10 INFORMATION FOR APPROPRIATE ASSESSMENT: HARBOUR FACILITIES ALONE

10.1 Introduction

10.1.1 This section of the HRA provides the information required for Appropriate Assessment of the likely significant effects of the proposed Harbour facilities on the Teesmouth and Cleveland Coast SPA and Ramsar site. With reference to the relevant sections of the ES where appropriate, this section describes the potential impacts of the Harbour facilities insofar as they are relevant to the qualifying features / criteria of the SPA and Ramsar site. The potential impacts identified are then considered in the context of the defined conservation objectives for the relevant qualifying features / criteria and a view is given on whether the Harbour facilities (alone) is predicted to have an adverse effect on the integrity of the SPA and Ramsar site.

10.1.2 In accordance with the requirements of PINS Advice Note 10, **Appendix 10.1** contains the integrity matrices (adopting the template provided as an appendix to Advice Note 10) that summarise the findings of the assessment.

10.2 Approach to assessment of potential adverse effects

10.2.1 Determining whether, in view of a European site's conservation objectives, the plan or project either alone or in combination with other plans or projects would have an adverse effect (or risk of this) on the integrity of the site has been assessed in light of:

- site-specific information obtained from surveys and studies undertaken as part of the EIA for the proposed scheme;
- the advice of statutory bodies;
- the potential effects on the Teesmouth and Cleveland Coast SPA and Ramsar site;
- evidence provided within the ES; and,
- professional judgement and lessons learned from other development projects.

10.2.2 The following definitions and approach were used to determine whether the Harbour facilities would result in an adverse effect on the Teesmouth and Cleveland Coast SPA and Ramsar site. This approach has been consulted upon with Natural England. Although this information is specifically developed for the assessment of potential effects on European sites, the same principles apply to assessment of potential effects on the qualifying criteria of Ramsar sites.

Site integrity

10.2.3 The assessment of adverse effects on the integrity of a site is addressed in light of the conservation objectives for each site. The integrity of a site is defined as the *"the coherence of the site's ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or populations of species for which the site has been designated"* (ODPM Circular 06/2005).

10.2.4 EC guidance (European Commission, 2000) emphasises that site integrity involves its ecological functions and that the assessment of adverse effect should focus on and be limited to the site's conservation objectives.

Adverse effect

10.2.5 The potential impacts of the proposed scheme during the construction, operation and decommissioning stages have been considered in the context of their effects on the qualifying features and criteria (the species and their supporting habitats) of the Teesmouth and Cleveland Coast SPA and Ramsar site.

10.2.6 An adverse effect on integrity is likely to be one which prevents the site from making the same contribution to favourable conservation status for the relevant feature as it did at the time of designation. In addition, an adverse effect would be one which caused a detectable reduction in the species for which the sites are designated, at the scale of the site rather than at the scale of the location of the impact.

10.2.7 Article 1 of the Habitats Directive defines the conservation status of a natural habitat as 'favourable' when "the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future". An adverse effect on site integrity will not occur if it can be shown that, in the long term, the habitat or population of the species in question as a viable component of the site will be maintained despite potential impacts. Long term is considered to be a period of at least five years. This is considered to be an appropriate timescale for the assessment of adverse effect on integrity because, for example, SPAs are usually designated in the UK on the basis of five year population estimates. A five year rolling mean is used because it is considered to take account of sufficient data to demonstrate that birds use sites regularly, smoothing out any short term peaks and troughs in numbers.

10.2.8 Using the same argument, it is therefore logical to continue to review populations over the same timescale in order to demonstrate that observed use or 'non-use' of habitat is typical, and not a chance event. In addition, bird breeding performance and productivity varies between species and between years, and many species have long life spans. Population dynamics data therefore need to take into account the possible short term fluctuations in the numbers of any species.

10.2.9 European Commission (2000) also recommends that, when considering the 'integrity of the site', it is important to take into account a range of factors, including the possibility of effects manifesting themselves in the short, medium and long-term.

10.3 Assessment of potential effect of the Harbour facilities on the integrity of the Teesmouth and Cleveland Coast SPA and Ramsar site

Focus

10.3.1 With regard to the Teesmouth and Cleveland Coast SPA and Ramsar site, the HRA screening assessment determined that the potential for LSE existed with respect to the proposed Harbour facilities due to the following:

- direct loss of habitat within the intertidal and subtidal areas of the Tees estuary;
- direct loss of habitat within Dabholm Gut and Bran Sands lagoon (due to the construction of conveyor bridge supports within the upper reach of Dabholm Gut)
- potential for changes in water levels in the lagoon;
- noise, vibration and visual disturbance;
- potential for deposition of polyhalite (dust) within habitats used by waterbirds;
- release of sediments during piling and capital dredging; and,
- changes to sediment transport pathways / coastal processes.

10.3.2 Natural England stated within the advice that followed its review of the HRA Screening Report that the Appropriate Assessment for the proposed Harbour facilities should specifically consider the following:

- impacts arising from disturbance to uncontaminated sediment (as well as contaminated sediment);
- impacts to existing conditions within Bran Sands lagoon due to changes to the frontage (e.g. potential changes to permeability within the embankment which could impact upon water levels);
- potential impacts from construction and operational phase dust emissions, including the potential for polyhalite dust escaping during operation and the implications of this for habitats;
- visual disturbance from employees moving around site;
- lighting impacts along with any potential shadowing caused by structures on site (Natural England stated that whilst this is unlikely to be an issue this should be addressed within the assessment); and,
- water / sediment quality issues that may arise during the operational phase due to maintenance dredging.

10.3.3 The information within the following sections has been provided to assist with the understanding of whether the proposed scheme would result in an adverse effect on the integrity of the Teesmouth and Cleveland Coast SPA and Ramsar site. Cross reference is made to the relevant sections of the ES which contain the detailed assessment of potential impacts of relevance to the HRA.

10.3.4 The following sections are structured according to the categories of potential effect as set out in **Table 8.2** (which are also carried across to the screening matrices included in **Appendix 8.1**), namely:

- Coastal processes.
- Habitat loss / change.
- Disturbance.
- Water and sediment quality.

10.3.5 The potential impacts identified in the HRA Screening Report, and raised by Natural England in its response to that report, are addressed in the context of the above categories of effects.

Coastal processes

10.3.6 An assessment of the potential effects of the proposed Harbour facilities on coastal processes (comprising effects on tidal propagation, wave climate, current speeds and sediment budget of the estuarine system) has been undertaken and is reported in **ES Section 5** (Section 5.6). The assessment included both the solid and open quay structures in order to predict the implications of both forms of construction on the hydrodynamic and sedimentary regime. For the purposes of the HRA, the maximum (realistic worst case) effects are presented below, with justification provided.

Effect on tidal propagation

10.3.7 The proposed scheme does not have the potential to have an effect on tidal propagation given that the capital dredging is limited to the deepening of a short section of the existing dredged approach channel. Importantly, no capital dredging seaward of the location of the proposed port terminal towards the mouth of the Tees would occur and, therefore, the proposed scheme has no potential to effect the way in which the tide propagates into the estuary.

Effect on wave climate

10.3.8 Given that the only proposed capital dredging of the approach channel is located immediately adjacent to the port terminal, with no dredging proposed seaward of this point towards the mouth of the Tees, there would be no effect on the penetration of waves into the Tees estuary from offshore as a result of the proposed scheme. The full results of the wave modelling are presented in **ES Section 5.6** and **Appendix 5.1**.

10.3.9 The modelling results for the solid quay structure show that the vertical face of the proposed quay has higher reflection properties than the existing shoreline, resulting in the reflection of wave energy off the quay face and leading to localised areas of larger wave heights. The maximum predicted effect of the proposed scheme is an increase in significant wave height in the range 0.05m to 0.1m. No increases in wave energy over the designated intertidal area at Teesmouth are shown, although some increases of very low magnitude may occur on the narrow spits located to either side of Seaton Channel. The magnitude of the predicted change is, however, very low (up to 0.1m) and no effect on the spits would arise.

Effect on current speeds on flood and ebb tides

10.3.10 The results of the modelling of the predicted effect on current speeds are presented in **ES Section 5.6** and **Appendix 5.1**. The capital dredging of the section of approach channel adjacent to the proposed berth pocket is responsible for the majority of the predicted effect on current speed and direction, with currents predicted to be reduced within the deepened areas. Some current speed increases are predicted on the shoreline adjacent to the works, suggesting that the dredging is predicted to draw some of the flow to the south side of the estuary. Such effects are shown to be relatively local to the proposed works.

Effect on sedimentary regime (budget) of the Tees estuary

10.3.11 The results of the modelling of the predicted effect on sediment budget are presented in **ES Section 5.6**. The predicted effects of the proposed scheme on tidal propagation, wave climate and current speeds integrate to result in an effect on the sediment budget of the estuary.

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

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

10.3.14 In terms of the maintenance dredging requirement of the proposed berth pocket and deepened approach channel, average infill rates are predicted to be up to 5,900m^3 per year. However, this would not represent an additional 5,900m^3 of deposition a year (because there would be no effect on sediment transport into the estuary). The effect of the scheme would be a localised redistribution of (existing) sediment deposition in response to predicted changes in current speeds. It is predicted that this very small change in the overall fine sediment regime would not alter the present frequency of, or methodology used for, maintenance dredging and no effect on sediment supply to intertidal areas throughout the Tees estuary would occur. Consequently, no effect on morphology of intertidal areas is predicted.

Habitat loss / change

Direct impact on feeding and roosting habitat

10.3.15 The implications of the proposed scheme on habitat used by feeding and roosting waterbirds are assessed in **ES Section 9.6**. The following summarises the potential direct effects of the proposed scheme on feeding and roosting habitat:

- The piled supports for the conveyor would each have a direct footprint of approximately 1m^2 and, therefore, the direct impact on Dabholm Gut (associated with construction of the conveyor in the southern corridor) would be approximately 3m^2 and the direct impact on the lagoon (associated with construction of the conveyor in the southern corridor) would be approximately 1m^2. It should be noted that the conveyor would be constructed in either the northern or southern corridor (but not both).

- The intertidal footprint of the port terminal would be approximately 3.6ha (worst case associated with the solid quay option). This area, therefore, would be lost due to the construction of the port terminal. However, this calculation does not reflect the area of intertidal habitat that is typically available for use by waterbirds and, when considering intertidal functionality – a key consideration for the HRA – use of an area of loss alone in defining the potential impact is too simplistic. An analysis of intertidal exposure (presented in **ES Section 9.4**) shows that for a full spring/neap tidal cycle, the intertidal area in the footprint of the works would be exposed for a cumulative average of 20% of the time (i.e. 131 hours out of every 28 days (or 655 hours)). The intertidal area is also of poor quality as a waterbird feeding habitat (as described in **ES Section 8.4**) and does not represent an important feeding area (as demonstrated through the waterbird data presented in **ES Section 9.4, ES Appendix 9.2** and **Section 7.5** of this HRA).

