7**	**0**	**4**	**17**	**8**	**3**	**6**	**15**	**4**	**10**	**1**	**4**	**0**	**5**	**1**	**17**	**5**

During the high tide counts to date, six species have been recorded across the four sectors. The majority of birds recorded were roosting at high tide, with a small amount of foraging activity by redshank and oystercatcher at Sectors 3 and 4. As of the 22nd September 2020 survey, birds in Sector 1 (notably curlew, grey heron and redshank) were seen to use both the riverbank and the existing quay structure. Birds recorded at high tide displayed a clear preference for the North Tees Mudflat (Sectors 3 and 4) over the main river channel (Sector 2) and the artificial structures and riverbank at Sector 1, as indicated in **Table 12.13**.

Of the six species recorded during the high tide surveys to date, only redshank is a feature and/or major assemblage component of the SPA / Ramsar site and SSSI. The peak count of redshank (7) represents 0.4% of the SPA passage population and 0.8% of the current Tees Estuary population, as per the most recent WeBS counts (2014/15 to 2018/19).

Low tide counts

The results of the low tide surveys (up to the time of writing) at each of the four sectors are presented in **Table 12.14**.

Table 12.14 Site survey low tide peak counts, July to September 2020

Survey visit	14/07				05/08				18/08				01/09				15/09			
Sector	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Bar-tailed godwit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Cormorant	3	2	2	0	5	0	1	6	0	0	5	3	2	1	6	2	0	2	3	6
Curlew	3	0	14	15	2	0	24	16	2	0	23	8	1	0	14	14	2	0	13	10
Grey heron	0	0	1	3	0	0	0	0	0	0	0	0	2	0	1	1	0	0	1	2
Lapwing	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	28	0	0	0	49
Little egret	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
Oystercatcher	2	0	5	3	0	0	4	3	1	0	3	3	2	0	3	0	2	0	1	3
Redshank	0	0	2	0	0	0	5	7	0	0	30	52	1	0	26	56	2	0	29	51
Turnstone	0	0	0	0	0	0	0	0	0	0	0	12	0	0	4	3	0	0	9	1
Whimbrel	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**8**	**2**	**24**	**22**	**8**	**0**	**34**	**32**	**3**	**0**	**62**	**101**	**8**	**1**	**55**	**115**	**6**	**2**	**56**	**123**

During the low tide counts to date, ten species have been recorded across the four sectors. At low tide, foraging was the most regular activity recorded, highlighting the importance of the intertidal habitat at Sectors 3 and 4 (North Tees Mudflat) as a feeding resource. The relatively high total counts at North Tees Mudflat were largely driven by the presence of curlew, redshank and lapwing. Counts have increased with each subsequent visit, indicating that populations in the survey site will likely increase moving into winter months. Birds recorded at low tide displayed an even clearer preference for the North Tees Mudflat over the main river channel and the artificial structures and intertidal at Sector 1 than they did at high tide, as indicated in **Table 12.13**

Of the eight species recorded, one (redshank) is a feature of the SPA / Ramsar site and SSSI and one (lapwing) is a major component species of the qualifying assemblage. The peak count of redshank (82) recorded at North Tees Mudflat represents a significant proportion (5.0%) of the SPA passage population, and 9.7% of the current Tees estuary population as per the most recent WeBS counts (2014/15 to 2018/19). The peak count of lapwing (49) represents 1.3% of both the SPA population and the current Tees estuary population (2014/15 to 2018/19).

Summary of site-specific estuarine bird survey

The site-specific survey indicates that the intertidal areas adjacent to the proposed scheme footprint (i.e. North Tees Mudflat) provide important foraging opportunities for non-breeding water birds at low tide during the surveyed months of July to September. Species supported include a notable population of redshank, a qualifying feature of the SPA / Ramsar site and SSSI, and lapwing, a component species of the SPA / Ramsar site and SSSI assemblage. At high tide, when the intertidal areas are submerged, water bird numbers are considerably lower. Usage of South Bank and the existing quay structure during the surveyed period appears to be very low at both high tide and low tide, indicating that this habitat is of comparatively low value. However, it should be noted that at the time of writing the survey does not provide a quantitative indication of the usage of the area by water birds during winter months, when the Tees estuary supports its highest numbers.

As previously noted, in the absence of recent low tide counts of wintering birds at the North Tees Mudflat across the full winter period, the assumption made for the purposes of impact assessment is that North Tees Mudflat is used by a significant proportion of the Tees estuary water bird population (see also **Table 12.3**).

12.4.4 South Bank tern survey

The tern species survey undertaken from the South Bank Wharf between late June and early August 2020 (INCA, 2020) indicated that very few terns were recorded using or commuting along the river channel adjacent to the wharf (see **Figure 12.3**), and numbers were lower than in similar surveys undertaken in 2015 (Perrow *et al.*, 2016) and 2016 (INCA, 2016). No little terns were recorded during any of the four counts, and only three Sandwich terns were recorded (representing 0.2% of the SPA population). From previous counts of the site (Perrow *et al.*, 2016; INCA, 2016), it is understood that common tern is the most regular user of the site, and **Table 12.15** presents the common tern counts in 2020 compared with those in 2015 and 2016.

The maximum count in 2020 of 12 individuals represents 1.5% of the SPA population, and the behaviour recorded included commuting through the site and foraging. In 2020, common terns were most prevalent in June, with very few recorded in later counts. The counts indicate that, generally speaking, the only tern species to regularly use the river channel near to the proposed scheme is common tern, though even numbers of these are relatively low when compared with other areas of the Tees (INCA, 2020).

Table 12.15 Point counts of common tern at South Bank Wharf in 2020 (INCA, 2020), 2016 (INCA, 2016) and 2015 (Perrow et al., 2016)

	Count		
	2015	2016	2020
Late June	11	10	12
Early July	5	9	0
Late July	22	4	1
Early August	N/A	N/A	2

12.4.5 Review of existing ornithological abundance and distribution data in the lower Tees estuary

This section provides information from other ornithological studies undertaken across the lower Tees estuary, supplementing the data from the WeBS and site-specific surveys of sites within or adjacent to the proposed scheme footprint (including the North Tees Mudflat).