- The NWL jetty is used by significant numbers of roosting cormorant (**ES Section 9.4**). The removal of the jetty as a result of the construction of Phase 2 of the port terminal would result in the loss of this roosting site. In addition, waterbirds use the embankment between the lagoon and the estuary for roosting, including the crest of the embankment and the slope of the embankment on the estuary side (however, the new structures would provide new opportunities for roosting cormorant).

10.3.16 Bran Sands lagoon and Dabholm Gut represent important supporting habitats to the SPA and Ramsar site (as demonstrated through the waterbird data presented in **ES Section 9.4, ES Appendix 9.2** and **Section 7.5** of this HRA). Importantly, the Harbour facilities have been designed to avoid any significant direct effects on these habitats (indirect disturbance effects are discussed below; see *Disturbance*).

10.3.17 As described in **ES Section 3**, habitat enhancement measures are also incorporated into the design of the proposed scheme. One of the objectives of the proposed measures is to provide additional feeding habitat in Bran Sands lagoon, while also mitigating the impact on waterbirds due to the loss of intertidal habitat due to the construction of the port terminal. Three options for the habitat enhancement measures were initially developed and presented in the draft HRA for discussion with Natural England; with the option shown on **Drawing PB1586-SK466** in **ES Section 3** (and included in the MMS in **Appendix 3.1**) being the preferred option. The measures proposed would provide shallow water areas with intertidal fringes and would be designed to enable waterbird feeding across the area throughout the entire tidal cycle.

10.3.18 It is proposed that a feeding habitat of approximately 50% greater than that which would be lost due to the construction of the port terminal would be created (but the created area would be available for feeding for a significantly greater length of time compared with the existing intertidal habitat at the location of the port terminal). The use of maintenance dredged material to create the surface layer of the shallows would mean that benthic invertebrates would be already present within the sediment (from the point of establishment of the new habitat), and the exchange of water between the lagoon and the estuary would bring invertebrate larvae into the lagoon, thereby ensuring that a sustainable habitat can be created. The creation of the new shallows / intertidal areas is expected to represent a significant enhancement to the waterbird interest of the lagoon and to the Tees estuary and would occur during Phase 1 of the construction of the Harbour facilities, several years in advance of the loss the whole area of intertidal that eventually would be within the footprint of the port terminal.

10.3.19 When the scheme is considered as a whole, there would be a net gain overall in the quality of habitat available for waterbird feeding, and the habitat would be available for significantly more time in the tidal cycle compared with the existing intertidal area. The concept design produced for the proposed habitat enhancement in Bran Sands lagoon shows an area of new shallow water / intertidal margins of approximately 5.4ha.

10.3.20 The proposed habitat enhancement measures also include the creation of a series of islands in Bran Sands lagoon to create roosting, loafing and nesting opportunities for waterbirds. The creation of this habitat would also occur several years in advance of the loss of the NWL jetty and loss of roosting habitat along the whole of the port terminal frontage; which would occur during the construction of Phase 2 of the proposed Harbour facilities.

10.3.21 Following review of the draft HRA, Natural England requested assessment of the potential effect of the creation of the habitat enhancement proposals on habitat used by diving waterbird species (largely diving ducks), given the existing importance of the lagoon for these species. Typically, diving species are concentrated in areas of the lagoon that are of sufficient depth for them to feed most successfully. The distribution plots (included in the MMS; **Appendix 3.1**) enable the preferred locations of these species to be readily identified and, consequently, a conclusion to be drawn regarding the likely effect of the habitat enhancement proposals on this existing waterbird interest, summarised as follows:

- Goldeneye – widespread across the lagoon but with an apparent concentration in the northern half of the lagoon.
- Red-breasted Merganser – concentrated in the north-western quadrant of the lagoon, with some presence in the south-eastern quadrant.
- Little Grebe – concentrated in the north-western quadrant of the lagoon, outside of the footprint of the habitat enhancement proposals.
- Pochard – recorded in the location of the habitat enhancement proposals.
- Tufted Duck – not recorded in the lagoon for the period of surveys represented in the distribution plots.
- Scaup, Long-tailed Duck and Great Crested Grebe – located in the northern section of the lagoon, outside of the footprint of the habitat enhancement proposals.

10.3.22 On the basis of this analysis, it is concluded that diving species tend to concentrate in areas of the lagoon outside of the area proposed for the creation of new shallows. The distribution data does show that some diving species use the area in the footprint of the location identified for creation of new shallows, but no one species is concentrated in this area to the exclusion of the remainder of the lagoon. Therefore, the proposals are not expected to have an adverse effect on the existing populations of diving species that use Bran Sands lagoon, but would result in the redistribution of part of the population of those species that have been demonstrated to use the area proposed for the creation of new shallows.

Potential impact on existing habitat interest associated with changes to water exchange between the Tees estuary and Bran Sands lagoon

10.3.23 The proposed scheme has the potential to impact upon water exchange between the Tees estuary and Bran Sands lagoon, due to changes in permeability through the existing embankment which separates the lagoon from the estuary, associated with the installation of a revetment for the open quay structure and reclamation for the solid quay structure. This has the potential to impact upon the function of the lagoon, which is a supporting habitat to the SPA and Ramsar site. To assess the significance of this potential effect (and the interaction between Bran Sands landfill and the lagoon; see Water and sediment quality below), an assessment of hydraulic functioning of the lagoon has been undertaken and a conceptual hydrogeological model has been developed (see **Figure 10-1**; (a) underlying geology and (b) conceptual hydrogeological model), based on the studies undertaken for the ES (ES Section 6).

10.3.24 The conceptual model demonstrates that water in the lagoon is derived from a number of sources, as follows:

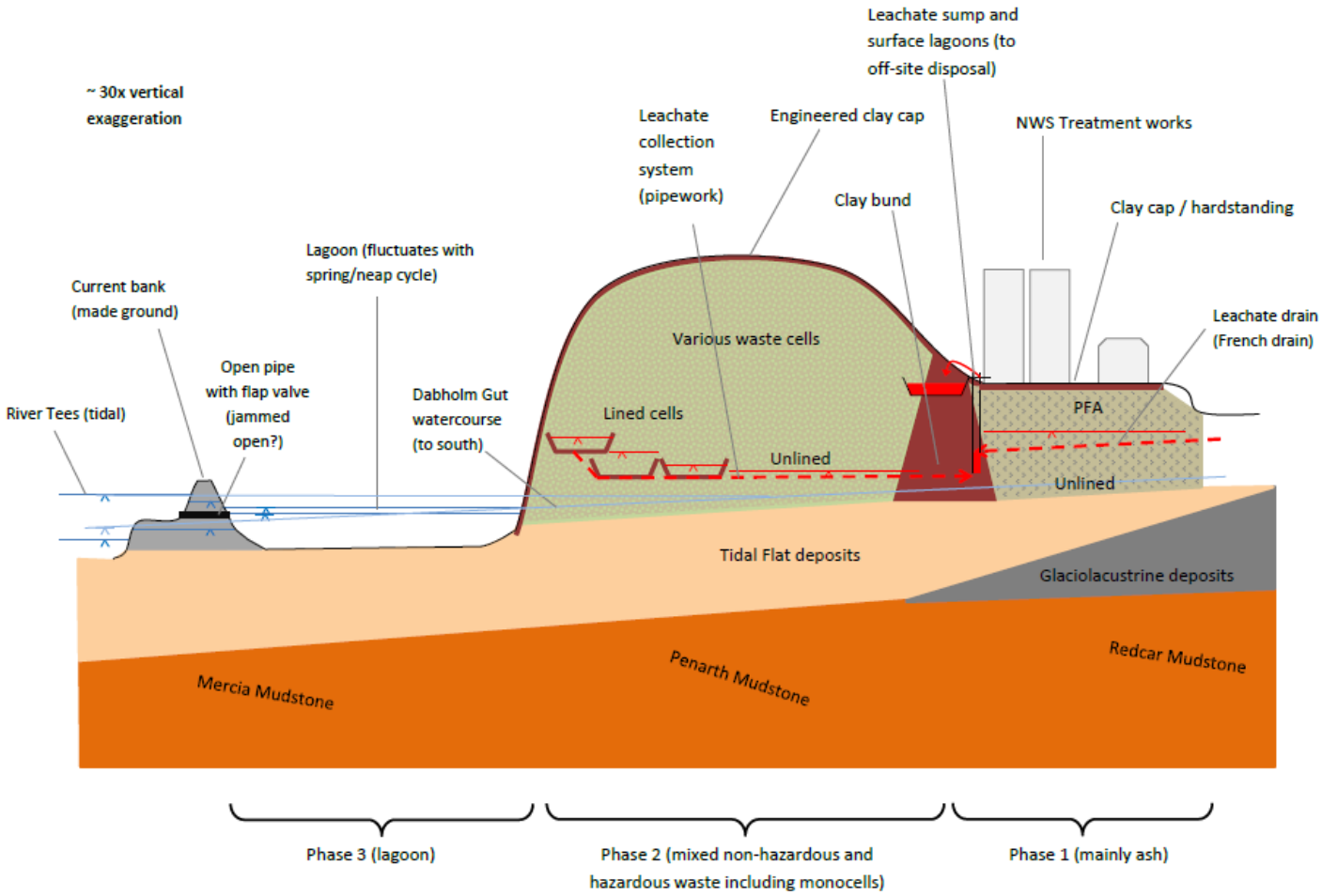
- Upwelling regional groundwater flow into the Tees and into the lagoon (especially from a buried channel).
- Local shallow groundwater flow in the alluvial aquifer, including a contribution from the landfill.
- Clean surface water run-off from the landfill.
- A limited amount of exchange with the Tees estuary through the embankment between the lagoon and the Tees/Dabholm Gut and (in the main) the pipe through the embankment.