Wintering bird surveys 2014-15 at Teesside

The Teesside wintering bird survey was undertaken across a number of survey sites within the Teesmouth and Cleveland Coast SSSI between November 2014 and March 2015, as part of a Natural England national review of the SSSI network (Ecology Consulting, 2015). Survey sites within 1km of the footprint of the proposed scheme included:

- North Tees Mudflat and Brownfield, an area of 65ha which incorporated the North Tees Mudflat and adjacent terrestrial area; and,
- Vopak Foreshore and Brownfield, an area of 22ha which incorporated the intertidal foreshore approximately 100m north of the Tees Dock turning circle (part of the SPA, Ramsar site and SSSI) plus adjacent terrestrial area.

Both low tide and high tide counts were undertaken in the two sectors (two low and two high per month in November / December 2014, three low and three high per month in January to March 2015). **Tables 12.16** and **12.17** present the peak monthly counts at North Tees Mudflat (and Brownfield) and Vopak Foreshore (and Brownfield), respectively, for all waterbird species with a peak count of more than one (for conciseness, species with a peak count of one or less have not been included).

Table 12.16 High tide and low tide peak counts at North Tees Mudflat and Brownfield (adapted from Ecology Consulting, 2015)

	High tide peak counts					Low tide peak counts				
Species	Nov.	Dec	Jan	Feb	Mar	Nov	Dec	Jan	Feb	Mar
Shelduck	0	4	12	37	12	11	6	8	22	27
Gadwall	0	0	0	0	4	0	0	0	0	0
Teal	0	6	0	0	0	0	0	0	0	0
Mallard	0	2	2	2	0	0	0	2	0	2
Red-breasted merganser	0	0	0	0	0	1	0	2	0	0
Cormorant	4	12	3	3	0	8	7	2	3	1
Oystercatcher	0	0	0	7	2	1	0	1	5	4

	High tide peak counts					Low tide peak counts				
Species	**Nov.**	**Dec**	**Jan**	**Feb**	**Mar**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
Lapwing	0	0	0	0	0	2	0	36	0	0
Curlew	10	10	8	16	6	20	13	30	27	16
Redshank	0	0	0	0	0	115	54	11	4	2
Common gull	2	0	75	2	0	0	2	1	2	0
Lesser black-backed gull	0	0	0	0	1	0	0	0	0	4
Herring gull	1	3	66	120	5	202	451	236	755	457
Great black-backed gull	2	1	1	2	4	31	35	49	19	8
Black-headed gull	20	45	195	134	2	137	66	255	345	164

Table 12.17 High tide and low tide peak counts at Vopak Foreshore and Brownfield (adapted from Ecology Consulting, 2015)

	High tide peak counts					Low tide peak counts				
Species	Nov.	Dec	Jan	Feb	Mar	Nov	Dec	Jan	Feb	Mar
Shelduck	0	0	0	4	240	0	0	0	2	1
Mallard	0	0	2	0	0	0	0	0	0	0
Eider	0	1	0	0	0	0	0	0	5	3
Red-breasted merganser	0	0	8	6	1	2	0	1	5	4
Cormorant	1	1	37	0	4	2	14	16	46	1
Oystercatcher	8	6	5	5	4	3	3	4	8	4
Lapwing	225	0	243	124	0	230	82	189	17	0
Bar-tailed godwit	0	0	0	1	0	2	0	1	0	0
Curlew	19	20	7	9	6	3	12	13	4	6
Redshank	2	3	5	1	2	3	1	1	1	1
Turnstone	1	0	4	0	0	0	0	0	0	1
Common gull	24	29	46	12	4	1	0	3	255	6
Lesser black-backed gull	0	0	0	0	1	0	0	0	1	6
Herring gull	20	15	68	48	53	33	97	216	353	101
Great black-backed gull	0	0	2	8	1	12	52	38	36	1
Black-headed gull	45	11	26	2	3	11	0	17	20	1

The two sectors were divided into smaller subsections for the purpose of recording the distribution of birds. Both the North Tees Mudflat and the Vopak Foreshore supported much greater number of birds than their respective adjoining brownfield land. As is also suggested by the site-specific low tide surveys in 2020 (see **Section 12.4.3)**, the 2014/15 counts indicate that the North Tees Mudflat is notable as a foraging site for redshank at low tide (up to 115 individuals, representing 7% of the reference SPA / Ramsar site population) and small numbers of curlew *Numenius arquata* (peak count of 30). The intertidal area at North Tees Mudflat was also used for feeding and roosting by significant numbers of herring gulls (up to 755 individuals, 23% of the SPA mean population), black-headed gulls (up to 345 individuals, 15% of the mean SPA

population) and great black-backed gulls (up to 49 individuals). Birds appeared to be relatively evenly distributed across most of the intertidal area.

The Vopak Foreshore count sector was generally less populated than the North Tees Mudflat, though it supported a significant roost of lapwing (peak count of 243 individuals, 6% of the mean SPA population), a component species of the SPA / Ramsar site assemblage. Lapwing roosts were mainly on the mudflat but also occasionally on the adjacent brownfield grassland. Small numbers of curlew were recorded feeding through the tide and a small cormorant roost was regularly present on the rocky shore. There were relatively high numbers of herring gull (an assemblage component species) and great black-backed gull roosting and feeding on the mudflat and rocky shore (Ecology Consulting, 2015).

Vopak Foreshore waterbird survey 2013/14

A vantage point monitoring survey was undertaken on a bi-monthly basis (June 2013 to March 2014) along the Vopak foreshore, as part of planning work for the Anglo American Harbour facilities (INCA, 2014). This section presents the results of the 2013/2014 Vopak Foreshore monitoring. The section of the foreshore monitored does not form part of an existing WeBS count sector.

Ten species were recorded during the monitoring period, of which two (common tern and redshank) are qualifying features of the SPA / Ramsar site, one (lapwing) is an important component of the SPA / Ramsar site waterbird assemblage, and one (shelduck) is additionally notified in the citation for the SSSI. **Table 12.18** indicates the species recorded and peak counts during the monitoring period.