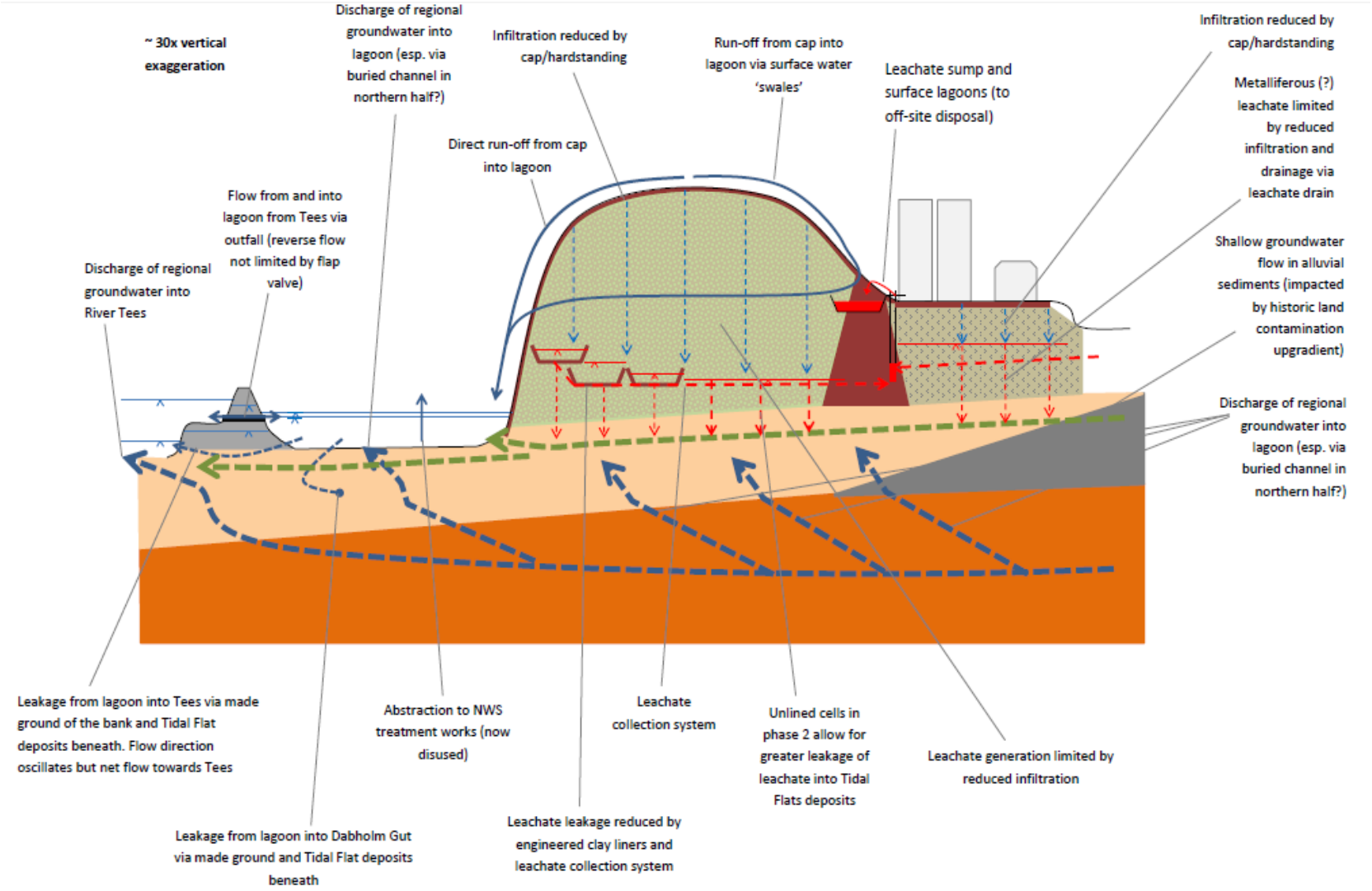
10.3.25 Outflow of water from the lagoon is via:

- Discharge through the pipe in the embankment to the Tees estuary.
- Flow (seepage) through shoreline made ground to the Tees estuary.
- Flow (seepage) through the bank of the lagoon into Dabholm Gut.

10.3.26 The conceptual model demonstrates that there are a number of sources of water to the lagoon, with flow through the embankment being one of these sources, but a minor one in the context of the wider hydrogeological functioning of the area. The flow direction through the embankment oscillates in response to tidal variation in the Tees; however, the net direction of exchange via this route is from the lagoon towards the Tees (**Figure 10-1**).

Figure 10-1 Bran Sands landfill showing (a) underlying geology (upper figure) and (b) conceptual hydrogeological model (lower figure)





10.3.27 Due to the constriction in flow between the estuary and the lagoon as a result of the size of the pipe through the embankment (which is approximately 800mm in diameter), the water level variation in Bran Sands lagoon is not synchronised with water levels in the Tees.

10.3.28 Whenever the end of the pipe (on the estuary side) is covered by the tide, water enters Bran Sands lagoon due to the greater head of water that exists in the Tees compared with the lagoon. When the pipe is exposed on the estuary side, water leaves the lagoon at a slower rate given the relatively low head of pressure in the lagoon.

10.3.29 The water level in the lagoon incrementally rises over a series of spring tides and falls over a series of neap tides. This reflects the duration of time that the end of the pipe in the Tees is submerged (i.e. it is submerged for a longer period of time on a spring tide than on a neap tide, and so more water enters the lagoon on a spring tide).

10.3.30 From analysis of groundwater levels in boreholes surrounding the lagoon, it is estimated that the range in water level on a spring-neap cycle is ±0.4m. In order to refine this information, a programme of water level measurement is proposed to be undertaken as part of the design of the habitat enhancement scheme (and inform the design of the level of the placement of dredged material).

10.3.31 In addition to the spring-neap variation in water level in the lagoon, there is a shorter term variation in water level in response to the volume of water entering and leaving the lagoon via the pipe through the embankment on a rising and falling tide. This variation has not been directly measured but is understood to be minimal, that is, of the order of a few tens of centimetres. The nature of this short term variation in water level would be understood through the programme of water level measurement referred to above.

10.3.32 In light of the findings of the studies undertaken to develop the conceptual hydrogeological model, it is concluded that the construction of the port terminal along the frontage between the Tees estuary and the lagoon would not have a significant effect on the water level regime in the lagoon. Consequently, no effect on the existing habitat condition within the lagoon is predicted.

10.3.33 The pipe through the embankment, which provides the direct link between the lagoon and the Tees estuary, would be maintained as part of the design of the port terminal and this linkage between the water bodies would, therefore, remain. A flow control gate would be included in the design in order that Bran Sands lagoon could be temporarily isolated from the Tees estuary in the event, for example, of a pollution incident in either water body. No active control over the water level regime in the lagoon is proposed.

10.3.34 At the meeting held at Bran Sands lagoon on 5 February 2015 (see Section 3.4), the above proposals were discussed and the justification for not proposing to actively change the existing water level regime was acknowledged. However, it was agreed that having the ability to adjust water levels in the lagoon in the future would be desirable and would provide flexibility in future management. For example, increasing tidal exchange could provide further conservation benefit through increasing food supply and

invertebrate colonisation of the new shallows. It is proposed, therefore, that a second flow control structure would be constructed when the existing pipe is replaced. This would not be operational initially, but could become active should this be desirable in the future if the monitoring demonstrates that alteration of the water level regime would be acceptable (and the limits thereof). This should be able to be confirmed when the functioning of the lagoon, following the implementation of the habitat enhancement, is understood through the proposed monitoring (in particular, the relationship between Bran Sands landfill and water exchange with the lagoon) (refer to **Appendix 3.1**).

Water and sediment quality

10.3.35 The potential effect of the proposed scheme on habitat quality (as opposed to extent, which is addressed above) and prey availability (food resources) is linked to the effect of the proposed scheme on water and sediment quality. This sub-section focusses on the potential effects of the proposed scheme on the suspended sediment concentration in the water column during capital dredging, sediment deposition and water quality in Bran Sands lagoon. The potential effect of dust generation from handling of polyhalite and subsequent deposition onto habitats used by waterbirds is also discussed.

Suspended sediment concentration in the water column during capital dredging

10.3.36 Modelling of the dispersion of sediment during capital dredging has been undertaken for a range of scenarios during varying hydrodynamic conditions (low river flows and spring tide; and high river flows and neap tides). The modelling simulated dredging using three types of dredging plant to capture the most likely dredge method based on the bed material to be dredged throughout the proposed dredging. The dredgers that were simulated in the modelling are:

- backhoe dredger (BHD) in the river channel;
- trailing suction hopper dredger (TSHD) at the berth and quay construction area; and,
- cutter suction dredging (CSD) (with pumping into a barge) at the berth and quay construction area.

10.3.37 Full results of the modelling studies are presented in **ES Section 5.5**.

10.3.38 The results show that the mean increase in depth averaged sediment concentration above background concentrations in the vicinity of the dredger is highest for a CSD (greater than 500mg/l) and TSHD (greater than 200mg/l) compared with a backhoe dredger. The TSHD results in the largest spatial extent of sediment plume. Predicted mean concentration increases of suspended sediment outside the proposed dredge footprint are only a few tens of mg/l at most, on average. The simulations show that an area of elevated suspended sediment concentration, in the range of 10mg/l to 50mg/l above background may be anticipated in the channel, 1.5km either side of the dredging works.

10.3.39 Sediment quality testing has been undertaken within the proposed berth pocket and section of approach channel that would be dredged and this has shown that the silts overlying geological material

are contaminated (**ES Section 7.4**). Consequently, it is proposed that these sediments would be dredged using an enclosed grab (and removed to a barge) in order to ensure that there is no significant release of contaminated material during the capital dredging. Hence the results of the sediment plume dispersion modelling presented in **ES Section 5.5** relate to the dispersion of fine material generated during dredging of non-contaminated sediments.

10.3.40 During the operational phase, maintenance dredging would be required to maintain the dredged depth within the berthing pocket and approach channel. This potentially would result in an increase in total suspended sediment concentrations within the water column. However, the sediment transport modelling has predicted that the effect of the proposed scheme would be extremely small and well within any natural variability in the estuary. The predicted very small change in the overall fine sediment regime in the Tees is not predicted to alter the frequency of, or methodology used for, maintenance dredging.

Sediment deposition onto the seabed

10.3.41 The sediment dispersion modelling made predictions of the extent and magnitude of deposition onto the seabed (**ES Section 5.5**). A maximum deposition rate of 1 to 2mm per day in an area 2km either side of the proposed dredge footprint was predicted, with greater deposition in the immediate vicinity of dredging activity. The plume dispersion modelling predicted no average increase in suspended sediment concentration over the intertidal areas; hence a negligible quantity of sediment would be available for deposit on the intertidal areas.

Water quality in Bran Sands lagoon

10.3.42 The conceptual model presented in **Figure 10-1** shows that there is hydraulic connectivity between Bran Sands landfill and the lagoon. Phase 1 of the landfill (**Figure 10-1**) is considered likely to contribute some metal contamination to the shallow groundwater. Phase 2 of the landfill (**Figure 10-1**) contains hazardous and non-hazardous waste streams. The landfill has both lined and unlined mono-cells and was built partly on 'dilute and disperse' principles.

10.3.43 Waste is no longer deposited within the landfill and the landfill has been capped with a composite capping system. It is the subject of a Closure Plan agreed with the Environment Agency. Capping was completed in April 2007, with restoration completed in 2008. Data suggests that the side slopes of the Phase 2 area comprise a 1.0m thick clay cap, with the remainder of the Phase 2 area capped with a 300mm thick clay layer, overlain by a high density polythene geomembrane, a protection geotextile and 1.0m of subsoil and topsoil. A surface water drainage system is in place to prevent excessive infiltration and damage to the capping system.