Table 12.18 Peak counts during the Vopak Foreshore monitoring surveys 2013/14 (INCA, 2014)

Species	Months recorded	Peak count	Proportion of the pSPA/Ramsar population (Natural England, 2018)
Shelduck	Jun, Nov, Feb, Mar	2 (Feb, Mar)	
Grey heron	Jul	7	
Cormorant	Jun, Aug – Dec, Mar	73 (Jan)	
Oystercatcher	All	8 (Aug)	
Lapwing	**Jul – Jan**	**165 (Dec)**	**4.2%**
Curlew	Jun – Dec, Mar	5 (Oct, Dec)	
Bar-tailed godwit	Oct, Nov, Jan	5 (Oct)	
Dunlin	Sep	4	
Redshank	**Sep, Nov, Mar**	**2 (Sep, Nov)**	**0.1%**
Common tern	**Aug**	**2**	**0.3%**

The most abundant species recorded was lapwing, although the peak count recorded (165 in December 2017) represented less than 5% of the component lapwing population within the SPA / Ramsar site waterbird assemblage. Of the SPA / Ramsar site qualifying species, only redshank and common tern were present. Both had a peak count of two, which represents a negligible proportion of the SPA / Ramsar site populations.

12.4.6 Future evolution of the baseline in the absence of the proposed scheme

In the absence of the proposed scheme, future trends in the numbers and distribution of bird species in the Tees estuary are likely to be shaped by localised drivers such as future industrial / commercial works along the river, plus wider issues such as climate change. The ongoing activities along the banks of the Tees

estuary would continue, and therefore the levels of direct and indirect disturbance to birds within and adjacent to the Tees would not be expected to decrease.

12.4.7 Ornithology receptors scoped in for assessment

Based on the information gathered from the site-specific surveys and the desk-based review of other data sources in the Tees estuary, receptors included in the following impact assessments are as follows:

- Wintering (non-breeding) waterbirds, including features of the Teesmouth and Cleveland Coast SPA / Ramsar site and SSSI, which are notably present on intertidal areas of the North Tees Mudflat and the Vopak Foreshore.
- Breeding terns, which are features of the SPA and could potentially forage within the Tees estuary, including within the footprint of the proposed scheme.

12.5 Potential impacts during the construction phase

12.5.1 Loss of supporting habitat due to dredging / excavation and demolition works

During the construction phase, it will be necessary to excavate up to 2.5ha of the intertidal area which runs along the South Bank, between the existing wharf and the riverbank. This will be converted to new subtidal habitat within the proposed berth pocket. Additionally, the existing wharf structure and smaller jetties downstream will be demolished and replaced by a new quay set into the riverbank. All works below the high tide mark are within the Teesmouth and Cleveland Coast SPA, therefore such changes may represent a loss of potential foraging habitat (intertidal) and roosting habitat (artificial structures) for waterbirds, including SPA / Ramsar site and SSSI features.

The dredging footprint in the main channel does not overlap with the intertidal habitat available at North Tees Mudflat or any other intertidal areas along the river, therefore there is no direct impact on supporting habitat beyond those referred to above.

Data available to date from site-specific surveys undertaken in 2020 (albeit outside of the key wintering season), which indicate that high tide peak counts within Sector 1 (i.e. South Bank) range from zero to 10 individuals (see **Section 12.4.3**), suggest that the area which is to be subject to demolition and excavation (including the artificial structures) is of low value to roosting or foraging birds at high tide. This suggestion is supported by WeBS core counts of coastal and estuarine birds at Sector 52426 (which incorporates the structures due to be demolished), which indicate that the sector does not appear to support high numbers of birds (at high tide) even during the peak winter months (see **Section 12.4.2**). Numbers within the sector are significantly lower than other areas of the Tees estuary (for example, the mean winter peak at Sector 52426 is 261 individuals, compared with 2,377 at the neighbouring sector 52427). Furthermore, there are several other artificial structures along the Tees, typical of an industrialised waterway, that could offer alternate roosting / loafing locations.

The results obtained so far from the 2020 site-specific low tide surveys (see **Section 12.4.3**) show a consistent preference by waterbirds for North Tees Mudflat over South Bank and the intertidal area within the footprint of the proposed scheme. During the summer / early autumn months, peak low tide counts at South Bank range from three to eight individuals, compared with a range of 46 to 179 individuals at North Tees Mudflat. Whilst noting that the results to date do not encompass the key wintering months, they so far suggest that, even at low tide, the value of the habitat available in the area affected by excavation and demolition is low, and sensitivity of birds to loss of this habitat would be far lower than it would, for example, to a permanent loss at North Tees Mudflat or other intertidal areas further downstream.

The above also indicates that, within the immediate area, there are alternative (even preferable) high-value supporting habitats available to the comparatively low-value habitat to be lost through demolition and excavation. In the wider area, existing literature (e.g. Natural England, 2018a), Tees Estuary WeBS core site counts (**Section 12.4.2**) and other surveys of the Tees (**Section 12.4.5**) indicate that there are other alternative sites within a reasonable proximity that are clearly suitable for supporting high numbers of waterbirds, including *inter alia* Vopak Foreshore (~1.4km away), Bran Sands South (~2.1km away) and Seal Sands (~2.6km away). When set into the context of these (and other) areas in the Tees, displacement of birds due to the loss of 2.5ha of comparatively low-value intertidal habitat and the existing artificial structures is considered to be of low magnitude. Put into the context of the wider SPA, the total area of potential supporting habitat within the footprint of the proposed dredging and excavation represents just 0.3% of the SPA. As such, the loss of supporting habitat within the footprint of the proposed scheme is considered to be of **minor adverse** significance.

Mitigation and residual impact

While the artificial structures and other areas within the footprint of the works at South Bank may be considered to be of low value as supporting habitats, disturbance of any birds nesting at the site would be considered a contravention of the Wildlife and Countryside Act 1981 (as amended). To avoid this, surveys should be undertaken to check for the presence of potential nesting habitat and nests prior to demolition and other construction-phase works, if undertaken during the breeding season (March to August). In the event that nests are identified, an exclusion zone would be established around the nest and works not permitted within the exclusion zone until the nest is confirmed as no longer in use. This should be overseen by an experienced ornithologist. This mitigation will be included in the CEMP. The residual impact would be **minor adverse**.

12.5.2 Impacts on feeding and food resources due to reductions in water quality

As discussed further in **Section 13.5.1**, dredging and excavation activities resulting in an increase in SSC may have an adverse impact on prey items (i.e. fish) within the water column that could lead to barrier effects and behavioural responses that may see temporary displacement of those species, over an estimated period of approximately five months. This in turn has the potential to affect SPA / Ramsar site and SSSI features that feed on such resources, such as terns. Furthermore, high turbidity as a result of increased SSC limits visibility through the water, which may adversely affect the ability of aerial predators to detect prey items (Cook and Burton, 2010). As detailed in **Section 9.5.2**, the effects of increased SSC would have a negligible impact on benthic prey species in the intertidal zone so consequent effects on waterbirds feeding on such prey are unlikely.

The area that may be affected by increases in SSC during dredging has been described in **Section 6.5.2**. In summary, the largest sediment plumes are likely to arise during Stage 2 of the dredging (i.e. BHD and TSHD working in parallel to dredge in the berth pocket and the main channel). During this stage, the zone of influence extends approximately 750m downstream and 2,500m upstream of the dredged area (see **Figure 6.39**), though it should be noted that only part of those areas would be affected at any point in time (it is not a sediment plume, rather a combined zone of influence). The sediment dispersion modelling of Stage 2 dredging, presented in **Section 6.5.2** indicates that significant SSC excesses from the capital dredging are confined to the dredging transects and are predicted to decrease significantly with increased distance from the dredging vessel, both laterally and along the line of the vessel, with plumes diminishing typically to levels of <30 mg/l but often <10mg/l at a distance of no more than a few hundred metres. Baseline levels are expected to be restored within a few minutes to a few hours of release. For the purpose of this assessment, the sediment plume may be regarded as representing a temporary loss of foraging habitat.

As outlined in **Table 12.4**, little terns within the SPA / Ramsar site nest almost exclusively at Crimdon Dene (approximately 6km north of the mouth of the Tees estuary), with foraging grounds confined to the coastal waters north of Hartlepool Headland (Natural England, 2018a). Along with the absence of little tern sightings in the WeBS counts and site survey data reported in **Sections 12.4.2** and **12.4.4**, this indicates that little terns do not forage to any significant extent within the predicted range of the sediment plume. Likewise, the WeBS core counts and site-specific tern surveys indicate very little use of the affected area by passage Sandwich terns, with a mean annual peak (2013/14 to 2018/19) of four recorded across the two core count sectors and a total of three recorded during the 2020 South Bank tern survey visits (noting that, as a passage feature of the SPA, it is unlikely that significant numbers of Sandwich terns would be present during the breeding season). As such, there will be no significant impacts to the foraging capability of either of these tern species as a result of increased suspended sediments during the construction phase.

Common terns are known to breed at Saltholme RSPB Reserve (see **Table 12.4**) and regularly use the Tees estuary for foraging (Natural England, 2018a). As such this species is the most likely to be affected by impacts on foraging resources, and as a worst-case scenario the assumption for this assessment is that the dredging campaign may overlap with part of the common tern breeding period.

A peak count of 12 birds (representing 1.5% of the SPA / Ramsar site population) was recorded during the 2020 tern survey (the coverage of which is assumed to provide sufficient evidence for the use of the area affected by dredging, as detailed in **Section 12.3.2**). The peak count in 2020 was a decrease on previous surveys, and the 5-year mean peak from WeBS counts at sectors 52426 and 52427 was 19, representing 2.4% of the SPA / Ramsar site population. As such, while foraging resources for terns are considered to be of high value, particularly during the common tern breeding period, the number of terns that use prey resources within the affected area are relatively low (INCA, 2020). Common terns have been reported to have a high sensitivity to the potentially longer-term indirect impacts on prey resources (MMO, 2018) but, as detailed further in the assessment on fish resources (see **Section 13.5.1**), there are not anticipated to be any long-term impacts on fish as a result of increased SSC.

Tern foraging ability may be inhibited by poor visibility above the surface. Terns typically hover several metres above the water surface, before plunging after prey. Vision through clear waters is generally important for foraging and therefore terns may be sensitive to the turbidity caused by dredging operations and re-suspension of sediment (Cook and Burton, 2010). However, common terns typically only dive to 1m or less, which is shallower than some other terns (Cabot and Nisbet, 2013), which means that impacts on common terns from increased turbidity are likely to be less significant than they would for deeper-diving species (e.g. Sandwich tern). Furthermore, the occurrence of frequent (almost daily) maintenance dredging activity within the river channel and berths suggests that exposure to such effects in the affected area is already relatively high and some level of habituation to such impacts is likely. As such, the sensitivity of common terns within the Tees estuary to increases in SSC is considered to be medium.

As described above, the zone of influence of the Stage 2 dredge presented in **Figure 6.39** significantly overstates the area that would be affected at any single time, which would be considerably smaller. It should be noted that approximately 9,400ha of subtidal in the January 2020 extension to the seaward boundary of the SPA was informed by the predicted foraging range of breeding common terns at Saltholme (Natural England, 2018a), and the area likely to be affected by the sediment plume at any one time represents around 0.5% of the total subtidal foraging area within the SPA. Therefore there is sufficient alternate foraging habitat available even if the plume does result in temporary occlusion from the affected area. Furthermore, SSC levels are only predicted to exceed baseline levels during the dredging campaign (a period of approximately five months) and would return to normal upon completion. Even during the campaign, baseline levels would return within a few minutes to a few hours of cessation at a given point. It should also be noted that Stage 2 dredging will only comprise approximately one month of the approximately five month dredging campaign,

and the other stages of the dredge campaign would result in a smaller plume than that described for Stage 2. The magnitude of the impact is therefore considered to be low.

Given the high value and medium sensitivity of common tern as a breeding SPA / Ramsar site and SSSI feature, and the low-level magnitude predicted, it is predicted that impacts on common tern as a result of increased SSC would be **minor adverse**.

Mitigation and residual impact
While the anticipated impact is minor, the following mitigation measure, proposed to reduce the potential for impacts on migratory fish from increased SSC (see **Section 13.5.1**), may also help to reduce consequent impacts on foraging terns:

- Limiting the TSHD and backhoe to working within one side of the river at a time. Operations will therefore be undertaken in long strips along the axis of the estuary rather than dredging across the width of the river. This is to reduce both the extent and impact of the dredged plume, as any plume generated by operations is predicted to collectively occupy around half the width of the river channel. This approach has been proposed for other capital dredge operations in the Tees, such as in the NGCT scheme (Royal HaskoningDHV, 2020).

With the implementation of the above mitigation measure, the modelled plume would only occupy half of the width of the river at any one time, which would have a two-fold effect. Firstly, since one side of the river will remain relatively unaffected at any given time the risk of displacement of fish would be reduced. Secondly, it would lessen the risk of high turbidity and would thus likely improve tern foraging ability. With the implementation of this measure, the residual impact is predicted to be of **minor adverse** significance.