10.3.44 Leachate from the landfill site is collected from leachate extraction chambers located within the waste mass and this is then pumped to one of three leachate holding lagoons prior to being pumped to the sewer system under a discharge consent. Leachate is reported to meet discharge consent parameters.

10.3.45 Surface water from the landfill is collected via two swales to prevent ponding and control surface water run-off. Surface water is ultimately discharged to Bran Sands lagoon (see **Figure 10-1**).

10.3.46 Environmental monitoring (groundwater, ground gas and leachate monitoring) is being carried out in accordance with the Closure Plan for the site. There is one monitoring point in Bran Sands lagoon (SW1; see **ES Section 6**) which is sampled for pH, ammonium, electrical conductivity, dissolved oxygen, chemical oxygen demand and chlorides (Cl) quarterly and reported annually. Monitoring parameters are in compliance with the Environmental Permit and Closure Plan.

10.3.47 The habitat enhancement proposals involve placing a relatively thin layer of dredged material over a proportion of the lagoon basal area. The enhancement proposals would be placed away from the existing landfill cap in order that there would be no direct impact on the leachate head within the landfill. The proposed placement of dredged material in lagoon would not reduce the flow of deeper groundwater into the lagoon (as it would be a high permeability material, placed over a portion of the lagoon only) and, therefore, no significant implications for water quality are predicted.

10.3.48 The most significant potential impact on water quality in the lagoon would arise if water levels in the lagoon were to increase up to the level of the cell linings within the landfill. This could affect the stability of the cells and/or volume of leachate entering the leachate collection system. For this reason, the habitat enhancement proposals do not involve active changes in lagoon water level and no effect on the current functioning of the landfill leachate collection system is envisaged. As stated above, a flow control gate on the pipe through the embankment would be included in the design in order that Bran Sands lagoon could be temporarily isolated from the Tees estuary in the event, for example, of a pollution incident in either water body, but no routine intervention in water level fluctuations is proposed.

10.3.49 In conclusion, it is considered that there is no mechanism whereby the habitat enhancement proposals could have an impact of any significance on the existing water quality conditions in the lagoon. The lagoon currently represents an important feeding and roosting area for waterbirds, and there is no existing concern regarding water quality in the lagoon in this context. Water quality is in compliance with the requirements of the Environmental Permit and the environmental monitoring provides an understanding of the current interaction between the landfill and the lagoon.

10.3.50 The habitat enhancement proposals would improve conditions in the lagoon for the waterbird assemblage and contribute towards the functioning of the estuary system.

10.3.51 Monitoring of water quality in the lagoon would continue in the future in accordance with the requirements of the Environmental Permit and Closure Plan.

Generation and settlement of polyhalite dust

10.3.52 The polyhalite would be processed at the MHF at Wilton into a granulated (pellet) form of a specific size that would be coated in a layer of wax. The polyhalite product would also be screened at the MHF so that any fines or undersized pellets are reprocessed.

10.3.53 The product would be transported from the MHF to the port via an overland conveyor. The conveyor would be covered or enclosed along its entire length due to the need to ensure that the product is dry. The polyhalite product would not directly be exposed to the atmosphere at any point along the conveyor system.

10.3.54 On the basis of the above, it is concluded that there is no significant potential for the release of dust from the handling of the polyhalite and, therefore, the potential for deposition onto habitats used by waterbirds is not considered further in this HRA.

Disturbance effects

10.3.55 The proposed scheme has the potential to give rise to a number of disturbance effects during the construction phase, as follows:

- Airborne and underwater noise.
- Movements of plant and personnel (i.e. visual disturbance).
- Lighting.

10.3.56 During the operational phase, the following potential disturbance effects could occur:

- Noise from operation of the port terminal and conveyor.
- Interruption to sightlines and overshadowing of Bran Sands lagoon and intertidal areas.
- Increased shipping activity (potentially resulting in ship wash disturbance).
- Lighting of the port terminal and conveyor.

10.3.57 These potential disturbance effects are discussed below.

Noise generated by construction works (airborne and underwater)

10.3.58 Airborne noise modelling has been undertaken to predict the noise levels due to the construction works; full results are presented in **ES Section 14.5**, with the potential impacts on waterbird populations presented in **ES Section 9.5**.

10.3.59 The potential impact of construction noise disturbance was assessed by comparing predicted noise levels with research into the behaviour of waterbirds in response to impulsive noise. Noise modelling was undertaken for various stages of construction works, with the worst case being assessed for percussive piling for the port terminal and bored piling techniques for the conveyor.

10.3.60 On the basis of the noise modelling predictions, it can be expected that no significant effects would occur to waterbirds on the inland half of the lagoon or on the opposite bank of the Tees estuary (the Vopak foreshore) due to the piling for the construction of the quay. For the construction of the conveyor along either the northern or southern routes, no significant effects would occur beyond the mid-point of the lagoon (i.e. either the northern or southern half of the lagoon would be affected, depending on which conveyor route is constructed). Closer to the noise source, it would be expected that waterbirds

would exhibit a non-flight behavioural response (e.g. moving away from the source of noise emission) or, in the immediate vicinity of the piling works, birds may exhibit a flight response. No significant effects, in terms of noise emissions, are predicted within the boundaries of designated sites, including the North Tees Mudflat.

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

10.3.62 As a worst case, the ES assumed that the piling works would take place over some or all of the winter period and, on this basis, it was anticipated that there would be a disturbance effect over part of Bran Sands lagoon and Dabholm Gut.

10.3.63 As mitigation for the potential impact of noise (and visual) disturbance, it is proposed that noise attenuation barriers would be positioned:

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

10.3.64 The noise attenuation barriers would most likely constitute a 3m high hoarding at ground level.

10.3.65 In addition, the proposed use of a noise reduction curtain over the hammer piling rig during percussive operations for the quay construction is to the investigated. This would mitigate the predicted noise impact during quay construction.

10.3.66 The effect of the proposed mitigation on piling noise at ecologically sensitive receptors (see **Figure 10.2**) has been modelled and contour plots produced (**ES Section 14.5**). **Tables 10.1** and **10.2** present a summary of the calculated pre- and post-mitigation noise levels during percussive piling for the quay and auger piling for the construction of the conveyor in either the southern or northern corridor.

10.3.67 The results of the underwater noise modelling are presented in **ES Section 11**. The potential underwater noise effects are of most relevance to the potential impact on fish, but are considered within this HRA given that small fish represent prey for some waterbird species.

10.3.68 The underwater noise modelling results for a 2000mm diameter pile predict that physical injury to fish could occur up to a maximum distance of 36m from the noise source. A maximum range of 84m from the noise source was predicted for a startle reaction in fish.

Figure 10.2 Assessed receptor locations and baseline monitoring locations

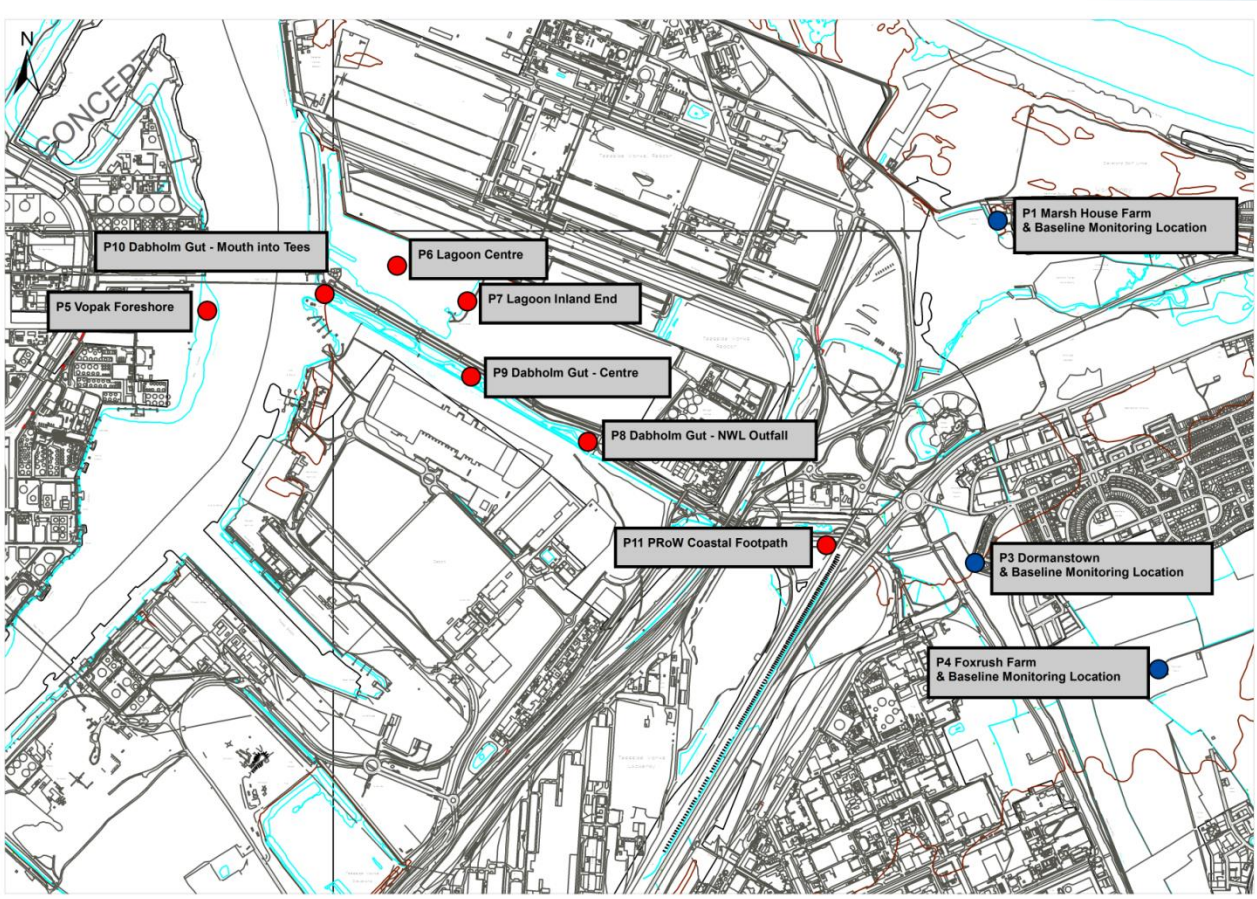


Table 10.1 Mitigated day noise impacts at ecologically sensitive receptor locations during quay percussive piling and south conveyor option construction (auger piling)

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

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

Table 10.2 Mitigated day noise impacts at ecologically sensitive receptor locations during north conveyor option construction (auger piling)

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

10.3.69 With regard to underwater noise from capital dredging, the modelling results show that underwater noise levels would not be sufficient to reach the criteria for lethal effect or physical injury. The noise modelling predicted that behavioural responses (avoidance reaction) would occur in fish species in an area that is highly localised to the dredger, and any avoidance reactions would be temporary for the duration of dredging.