12.5.3 Effects of sediment deposition on intertidal food resources

The deposition of fine sediment within intertidal areas due to capital dredging has the potential to affect benthic communities that represent a feeding resource for waterbirds. For example, high levels of overall deposition or a high rate of deposition could adversely affect components of the benthic community, to the detriment of feeding waterfowl.

The nature of the predicted deposition of fine material, in terms of total deposition and areas affected by the dredging, is presented in **Section 6.5.2**. Fine sediment will be deposited within minutes or hours if carried in suspension from the point of release. Most falls within the dredged areas, whilst deposition elsewhere is much lower. There is no measurable modelled deposition (see **Figures 6.50 and 6.55**) at waterbird-supporting habitats (i.e. mudflats), such as North Tees Mudflat, Seal Sands, Brand Sands and North Gare Sands. The implications of deposition for benthic communities at North Tees Mudflat are presented in **Section 9.5.3**, where it is concluded that the structure and functioning of the benthic communities of intertidal areas would not be affected by the extent or level of deposition predicted.

Given the above, it is concluded that there will be no adverse effect on intertidal food resources as a result of the effects of capital dredging and therefore a **negligible** impact is predicted on the waterbirds relying on such resources.

Mitigation and residual impact
No mitigation measures are required and the residual impact is of **negligible** significance.

12.5.4 Construction-phase disturbance

The construction phase of the proposed scheme has the potential to cause acoustic and visual disturbance effects to bird populations within, or in close proximity to, the footprint of the proposed scheme. Bird reactions are likely to depend on the level and nature of the disturbance. Displacement from the site would effectively represent temporary habitat loss while construction works are ongoing. Noise and visual disturbance are considered separately below although in practice the two will be ongoing at the same time.

Noise disturbance

A distinction may be made between 'continuous' noise levels (L_{Aeq}) and maximum (impulsive) noise levels (L_{Amax}). During the construction phase, it is assumed that the greatest noise disturbance to birds using the study area is likely to arise from impulsive sources, such as impact piling works. As reported in **Section 3.9**, piling will be undertaken (non-continuously) over a period of approximately 15 months (seven months for Phase 1 and eight months for Phase 2), with downtime during transportation of piling rigs from one location to the next. Assuming the use of four rigs and ten minutes of impact piling activity per rig per day, there would be up to 40 minutes of piling activity per day during that period.

Wright *et al.* (2010) investigated the effects to waterbirds of impulsive noise and identified ranges in noise which cause behavioural responses (based on a measured L_{Aeq}). These are:

- No observable behavioural response: 54.9 to 71.5 dB(A);
- Non-flight behavioural response: 62.4 to 79.1 dB(A);
- Flight with return: 62.4 to 73.9 dB(A); and,
- Flight with all birds abandoning the site: 67.9 to 81.1 dB(A).

Similarly, Cutts *et al.* (2009; 2013) compiled classifications for construction noise disturbance to wintering waterbirds as follows:

- Noise below 50 dB(A): low;
- Regular noise 50-70 dB(A): moderate to low;
- Irregular noise 50-70 dB(A): moderate; and,
- Noise above 70 dB(A): high.

In this classification, low response was defined as 'no effect', moderate response was defined as 'head-turning, scanning, reduced feeding or movement to nearby areas' and high response was defined as 'preparing to fly, flight or abandonment on the area'.

Noise modelling undertaken for the proposed scheme was derived from baseline noise levels recorded at four ecological monitoring locations (for more information see **Section 17** and **Figure 17.1**), and predicted construction noise levels at seven noise-sensitive ecological receptors. This data is presented in **Table 12.19** below.

The predicted noise levels shown in **Table 12.19** indicate that general construction noise levels (i.e. those from dredging and demolition works, represented as the day / night L_{Aeq}) at most receptor locations will be less than 55 dB(A). Such noise levels are considered to be 'low' disturbance and are not anticipated to result in any observable behavioural response from birds (Cutts *et al.*, 2009; Wright *et al.*, 2010). At the downstream end of the North Tees Mudflat (i.e. directly across the river from the proposed scheme), general construction noise levels are predicted to be around 59.5 dB(A). Although higher than at other receptors, this is still considered to be within the moderate to low disturbance range and is unlikely to result in a behavioural response (Cutts *et al.*, 2009; Wright *et al.*, 2010).

Table 12.19 Predicted airborne noise levels at ecological receptors during construction

Calculation standard	Receptor	Day dB(A)	Night dB(A)	Lmax dB(A)
ISO 9613	ST1 – Vopak Foreshore	38.6	38.6	56.6
	ST4 – Dabholme Gut (mouth)	36.8	36.8	56.4
	ST5 – Dabholme Gut (centre)	35.5	35.5	53.1
	North Tees Mudflat – 1 (downstream)	59.5	59.5	80.0
	North Tees Mudflat – 2 (centre)	51.1	51.1	72.9
	North Tees Mudflat – 3 (upstream)	46.8	46.8	68.8
	Seal Sands	32.1	32.1	50.4

While most construction-related noise is unlikely to cause significant disturbance to birds at North Tees Mudflat, the impulsive noise levels associated with the piling works indicated in **Table 12.19** range between 68.8 dB(A) at the upstream receptor and 80.0 dB(A) at the downstream receptor (nearest to the site of the piling works).

In addition to the supporting habitat offered at North Tees Mudflat, the change to the boundary of the Teesmouth and Cleveland Coast SPA / Ramsar site indicates that the waters in the Tees channel downstream of the Tees Barrage represent sensitive feeding habitat for terns. However, South Bank tern surveys undertaken in 2020, 2015 and 2014 (see **Section 12.4.4**) indicate that this section of the river is infrequently used by terns, with more important foraging areas elsewhere within the SPA / Ramsar site (INCA, 2020). As such, impacts on tern species are considered to be of less significance than impacts on waterbirds at North Tees Mudflat.

Based on the noise levels predicted in **Table 12.17**, noise disturbance at North Tees Mudflat from the proposed piling activities is considered to be high, such that the waterbirds present may exhibit behavioural responses such as flight with return or abandonment of the site. As described previously, it has been agreed with Natural England that, in the absence of recent site-specific survey low tide data for the North Tees Mudflat, the assumption for this assessment is that it supports a significant number of foraging and/or roosting waterbirds. The significance of the potential impact of noise disturbance due to the proposed construction works will depend on the timing of the construction works relative to the period when waterbirds numbers are at their highest in the Tees estuary (i.e. the wintering season, generally October to March). For the purposes of the assessment, and on a precautionary basis, it has been assumed that the piling works take place over some or all of the winter period.

As such, under a worst-case scenario of 40 minutes of impact piling noise per day, at low tide, the magnitude of the impact is considered to be high.

In terms of receptor sensitivity, the EIA for NGCT (Royal HaskoningDHV, 2020) referred to monitoring undertaken by INCA in 2004. Waterbird behaviour on Seal Sands was monitored during a period of percussive piling at Conoco-Phillips (approximately 270m away)). On all four of the monitoring visits (undertaken at the start and during the piling), there was no evident disturbance to the birds, with continued feeding at Seal Sands. At the nearest point, the piling in the proposed scheme is similarly distant (260-280m) from the North Tees Mudflat, and it is plausible that waterbirds using intertidal areas in the Tees would have a reasonably low sensitivity to piling disturbances at this kind of distance, therefore similar responses (or lack of) may be expected.

However, according to the Waterbird Disturbance Mitigation Toolkit (Cutts *et al.,* 2013), species such as redshank are 'particularly sensitive to noise stimuli, especially in conjunction with visual stimuli'. Although conducted outside of the wintering season, the site-specific low tide survey in July to September 2020 (see **Section 12.4.3**) suggests that, among the species it is likely to support, the North Tees Mudflat may be important for populations of SPA / Ramsar site and SSSI features such as redshank (for example, during the survey period the abundance of redshank represented up to 5% of the SPA / Ramsar site reference population). For this species, the Toolkit suggests that a noise of up to 70dB is acceptable at the bird but with caution above 55dB, which represents the most conservative threshold of all the species considered in the Toolkit. Given the conservation value of the species and its sensitivity to noise disturbance, it is suitable for consideration as a representative species for the purpose of this assessment; therefore, the assessment is conservatively based on a high receptor sensitivity.

As such, it can be concluded that the potential for construction related noise disturbance to waterbirds will be **moderate adverse**.

Mitigation and residual impact

As mitigation for the potential impact of noise disturbance during the construction phase, it is proposed that noise reduction shrouding will be employed for the piling rigs, the use of which will (based on research) provide an estimated 14dB attenuation in impulsive noise. With the shrouding in place, and assuming a 14dB attenuation, the predicted noise levels reported above will be reduced to the levels presented in **Table 12.20** below.

Table 12.20 Predicted airborne noise levels at ecological receptors with shrouding on piling rigs

Calculation standard	Receptor	Day dB(A)	Night dB(A)	Lmax dB(A)
ISO 9613	ST1 – Vopak	37.8	37.8	42.6
	ST4 – Dabholme Gut (mouth)	35.9	35.9	42.4
	ST5 – Dabholme Gut (centre)	34.8	34.8	39.1
	North Tees Mudflat – 1 (downstream)	58.5	58.5	66.0
	North Tees Mudflat – 2 (centre)	49.3	49.3	58.9
	North Tees Mudflat – 3 (upstream)	44.8	44.8	54.8
	Seal Sands	31.2	31.2	36.4

Assuming the above reduction in noise level as a result of the shrouding, the noise levels at North Tees Mudflat and other important areas of intertidal within the Tees would be significantly lessened. Over much of the intertidal area (represented by the 'centre' and 'upstream' receptor points), impulsive noise falls to a level regarded as moderate to low (Cutts *et al.*, 2009 and 2013) and unlikely to result in observable behavioural responses (Wright *et al*, 2010). At the downstream receptor, an L_{Amax} of 66.0 dB(A) is within the range considered acceptable (i.e. less than 70 dB(A)) to sensitive species such as redshank, according to the Waterbird Disturbance Mitigation Toolkit (Cutts *et al.*, 2013). With this in mind, and considering the historic evidence that waterbird species in the Tees estuary may have some degree of tolerance to piling noises at the distances associated with this project, the implementation of the above mitigation measures are expected to reduce the potential for construction-related noise disturbance at North Tees Mudflat to **minor adverse**. A residual impact of negligible significance is predicted at the other sensitive intertidal areas within the Tees.

Visual disturbance

In addition to noise disturbances, there may be accompanying visual disturbances as result of the presence of construction personnel, plant / machinery, dredgers / other vessels and construction lighting. In particular, during dredging of the main channel, dredging vessels will operate in close proximity to the North Tees Mudflat and Vopak Foreshore. Dredging is due to continue for a period of approximately five months. This is considered most likely to affect waterbirds foraging and / or roosting on the nearby intertidal areas. Foraging and commuting terns passing through the site are not likely to be significantly affected since they could easily forage elsewhere within close proximity.

The Waterbird Disturbance Mitigation Toolkit (Cutts *et al.,* 2013) categorises visual disturbances into the following:

- High disturbance – associated with plant and personnel encroaching onto the mudflat.
- High to moderate disturbance – plant and personnel at the seaward toe and face of the bank. intermittent plant and personnel on the crest.
- Moderate disturbance – long-term plant and personnel on the crest.
- Low disturbance – long-term plant only on the crest, activity behind the flood bank.

High level disturbances would likely result in birds moving away from the source to less disturbed areas, and those that remain may not forage efficiently (which could impact on the survival of individual birds). However, activities occurring over a long period of time can lead to habituation and a reduction in the level of disturbance. As a worst-case scenario, demolition works involving plant and personnel working at the riverbank and on the South Bank intertidal are considered, but there will be no cause for personnel or plant on North Tees Mudflat or other high-value intertidal habitats further downstream.

Cutts *et al.* (2009) devised a schematic that summarises basic visual disturbance thresholds for general activities, key species and function. It indicates that for some species, behavioural responses during feeding may commence at around 300m distance, whilst others have a lower disturbance threshold (i.e. are less sensitive to visual disturbance).

Most areas of supporting habitat for waterbirds in the SPA / Ramsar site, including *inter alia* Vopak Foreshore, Bran Sands, Seal Sands and North Gare Sands, lie beyond the 300m threshold and would not be affected by visual disturbance at South Bank. However, at the nearest point, North Tees Mudflat is located approximately 250m from the South Bank and the site of the quay construction.