10.3.70 In conclusion, no significant effect on fish populations would be expected beyond a radius of approximately 100m from the location of piling for the quay construction and, therefore, there would be no significant effect on prey species for waterbirds. No effect is predicted on SPA waterbird populations as a result of underwater noise during construction.

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

10.3.71 The construction phase of the proposed scheme would require various personnel to be present on site depending on the nature of the works being undertaken.

10.3.72 Construction plant would also be present throughout the construction phase, with the focus of activity being along the corridor for the construction of the overland conveyor and along the Tees frontage for the construction of the quay. For the works within the conveyor corridor (and construction traffic travelling to the Tees frontage), existing infrastructure (e.g. pipelines) and landforms would screen the works from a direct line of sight to Bran Sands lagoon and Dabholm Gut, and significant visual disturbance to waterbirds is not envisaged to arise due to these activities.

10.3.73 It is considered likely that waterbirds would exhibit a behavioural response to visual disturbance and redistribute away from the immediate vicinity of the disturbance, but would be likely to become habituated to the visual disturbance over time. It is unlikely that the zone of effect of visual disturbance would be greater than the zone of effect due to increased noise emissions and, as a worst case, it is envisaged that birds within the seaward (western) half of the lagoon would experience disturbance initially, with habituation occurring over time. However, visual disturbance has the potential to occur over a longer period of time than noise disturbance, which is only likely to be of significance when piling is taking place.

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

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

- Artificial lighting during the construction phase would only be used during the hours of darkness, during low levels of natural light or during specific construction methods or tasks.
- Lighting would be directed to focus inwards to the site wherever possible to reduce external glare.
- The luminaires to be mounted on lighting columns would comprise of a flat glass construction, appropriate to the nature and location of the installation. The aiming angle of the peak intensity of the luminaire would be limited to maintain the light output from the luminaire within five degrees from the downward vertical. This would control the lighting of the area and minimise

any potential glare, sky glow and obtrusive lighting to the surrounding areas. The luminaires to be mounted on the lighting columns would also incorporate the appropriate photometry reflectors to control the distribution of light from the luminaires and maintain the illumination within the construction development areas, boundary or task area. The proposed horizontal lighting illuminance levels (minimum and average levels) would comply with the lighting standard and guidance documents relevant to the method and construction work being undertaken.

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

10.3.76 With the above mitigation strategy in place, in combination with the use of barriers to provide an acoustic and visual screen between the proposed construction works and the lagoon and Dabholm Gut, no effect on population levels of waterbirds would occur.

Noise from operation of the port terminal and conveyor

10.3.77 The noise impact assessment included predictions of noise that would be generated due to the operation of the Harbour facilities; full results are reported in **ES Section 14.6**. The findings of this assessment have informed a prediction of the potential disturbance effect to waterbirds, particularly those using Bran Sands lagoon and Dabholm Gut given the proximity of these areas to the proposed terminal. During the operational phase, there would be no change to the maintenance dredging method or frequency and, therefore, there would be no significant underwater noise effect associated with maintenance dredging for the proposed berth pocket.

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

10.3.79 It can be concluded that the downstream section of Dabholm Gut would be expected to experience an increase in noise during the operational phase, but the level predicted would be of a low magnitude and would not be expected to result in a behavioural effect on waterbirds. Birds would habituate to the change in noise level of the order and nature that is predicted. The effect is, therefore, considered insignificant in terms of potential effect on waterbird behaviour.

Interruption to sightlines and overshadowing of Bran Sands lagoon and intertidal areas

10.3.80 **ES Section 9.6** describes the predicted effect of the proposed scheme on sightlines for waterbirds and overshadowing. Some of the above structures proposed to be installed are of significant height (**Drawings PB1586-SK1040-1046, Drawings PB1586-SK490-497** and **Drawings PB1586-SK93** and **Drawings PB1586-SK91**), but they are not of significant mass and the number of structures that would be adjacent to the lagoon is minimal.

10.3.81 Given the above, the proposed scheme would not minimise sightlines in any direction.

10.3.82 In terms of overshadowing, the most significant effect would be the presence of the conveyor in the northern conveyor corridor (if this route is progressed) as it would cross the finger of the lagoon and the presence of the structure in this location would result in some potential fragmentation of the lagoon habitat, but this is not likely to result in significant behavioural effects on waterbirds or significantly detract from the potential of this area of lagoon to support feeding and roosting waterbirds. It should also be noted that there is an existing elevated conveyor that runs parallel to the eastern side of the finger of the lagoon.

Increased shipping activity (resulting in ship wash disturbance)

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

10.3.84 Given the above, and with relevant controls in place as at present (such as speed limits), disturbance due to ship wash is not predicted to be an issue with respect to the proposed scheme, with no implications for waterbird populations.

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

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

10.3.86 Nevertheless, following discussion with Natural England, mitigation measures have been investigated and built into the design in order to minimise the potential for any significant disturbance to areas used by waterbirds during the operational phase. Hence it is proposed that parking and storage areas immediately adjacent to Bran Sands lagoon would be screened (most likely by fencing).

With regard to mitigating the potential impact of lighting, the same principles to minimise the potential for significant effects on the waterbirds utilising Bran Sands lagoon and Dabholm Gut as described for the construction phase (set out above), would apply in operation.

10.4 Conclusion regarding the Teesmouth and Cleveland SPA and Ramsar site

10.4.1 This section draws conclusions regarding the potential effect of the proposed Harbour facilities (alone) for the Teesmouth and Cleveland SPA and Ramsar site. The outcomes of the assessment are summarised in the integrity matrices included in **Appendix 10.2**.

10.4.2 The proposed Harbour facilities would not directly affect habitats used by waterbirds within the boundary of the Teesmouth and Cleveland Coast SPA and Ramsar site; all proposed works are located outside the boundaries of the designated sites.

10.4.3 The predicted effects of the proposed port terminal and capital dredging on the hydrodynamic and sedimentary regime (which have the potential to indirectly affect habitats within the designated sites) during the operational phase have been demonstrated to be of a localised nature and a low magnitude. Of particular importance in this context is the effect of the scheme on the sedimentary regime of the Tees estuary. This is predicted to be negligible, with no effect on the supply of sediment to intertidal areas within the Tees estuary or wider coastal processes.

10.4.4 The proposed Harbour facilities would have a direct effect on a habitat, outside the designated sites, used by waterbirds which form part of the SPA population; that is, the intertidal footprint of the proposed quay. While this area is used by greater than 1% of the population (measured by the Tees WeBS site counts) for some species of waterbird (i.e. shelduck, redshank and turnstone on the river frontage), the total number of birds and species supported by this area is low and the area is not considered to be integral to the structure and function of the designated sites.

10.4.5 Nevertheless, habitat enhancement measures in Bran Sands lagoon are proposed. These measures would comprise the creation of feeding, roosting, loafing and nesting habitat. It is concluded that these measures would mitigate the loss of intertidal habitat due to the construction of the port terminal and, in addition, would represent a significant net benefit to waterbird populations and make a contribution to the functioning of the SPA and Ramsar site.

10.4.6 Two areas in close proximity to the proposed Harbour facilities (Dabholm Gut and Bran Sands lagoon) are considered to be of importance to the structure and function of the designated sites and this is clearly demonstrated through the comprehensive waterbird data available for these areas. It is concluded that the proposed scheme does not have the potential to have a significant effect on the habitats within these areas because any direct works would be minimal (restricted to a small number of supports for the conveyor). Furthermore, the proposed habitat enhancement measures would not compromise the current usage of the lagoon by diving waterbird species.

10.4.7 However, there would be disturbance impacts on waterbirds feeding and roosting in the lagoon and, to a lesser extent, Dabholm Gut. The most significant potential effect would be noise disturbance during the construction works, particularly during piling for the quay construction and conveyor when some disturbance to waterbirds would be expected and birds would redistribute away from the noise source. This potential impact would be mitigated through the use of acoustic barriers, which would also act as a screen to personnel movements during construction, and the potential use of noise reduction curtain over the hammer piling rig during percussive operations for the quay. Based on the implementation of these measures, these effects are not predicted to have the potential to have an adverse effect on the waterbird population of the SPA and Ramsar site.

10.4.8 Visual disturbance due to lighting (in construction and operation) is also likely to arise. However the lighting scheme would be specifically designed to avoid adversely affecting waterbirds that feed and roost at Bran Sands lagoon and Dabholm Gut.

10.4.9 The suspension and dispersion of sediment during capital dredging would temporarily affect water clarity, with a plume of sediment being dispersed along the axis of the navigation channel. The modelling work undertaken has predicted that there would be no increase in suspended sediment within the designated sites, and sediment deposition onto the seabed would be negligible beyond the immediate dredge footprint. Given that the silts (but not the underlying geological material) to be dredged are contaminated, this material would be dredged using an enclosed grab to avoid any significant release of silts into the water column during dredging.

10.4.10 The sediment plume within the Tees is likely to affect birds that feed on small fish in the water column, with some redistribution in feeding activity likely to occur. The sediment plume modelling has predicted that suspended sediment concentrations would not be affected at the estuary mouth and, therefore, bird feeding activity at the estuary mouth and within Tees Bay would not be affected. No effect is predicted on SPA waterbird populations as a result of underwater noise during construction affecting distribution of prey species (small fish)

10.4.11 Water quality in Bran Sands lagoon is currently in compliance with the requirements of the Environmental Permit and it is considered that there is no mechanism whereby the habitat enhancement proposals could have an impact of any significance on existing water quality conditions. Monitoring of water quality in the lagoon would continue in the future in accordance with the requirements of the Environmental Permit and Closure Plan.

10.4.12 The conservation objectives of the Teesmouth and Cleveland Coast SPA are set out below:

> "With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified [see **Section 5.2**], and subject to natural change:
>
> *Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;*

- *The extent and distribution of the habitats of the qualifying features.*
- *The structure and function of the habitats of the qualifying features.*
- *The supporting processes on which the habitats of the qualifying features rely.*
- *The population of each of the qualifying features.*
- *The distribution of the qualifying features within the site."*

10.4.13 In the context of these objectives, in conclusion, it is predicted that the proposed Harbour facilities alone, with the implementation of the proposed measures to mitigate the impact of construction noise and visual disturbance and habitat enhancement measures in Bran Sands lagoon, would not affect the structure and function (the integrity) of the Teesmouth and Cleveland Coast SPA.

10.4.14 The qualifying criteria of the Ramsar site are set out in **Section 5.3**. On the basis of the information presented in this HRA, it is further concluded that the proposed Harbour facilities (alone) would not affect the structure or function of the Ramsar site.

10.4.15 Natural England agree with the above conclusion regarding site integrity, and also agree that there is scope for delivering benefit to the waterbird assemblage should the proposals be implemented as described in the MMS (as confirmed in Natural England's letter dated 9 February 2015, appended to the MMS in **Appendix 3.1**).

11 INFORMATION FOR APPROPRIATE ASSESSMENT: HARBOUR FACILITIES IN COMBINATION WITH OTHER PLANS AND PROJECTS

11.1 Introduction

11.1.1 In combination effects refer to effects on certain receptors from the project under consideration together with other developments (plans and projects) in the wider area. As set out in **Section 6.2** other plans and projects considered in this in combination assessment – within the defined ZOI – include the following:

- projects that are under construction;
- permitted application(s) not yet implemented;
- submitted application(s) not yet determined;
- all refusals subject to appeal procedures not yet determined;
- projects on the National Infrastructure's programme of projects;
- projects identified in the relevant development plan (and emerging development plans); and,
- proposals currently at the scoping stage.

11.1.2 This in combination assessment has adopted the following principle: in order for the Harbour facilities to be considered to have the potential to contribute to in-combination effects, there must be sufficient cause to consider that a relevant habitat or species is sensitive to effects due to the project itself (e.g. as a result of particular influence of sensitivity, or the presence of a species in notable numbers on at least one survey occasion, rather than simply being recorded within the site). Therefore, only where the project alone was determined to have the potential for LSE on *Natura 2000* sites and features have these sites and features been included in the in combination assessment. If a LSE was not determined due to the Harbour facilities, there is no real prospect of it suffering from an in combination effect with another plan or project.

11.2 Projects included within the assessment of potential in-combination effects

11.2.1 To summarise the outcome of the screening assessment (**Table 8.7**), the following projects are included in the in combination assessment:

- MHF (part of the YPP).
- Dogger Bank Teesside A and B.
- Maintenance dredging within the Tees estuary.
- QEII Berth Development.
- NGCT (terminal and capital dredging).
- Arts and media centre (i.e. the Tuned In! facility, Redcar).

11.2.2 The following text summarises the key details of these projects in order to provide context for the in combination assessment.

MHF (part of the YPP)

11.2.3 The MHF would be located on a site on the eastern edge of the Wilton International Complex. It comprises two parcels of land with a combined area of 37ha. It would be linked to the port terminal by a conveyor system.

11.2.4 The MHF site would include:

- The tunnel portal (MTS Portal).
- A processing plant for crushing, screening and granulation.
- Storage buildings to hold 700,000t of finished polyhalite granular product. Conveyors to transport the product to the port terminal would run from the buildings.
- A run of mine material emergency store capable of holding 8,000t of run of mine material.
- Support infrastructure facilities.
- A spoil disposal area.

11.2.5 The works would include the following:

- Continuous flight auger piling at the product storage building, locomotive shed and the processing plant.
- The excavation and construction of MTS Portal.
- The construction of reinforced concrete bases and rafts.
- The construction of underground drains and other services.
- The erection of steelwork for structures and conveyors.
- The cladding of structures.
- Construction of roads and hard standing areas.
- Earthworks and spoil contouring.
- Installation of process equipment and associated electrical, mechanical and control services.

11.2.6 It is estimated that approximately 300,000m^3 of spoil would be generated from the 7km section of the tunnel at the Wilton end. Space on the site has been allocated for spoil mounds and it is anticipated that a cut-fill balance can be achieved.

Dogger Bank Teesside A and B

11.2.7 Dogger Bank Teesside A and B is the second stage of an offshore wind energy development of the Dogger Bank Zone. Dogger Bank Teesside A and B will comprise up to two wind farms, each with an installed capacity of up to 1.2GW, which are expected to connect to the national grid at the existing national grid substation at Lackenby, near Eston.

11.2.8 The main offshore and onshore components of the project are (Royal HaskoningDHV, 2014a):

- Wind turbines and associated foundations and scour protection measures;
- Offshore collector and converter stations and associated foundations, and scour protection measures;
- Offshore operations and maintenance infrastructure, such as accommodation platforms (or other appropriate accommodation arrangements), permanent moorings, and navigational buoys and scour protection measures;
  Subsea inter-array cables between the turbines, between turbines and substations and between sub-stations;
- Subsea export cables, carrying power from the wind farm to the shore, or possibly adjacent projects;
- Crossing structures at the points where project cables cross existing subsea cables and pipelines;
- Offshore meteorological masts and metocean equipment;
- Onshore transition pit;
- Cable system - from onshore transition pit to onshore converter station;
- Ancillary cable ducts these are buried ducts running adjacent to the cable system;
- Cable system - from onshore converter station to National Grid Electricity Transmission (NGET) substation; and,
- Converter substations.

Maintenance dredging within the Tees estuary

11.2.9 PD Teesport carries out maintenance dredging in the reaches of the river shown in **Figure 11.1** (below). Most dredging occurs in the approach channel and low-middle estuary in order to maintain access to berth pockets and impounded docks. TSHDs are currently used for the majority of the dredging, supported by grab dredging and ploughing where required (Royal HaskoningDHV, 2014b).

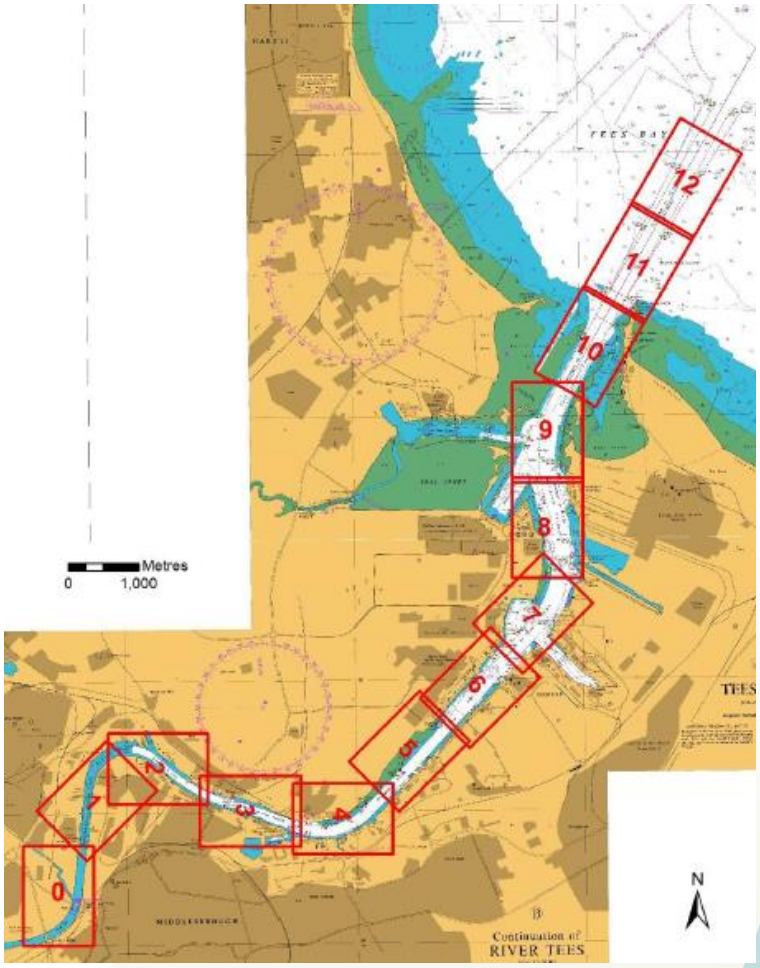
11.2.10 In 2013, the total volume of maintenance dredging was approximately 1.22 million m^3; this figure is very similar to the annual average over the period 2001 to 2013 (1.21 million m^3).

QEII Berth Development

11.2.11 This project would comprise the construction of a new 260m long quay on the site of the existing QEII jetty. The project will include capital dredging to deepen the existing QEII berth from 10.9m bCD to 11.4m bCD and to extend the berthing pocket to 45m wide by 300m long. A total of approximately 225 tubular steel piles will be installed in rock sockets. It is estimated that piling operations may extend for a period of approximately 120 days (17 weeks). The total volume of capital dredging is expected to be in the region of approximately 36,000m^3.

11.2.12 The timing for the implementation of this project is unknown.

Figure 11.1 Reaches of the Tees where maintenance dredging is undertaken (Royal HaskoningDHV, 2014b)



NGCT

11.2.13 This project is consented via an HRO which remains live. The project comprises the construction of a deep sea container terminal (1000m quay length) on the site of the existing Teesport Container Terminal 1, the redundant former Shell jetty and the Riverside Ro-Ro No. 3 at Teesport.

11.2.14 Capital dredging is proposed within the existing dredged approach channel to deepen the channel by 0.4m from 14.1m bCD to 14.5m bCD, with deepening from 10.4m below CD to 14.5m bCD for the final (approximately) 1km of the approach to the proposed terminal and to 16m bCD in berthing areas at the quay face. The total volume of material that will arise from the capital dredging will be approximately 4.8 million m^3.

Arts and media centre (the Tuned In! facility, Redcar).

11.2.15 Tuned In! is a youth facility catering for a range of creative arts and crafts and is located on the seafront at Coatham. An assessment of the impacts of the proposed scheme on the Teesmouth and Cleveland Coast SPA and Ramsar site was undertaken in June 2010 (E3 Ecology Ltd, 2010) to accompany the planning application for the facility.

11.2.16 Given that the scheme has been implemented, construction phase effects are not relevant to this in-combination assessment.

11.2.17 It is difficult to clearly define the characteristics of the operational phase for a development of this nature, but the assessment undertaken by E3 Ecology Ltd highlighted that the main concern with regard to the operational phase was disturbance to roosting waders using the Coatham Boating Lake (disturbance through noise form the outdoor performance area and increased disturbance from an increase in visitor numbers in the immediate area of the boating lake).

11.3 Assessment of potential in-combination effects

11.3.1 The environmental parameters to be assessed within the in combination assessment have been defined through the screening assessment exercise, the conclusions of which are summarised in **Table 8.7**. The following are of relevance to the Teesmouth and Cleveland Coast SPA and Ramsar site:

- direct loss of habitat;
- noise disturbance during the construction phase;
- effects on marine water quality during capital dredging; and,
- effect on the hydrodynamic and sedimentary regime resulting in a potential effect on morphology of intertidal and subtidal habitats.

11.3.2 The potential in combination effect of the projects screened into the HRA are described and assessed in the following sub-sections.