At North Tees Mudflat, evidence from WeBS core counts between 2012/13 and 2016/17 suggests that there is relatively little in the way of roosting activity at high tide, which is supported by the evidence from the site-specific surveys undertaken to date. However, the intertidal area is assumed to support a significant number of waterbirds, including SPA / Ramsar site features, which forage on the mudflat at low tide. According to Cutts *et al.* (2009), at a 250m distance feeding activity may be disrupted by some species taking flight and showing other behavioural changes, such as a potential reduction in feeding.

The above guidance is based on the disturbance thresholds for unhabituated birds, whereas at North Tees Mudflat it is likely that most birds would be habituated to activity along the riverbank given that the Tees along this stretch is characterised by industrial activity. Furthermore, only works at the extreme upstream end of the proposed scheme footprint are within 300m of the mudflat (not including dredging activities, which are considered separately below), therefore during the majority of works they will be beyond the range of impact. As such, it is unlikely that there will be any significant effects on birds at the North Tees Mudflat due to construction-phase works on the opposite side of the river.

Artificial lighting associated with construction activities is a potential source of disturbance at night, although much of the riverbank in the Tees is used for industrial purposes so several areas are already lit at night, and it is expected that birds using the area would be habituated to sources of artificial lighting. In addition, waterbirds may feed nocturnally and some may actually take advantage of artificial light sources to extend feeding opportunities in darkness (e.g. Dwyer *et al.*, 2013). However, given the distance of North Tees Mudflat from the construction site it is unlikely that there would be any significant impact on roosting or foraging behaviour.

During dredging of the main channel and the turning circle, dredging vessels will operate in close proximity to the North Tees Mudflat and Vopak Foreshore. Most notably, sections of the channel dredge footprint run adjacent to the North Tees Mudflat (this is illustrated in **Figure 11.2**), therefore the presence of dredging vessels may result in disturbance to waterbirds foraging or roosting on the mudflat, including visual disturbance and the disturbance caused by shipwash, which can propagate across intertidal areas and cause birds to take flight. This disturbance, especially if it is repeated, could reduce the time that birds can feed within the tidal cycle and could therefore potentially 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.

The sensitivity of such species is offset by the fact that there is regular vessel traffic in the Tees (there are between 800 and 900 vessel movements in the Tees per month from commercial vessels alone, according to PDT (for more information on shipping movements, refer to **Section 14**)). This also includes regular maintenance dredging vessels which operate on an almost daily basis within the channel, including within 30m of the Vopak Foreshore and immediately adjacent to North Tees Mudflat. Therefore it is likely that birds foraging on the mudflat would have some level of habituation to such activities. Furthermore, it is likely that there will be further habituation over the dredging period and any effects would lessen through the course of the campaign.

Disturbances to birds at Vopak Foreshore would be limited to the very short-term dredging within the Tees Dock turning circle (anticipated to take approximately one week). Those at North Tees Mudflat would be limited to Stages 1 to 3 (a period of approximately 4.5 months), but only during times when the dredging transect runs close to the mudflat (for example, when dredging the southern half of the river it is unlikely to have any significant effect on foraging at the mudflat). It should also be noted that only birds foraging at the downstream end of the North Tees Mudflat would be affected, even when considering a 300m threshold, and the mudflat itself extends over a kilometre upstream of the dredge footprint. As such, any displacement of birds would likely amount to local redistribution on the same area of intertidal, which further limits the effects on foraging efficiency. With this in mind, the magnitude of the impact is considered to be medium.

Given the above, it is anticipated that visual disturbances from dredging operations would have a **minor adverse** impact on waterbirds using areas of intertidal within the Tees estuary.

Mitigation and residual impact

The mitigation measures outlined in **Section 12.5.2** would ensure that dredging vessels only operate along the axis of the river, rather than across it, thus minimising the frequency of occasions whereby the dredger operates adjacent to the North Tees Mudflat. There is no practical way of avoiding dredging activities since the deepening of the channel is integral to the proposed scheme.

Additionally, and as a matter of best practice, all construction lighting will be installed in a manner that reduces (wherever possible) light spill over the river.

While lessening the impacts somewhat, the above measures will not eliminate the sources of disturbance that may affect waterbirds foraging and roosting on North Tees Mudflat and Vopak Foreshore. As such, the residual impact is **minor adverse**.

12.5.5 Impacts on food resources due to underwater noise

As described in **Section 12.5.2**, the proposed scheme has the potential to indirectly impact on foraging common tern (and potentially wintering waterbirds) by affecting the availability of prey fish species. **Section 13.5.3** and **13.5.4** provides an assessment of the potential impact of underwater noise disturbance to fish as a result of dredging activities and residual noise from land-based piling works. The assessment concludes that there may be a minor adverse effect as a result of the dredging leading to fish moving away from the source of disturbance. In the worst case, the construction works are expected to result in the localised redistribution of resident fish species and temporary disturbance to migration patterns of fish throughout the Tees estuary. As such, affected resources are likely to remain within the foraging range of common terns and other piscivorous birds in the estuary and it is, therefore, anticipated that the temporary and localised disturbance to feeding resources will result in an impact of **negligible** significance.

Mitigation and residual impact
Mitigation measures for this impact are not considered necessary and the residual impact is **negligible**.

12.6 Potential impacts during the operational phase

12.6.1 Noise disturbance

Noise disturbances associated with the operational phase would include noise from day-to-day quayside operations, plus periodic vessel movements. In general, this is likely to form a fairly continuous background noise with occasional irregular sounds. The predicted noise levels were modelled at the same ecological receptor locations referred to in **Section 12.5.4** and are presented in **Table 12.21**.

Table 12.21 Predicted airborne noise levels at ecological receptors during operation

Calculation standard	Receptor	Day Db(A)	Night dB(A)	Lmax dB(A)
ISO 9613	ST1 – Vopak	29.5	29.5	40.6
	ST4 – Dabholme Gut (mouth)	26.9	26.9	38.1
	ST5 – Dabholme Gut (centre)	26.1	26.1	37.2
	North Tees Mudflat – 1 (downstream)	49.3	49.3	61.9
	North Tees Mudflat – 2 (centre)	40.7	40.7	54.0
	North Tees Mudflat – 3 (upstream)	36.8	36.8	50.0
	Seal Sands	23.2	23.2	35.5

The 'continuous' L_{Aeq} noise levels at the receptors during the operation phase, on a day-to-day basis, are predicted to range from 23.2 dB(A) to 49.3 dB(A), depending on distance from the source. Such levels are classified as low disturbance events and would have no observable effect on the behaviour of birds at any of the receptors (including North Tees Mudflat) (Cutts *et al.*, 2009 and 2013; Wright *et al.*, 2010).