Direct loss of habitat

11.3.3 The ES for the MHF stated that curlew (which forms part of the overall waterbird assemblage of the SPA and Ramsar site) was regularly recorded as feeding in the short grass sward areas at Wilton (the site of the MHF). A peak count of 17 curlew was recorded across the site in October 2013, which represented 2% of the Teesmouth population recorded by WeBS for this month. In March 2014, 11 curlew were recorded, which represented 2.3% of the WeBS count. It is generally accepted that 1% or more of a total population is significant to the population as a whole. Oystercatcher was the only other species of wader recorded, although numbers were very low.

11.3.4 The MHF and the Harbour facilities in combination would result in a loss of habitat used by waterbirds (but not the same type of habitat in each case). However, the numbers of birds that use the site of the MHF on occasion are very low in the context of the waterbird assemblage of the SPA and Ramsar site.

The bird surveys undertaken within the Wilton site also confirmed that none of the species found to be present are cited as interest features in the Teesmouth and Cleveland Coast SPA and Ramsar site.

11.3.5 No mitigation is proposed for the effect of the MHF given the very minor effect predicted and that the habitat that would be affected at the MHF site (short grass sward) is present and common in the wider area. Furthermore, the benefit provided by the habitat enhancement proposals (feeding and roosting habitat) included within the Harbour facilities proposals is considered to outweigh the combined effect of the Harbour facilities and MHF on the waterbird assemblage.

Noise disturbance during the construction phase

11.3.6 The noise assessment concludes that there is the potential for noise disturbance to waterbirds using Bran Sands lagoon and Dabholm Gut associated with construction works for the port terminal and overland conveyor (notably piling). This potential impact would be mitigated by the use of acoustic barriers.

11.3.7 **Part 3 Section 17** of the CIA (**Document 6.6**) assesses the cumulative noise impact of the NGCT and QEII Berth Development projects with the Harbour facilities. The assessment predicts the cumulative construction noise levels at the noise sensitive receptors included in the EIA (reported in **ES Section 14**); and concludes that the cumulative impact of noise and vibration on sensitive receptors is not predicted to be significant.

11.3.8 Noise disturbance was assessed in connection with the construction of the export cable landfall for the Dogger Bank Teesside A and B landfall on the coast (Royal HaskoningDHV, 2014c). Usage of the frontage by foraging or roosting waterbirds is low, probably reflecting limited available foraging resource and existing high level of disturbance. The additional disturbance levels due to the project were concluded to be localised, of short-term duration and unlikely to have a measurable effect on the designated SPA populations. No regular activities would take place within the cable landfall area throughout the operation phase. Hence an in combination effect is not predicted in conjunction with the construction of the Harbour facilities.

Effects on marine water quality and food (prey) resource for waterbirds due to capital and maintenance dredging

11.3.9 The potential for an interaction between sediment plumes that are predicted to be generated by capital dredging associated with various projects has been assessed in detail in **Part 3 Section 25** of the CIA.

11.3.10 It was concluded that there is only the potential for a cumulative effect to occur should the dredging programme for the Harbour facilities coincide with that for the NGCT **or** the QEII Berth Development. Under such circumstances, the effect would be a greater increase in suspended sediment concentration than predicted for the Harbour facilities alone but within the same predicted spatial extent of the plume for the Harbour facilities. The effect, therefore, would be additive rather than cumulative.

11.3.11 Increased suspended sediment concentrations have the potential to effect fish populations (which represent part of the diet for some species of waterbird), resulting in a behavioural effect, with movement away from the zone of increased suspended sediment concentration. However, the effect of a combined plume (in the zone of interaction) is not likely to result in a different behavioural response in fish compared with the effect of the projects in isolation.

11.3.12 Should the capital dredging for the three projects included in the CIA coincide, there would be an effect over a larger spatial extent than predicted for the Harbour facilities alone; and this effect would be additive rather than cumulative (i.e. the predicted impacts of each project would not interact to result in an impact that is of greater or lesser magnitude than the sum of the impacts in isolation). The combined effect of the projects would affect fish over a greater spatial area that the Harbour facilities in isolation, but the short term and localised nature of peaks in suspended sediment arising during dredging would not have an effect on SPA populations of waterbirds.

11.3.13 The deposition of sediment onto the seabed has the potential to affect the benthic invertebrate resource which represents an important food source for waterbirds. The extent and magnitude of deposition associated with the capital projects scoped into the HRA is assessed in **Part 3 Section 25** of the CIA.

11.3.14 Where the deposition footprints of the Harbour facilities and the QEII Berth Development coincide, the potential cumulative impact is predicted to be negligible. The predicted footprints of sediment deposition for the NGCT and the Harbour facilities are similar, although the effect of the NGCT capital dredge is more extensive and extends into Seaton Channel and onto Seal Sands. It was concluded that the only project with any potential to effect intertidal areas due to sediment deposition is the NGCT project (alone); deposition due to that project was predicted to be of very low magnitude. No intertidal sediment deposition was predicted during capital dredging for the Harbour facilities and, therefore, there is no potential for an in combination effect to arise.

11.3.15 Maintenance dredging is targeted towards areas that require dredging to maintain navigable depths and, although it would result in some losses of material into the water column, no detectable deposition of sediment onto the seabed is predicted to occur as a result of maintenance dredging. No maintenance dredging would take place at the location of the proposed Harbour facility when the construction and capital dredging works are being undertaken and, therefore, should maintenance dredging be undertaken elsewhere in the Tees estuary, there is a low potential for suspended sediment arising from maintenance dredging to interact with a sediment plume from capital dredging. It should be noted that it is highly unlikely that maintenance dredging would be scheduled when a significant capital dredging project, with the associated release of fine sediment to the estuary, was being undertaken

11.3.16 Mitigation measures to limit the suspension and subsequent deposition of sediment during capital dredging are proposed as part of the QEII Berth Development and the NGCT projects. For the former project, mitigation comprises the use of specialist dredging equipment (i.e. an enclosed grab loading into a sealed barge) for dredging of unconsolidated material to minimise resuspension in the water column. This requirement is specified because of the elevated concentration of contaminants within the

dredged sediment, and this measure would limit sediment release into the water column as far as practicable. This mitigation also applies to the dredging of the silts (overlying geological material) to be dredged as part of the Harbour facilities. As a result, there would be a negligible release of contaminated sediment during the capital dredging for these projects and, therefore, no potential for an in combination effect occur during the dredging of contaminated sediments.

11.3.17 The effect of sediment suspension on feeding birds (terns) in the nearshore zone associated with the construction of the export cable landfall for the Dogger Bank Teesside A and B windfarm project was assessed by Royal HaskoningDHV (2014c). It was concluded that the small-scale and temporary nature of the works in the nearshore zone (and within foraging range of terns) would not constitute a source of disturbance that would influence the foraging behaviour of terns such that potential adverse impacts at the population level would arise. No significant effect on fish prey species was predicted due to either suspended sediments or habitat change. Consequently, no significant in combination effect is predicted.

Changes to the hydrodynamic and sedimentary regime resulting in a potential effect on morphology of intertidal and subtidal habitats

11.3.18 An assessment of the predicted effects of the projects scoped into the HRA in combination assessment on the hydrodynamic and sedimentary regime has been undertaken and reported in **Part 3 Section 25** of the CIA. That assessment concludes by describing the predicted integrated effect of the various projects included within the assessment on the morphology of intertidal and subtidal habitats.

11.3.19 In summary, it is concluded that there would be no combined effect on the morphology of estuarine habitats between the Harbour facilities and the other projects considered. The justification for this conclusion is that:

- the Harbour facilities would not change the supply of fine sediment to the Tees; and,
- the deposition of sediment in the berth pocket of the Harbour facilities would be material that would (in the absence of the Harbour facilities) have deposited within the approach channel (anyway) and been subject to maintenance dredging and offshore disposal as part of maintenance of the channel.

11.3.20 Therefore, the effect of the Harbour facilities would be to cause a redistribution of sediment that requires maintenance dredging. The predictive modelling for the Harbour facilities concluded that the proposed scheme would not have the potential to affect the sediment budget of the estuary and, therefore, there would be no impact morphology of intertidal areas.

11.3.21 The only project predicted to have the potential to affect the estuary sediment budget was the NGCT. It was predicted that this project would result in a 10% increase in the supply of material to the Tees estuary from offshore; this arises due to the deepening of the approach channel through the mouth of the Tees and the resultant effect on tidal flows and sediment transport.

11.3.22 As a consequence of this effect, it was predicted that there would be an increase in the maintenance dredging requirement of the same magnitude.

11.3.23 In terms of combined impact with the NGCT, it follows that a 10% increase (beyond the effect predicted for the scheme in isolation) in the maintenance dredge requirement in the Harbour facilities berthing pocket could be expected, but this does not represent an overall increase in the maintenance requirement in the Tees for the reasons described above.

11.3.24 The studies for the QEII Berth Development did not identify any potential route for an effect on intertidal morphology, with the proposed scheme having a negligible effect on the deposition of sediment in the berth and, therefore, no potential for a combined effect.

11.3.25 It is concluded that there would be no combined effect with respect to the maintenance dredging commitment and, therefore, no in combination effect on the supply of material to intertidal and subtidal areas or on the morphology of the estuarine habitats in the Tees.

Noise disturbance during the operational phase

11.3.26 **Table 8.7** identifies that there is the potential for the Tuned In! arts and media centre to result in noise and visual disturbance, which could result in an additive (as opposed to interactive) in-combination effect.

11.3.27 The HRA for the Tuned In! facility (E3 Ecology Ltd, 2010) concluded that the disturbance effects of the facility would be minor, and effects could be readily mitigated by the provision of long-term screening on the boundary between the facility and Coatham Boating Lake. In addition, other measures (already in place for the adjacent Coatham Boatling Lake) were deemed to be part of the mitigation, namely reduction in access to the island in Coatham Boating Lake, the maintenance of wader sight lines, the improvement in roosting conditions, and appropriate design of new footpaths (E3 Ecology Ltd, 2010). Further measures to minimise disturbance to roosting waders have been implemented as part the detailed design for the boating lake in the Coatham Enclosure master plan. The assessment concluded that there would be no adverse effect on the integrity of the SPA as a result of the proposed development.

11.3.28 Given the above mitigation and conclusion of the assessment for the Tuned In! facility, it is concluded that there is unlikely to be any potential for a significant in combination effect on the Teesmouth and Cleveland Coast SPA and Ramsar site due to the Tuned in! facility acting in combination with the Harbour facilities.

11.4 Conclusion

11.4.1 In light of the conservation objectives for the Teesmouth and Cleveland Coast SPA (see **Section 10.4** and **Appendix 5.1**), it is predicted that the proposed Harbour facilities, when assessed in combination with other relevant projects, would not result in an adverse effect on the integrity of the Teesmouth and Cleveland Coast SPA.