The L_{Amax} levels predicted at the receptors range between 50.0 dB and 61.9 dB(A) at North Tees Mudflat, and less than 40.6 dB(A) at other receptors. At North Tees Mudflat, the levels fall within the range classified as 'low to moderate' by Cutts *et al.* (2009 and 2013), which are likely to have no significant behavioural

effect according to Wright *et al.* (2010), but as a worst case may lead to non-flight responses such as head turning, scanning, reduced feeding or movement to nearby areas.

The noises associated with the operational phase (i.e. vessel activity and quayside operations) are similar in type and level to those typical of the wider environment in the Tees estuary and form part of the background sounds that already exist at the receptors (for more information on the baseline noise levels at the ecological receptors see **Section 17.4**). As such, it is likely that birds foraging in intertidal areas along the riverbank are somewhat tolerant to day-to-day riverside human activities. With this in mind, it is considered that the impact of most noise disturbances arising from the operation of the new quay would be **negligible**, and any exceedances of the thresholds stated in Cutts *et al.* (2009) or Wright *et al.* (2010) would be sufficiently occasional that there would be no significant long-term impact.

Mitigation and residual impact
Mitigation measures for this impact are not considered necessary and the residual impact is **negligible**.

12.6.2 Disturbance due to increased vessel activity

Shipwash can be a source of disturbance to feeding waterbirds in that it can propagate across intertidal areas and cause 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. With respect to the proposed scheme, the areas used by waterbirds that may potentially be affected are North Tees Mudflat, Vopak Foreshore and other intertidal areas further downstream such as North Gare Sands, Bran Sands and Seal Sands.

Most of these areas are relatively exposed areas of intertidal, although some protection is afforded by the breakwaters. Seal Sands is likely to be less vulnerable to shipwash given its relatively sheltered location and the presence of the training wall fronting Seaton Channel. North Tees Mudflat is opposite the proposed quay and Vopak Foreshore is close to the Tees Dock turning circle, and both could be affected by shipwash from manoeuvring vessels. However, the fact that speeds will be low at these locations results in a low potential for ship-generated wash to impact significantly on the foreshore at the mudflat.

The Tees estuary currently experiences high levels of shipping activity, with between 800 and 950 vessel movements per month. It is predicted that there would be an additional 390 operational vessel calls per year from windfarm-associated vessels upon completion of the proposed scheme.

Given the very low magnitude of increase in vessel traffic compared with existing vessel movements, the potential additional impact of vessel disturbance associated with the proposed scheme is assessed to be of **negligible** significance.

Mitigation and residual impact
Mitigation measures for this impact are not considered necessary and the residual impact is **negligible**.

12.6.3 Effects of artificial lighting

The operational phase will include the use of lighting columns along the quayside. Under existing conditions there is little light spill from the proposed scheme footprint given its largely derelict nature, however, there is light spill into the water column from operations throughout the majority the estuary. An assessment of the disturbance impacts of artificial lighting on fish, set out in **Section 13.6.2**, concludes that effects would be negligible, therefore any effects on waterbirds and foraging terns would manifest as a direct behavioural response to lighting, rather than as a displacement of food resources.

Given the industrial use of the Tees, it is likely that there will be some level of habituation to riverside lighting. Waterbirds may feed nocturnally and some may actually take advantage of artificial light sources to extend feeding opportunities in darkness (e.g. Dwyer *et al.*, 2013). The area directly affected (i.e. adjacent to the proposed quay) has, as described above, little value to estuarine ornithology. Regardless, birds that may otherwise be affected will have been displaced from the site during demolition of existing features and excavation of the intertidal area at South Bank. Areas of higher value, such as North Tees Mudflat, are considered to be sufficiently distant to avoid impacts on roosting or foraging behaviour. As such, impacts on foraging / roosting waterbirds and terns is predicted to be **negligible**.

Mitigation and residual impact

While impacts are anticipated to be negligible, the implication of best practice mitigation measures set out in **Section 12.5.4** (i.e. sympathetic placement and orienting of lighting to minimise light spill across the water) will further reduce the impact on foraging / roosting waterbirds. The residual impact is **negligible**.

12.6.4 Effects on intertidal habitats due to hydrodynamic changes

The long-term changes to the hydrodynamic regime and tidal prism as a result of the deepened channel and new alignment of the South Bank are discussed in **Section 6.6.2 and 6.6.3**.

Figures 6.69 to **6.72** indicate that baseline tendencies (i.e. current speeds being greater on spring tides than on neaps, an ebb dominance during neaps and a flood dominance during springs) are largely unaffected by the proposed scheme. There are, however, zones of reduction in baseline flow along the northern bank, albeit slight, during peak flood neaps and peak flood springs. This coincides with the downstream section of the North Tees Mudflat. There are not anticipated to be any notable changes at other intertidal locations further downstream, such as Vopak Foreshore and Bran Sands.

The reductions in flow speed may lead to a slight increase in deposition at North Tees Mudflat; however, given the low magnitude of change to current flow, this is expected to be in the order of millimetres and is unlikely to lead to any significant changes to the foraging capability of birds using the site. Although surveys at North Tees Mudflat indicate that it may be important for foraging redshank and an assemblage of wintering waterbirds, SPA / Ramsar site qualifying features, minor increases in deposition are predicted to have a negligible impact on intertidal benthos (see **Section 9.6.2**) and would not adversely affect the availability of invertebrate prey to birds feeding on the mudflats . The predicted minor accretion of sediment at North Tees Mudflat may help to sustain the mudflat in the face of long-term sea level rise.

As outlined in **Section 6,** design calculations for the proposed scheme show that the increase in mean tidal prism as a result of the proposed scheme is 150,901m^3, which represents an estuary-wide increase of 0.8% and is not deemed to be a cause of significant estuary-wide change in hydrodynamics.

Given the above, it is anticipated that long-term impacts on water birds using the North Tees Mudflat as a result of hydrodynamic changes would be **negligible**.

Mitigation and residual impact

No mitigation measures are considered necessary, therefore the residual impact is **negligible**.