11.4.2 The qualifying criteria of the Ramsar site are set out in **Section 5.3**. On the basis of the information presented in this HRA, it is further concluded that the proposed Harbour facilities (alone) would not affect the structure or function of the Ramsar site.

11.4.3 Natural England agree with the above conclusion regarding site integrity (as confirmed in Natural England's letter dated 9 February 2015, appended to the MMS in **Appendix 3.1**).

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Appendix 2.1

Brief description of the Mine, MTS, Construction Village Park & Ride and Whitby Operational Park & Ride

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1 Introduction

1.1.1 This section includes a description of the Mine, MTS, Construction Village and Park & Ride components of the YPP. It is considered to be relevant to this HRA (for the Harbour facilities) because it considers the potential for interaction between the Harbour facilities and the other elements of the YPP in providing the evidence for scoping the other plans and projects to be included in the in combination assessment for the Harbour

1.1.2 **Tables 8.3 to 8.6** (**Section 8.3**) summarise the findings of the screening assessment undertaken for the YPP as reported in the HRA that accompanied the applications for the Mine and MTS and the MHF, and identify the potential effects of the YPP on the designated sites that could be affected by one or more of the components of the YPP.

1.1.3 With regard to screening, PINS Advice Note 10 states that:

> *"The screening matrices must reflect the screening exercise undertaken in its entirety, showing the screening result for all European sites including all features for which the European site(s) are designated, even if the screening exercise has concluded no LSE on certain European sites or features. This may include European sites and features screened out at the very beginning of the process, for example, those not mentioned by the consulted SNCBs as having the potential to be affected"*

1.1.4 In light of the above statement, and given that the screening exercise undertaken included all elements of the YPP, the results of the screening exercise in relation to the North York Moors SAC, North York Moors SPA and Arnecliff and Park Hole Woods SAC have been included in **Appendix 8.2**.

2 Mine

2.1.1 The Mine surface development site (the minehead) would be located on a greenfield site at Dove's Nest Farm, approximately 4km south of Whitby within the boundary of the NYMNP. This component of the YPP includes:

- A mine at a depth of about 1,520m below ground level (bgl).
- Two access shafts (northern production shaft and southern men and materials shaft).
- One intake ventilation shaft.
- An additional shaft to provide maintenance access to the mine end of the MTS.
- Subsurface infrastructure.
- Support facilities including staff amenities, workshops for mobile and fixed equipment maintenance, diesel fuel area, mine pump station, electrical sub-station and stores located in the pit bottom.
- Surface infrastructure, including mine site buildings, welfare facilities, Modular Wastewater Treatment Plant, gatehouse, parking and access roads (see **Figure 1** for an indicative layout of surface infrastructure).

2.1.2 The construction of the Mine would include the following:

- Conventional drill and blast methodology.
- Conventional methods of dozer, scrapers, peckers and excavators. Drill and blast maybe required for harder substrata.

2.1.3 In recognition of the sensitivity of developing the Mine within the boundary of a National Park, a number of measures have been included in the design of this aspect to ensure that it is consistent with the visual amenity policies of the NYMNPA. These measures include:

- The main portion of the winding head-frames would be located below ground level.
- All mining equipment, mineral handling equipment, support facilities, personnel and materials would be sent down a shaft and assembled or constructed underground.
- Winding hoists would be housed within agricultural style buildings of limited ridge height.
- Conveyance of workforce, machinery, materials and mineral to be via below ground access shafts or drifts.

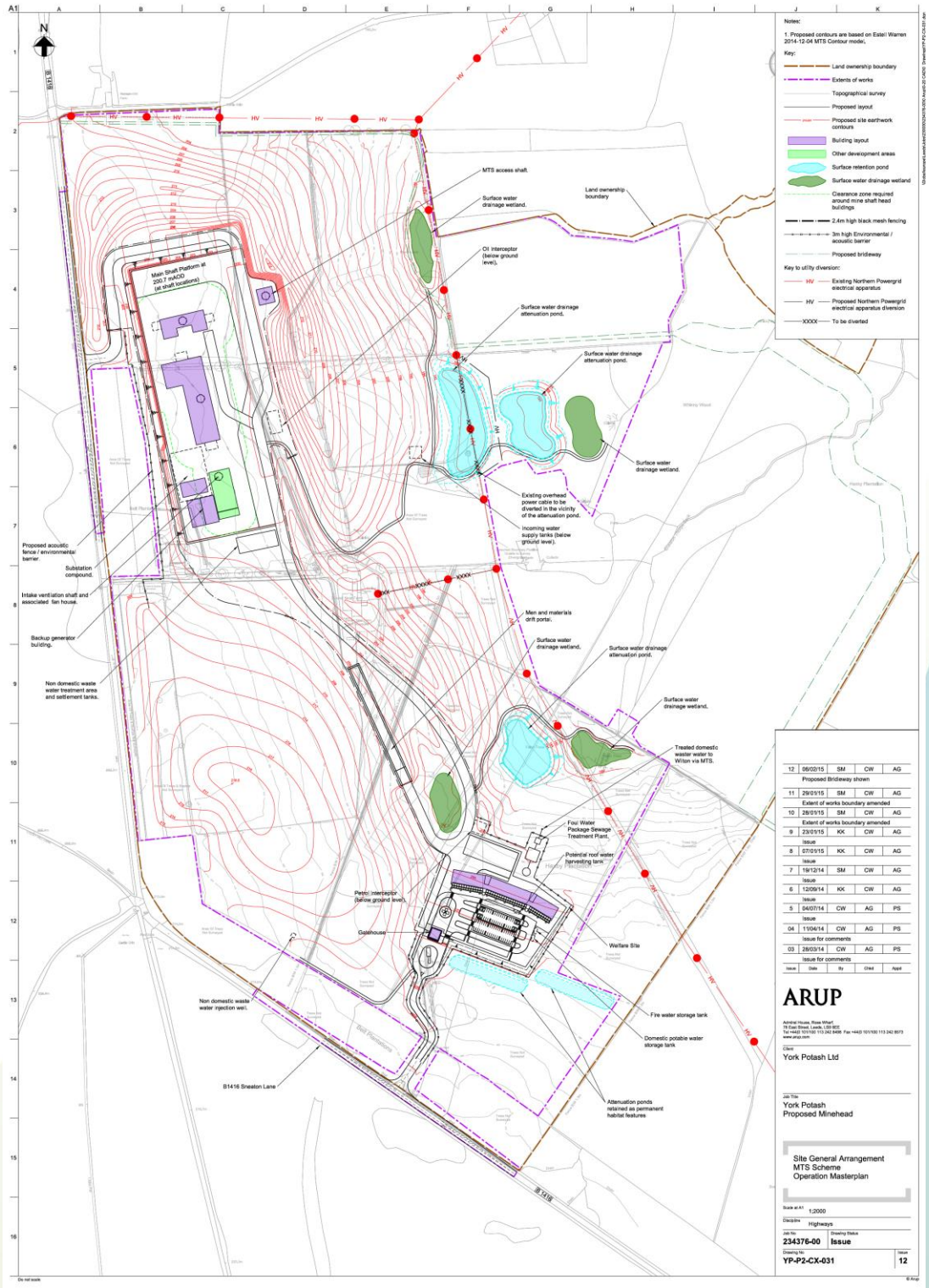
2.1.4 During operation there would be continuous sub-surface operations taking place for the working of polyhalite. The infrastructure in place to achieve this would comprise of:

- A production shaft. This would be used for minerals hoisting.
- A service shaft. This would be used for transportation of personnel, equipment and materials.
- A mine ventilation system. This would ensure airflow through the shafts.
- Support facilities. These would be located at the pit bottom and provide welfare support to mining operators.
- Mining infrastructure. This would comprise of infrastructure for working polyhalite at the pit bottom.

2.1.5 All mining would occur within the two polyhalite seams or adjacent salt. A room and pillar mining method using continuous miners would extract the mineral from the polyhalite seam.

2.1.6 The method comprises of cutting tunnels up to 12m wide and between 5 and 40m high using conventional continuous mining and drill and blast technology. Pillars vary in size depending on extraction height and would be left in-situ to provide local and regional support to the openings and overlying strata and to avoid impacts on aquifers and surface topography (subsidence). Strata control such as rock-bolts would be installed, where required by local conditions, to provide stability within the mining chambers.

Figure 1 Minehead operational site master plan



3 Construction Village, Construction and Operational Park & Rides

3.1.1 In addition to the Mine, there would be a Construction Park & Ride and may be a Construction Village, which would be located approximately 1.6km to the south west of Whitby town centre, covering approximately 2ha. The proposal compromises two components, namely;

- A temporary construction worker P&R.
- The option of a temporary construction village.

3.1.2 The need for the Construction Village is dependent upon the preference of the contractor and the availability of alternative overnight accommodation in the area at the time of the development

3.1.3 The village would include a two storey accommodation block, four single storey buildings, gatehouse, car parking (390 spaces), bus stop and outdoor recreational area. This site is located in Whitby, outside of the National Park and approximately 3km from the closest European site (the North York Moors SAC and SPA). Given the developed nature of its location and distance from these sites, as well as the relatively minor nature of the proposed works, the works associated with the development of the Construction Village and P&R were not considered further in the Screening assessment provided in the Mine, MTS and MHF HRA (albeit that the transport assessment for the Mine incorporated the use of the P&R).

3.1.4 The Park & Ride proposed for use in the operational phase is to the west of Whitby and is operated by North Yorkshire County Council (NYCC). YPL are looking to use the Whitby (Cross Butts) Park & Ride site, in conjunction with the existing NYCC Park & Ride scheme, as part of the operational YPP. Alterations to the existing Whitby Park & Ride are expected to be minor, but may include an additional 100-120 car parking spaces and a proposed security gatehouse. Given this, the Operational Park & Ride was not considered in the Mine, MTS and MHF HRA Screening assessment.

4 Minerals Transport System

4.1.1 The MTS would transport mined polyhalite between the proposed mine below Dove's Nest Farm and the MHF at Wilton, Teesside. The MTS would be capable of an initial capacity of 6.5Mtpa and, after upgrading of the conveyor drive system, a capacity of 13Mtpa. The tunnel would accommodate a conveyor, maintenance train track and provision for 66kV mine power supply cables.

4.1.2 The tunnel would be accessed by a shaft at the mine and a portal at Wilton. Between these two ends, it is proposed that the tunnel would be accessed from three intermediate shafts located at Lady Cross Plantation near Egton; Lockwood Beck near Stanghow; and Tocketts Lythe near Guisborough for inspection and maintenance purposes. Each of these access points also acts as a secondary evacuation point.

4.1.3 The MTS would comprise the following:

- A single tunnel approximately 36.7km in length with an internal finished diameter of approximately 5m, which increases to 6.5m for segmented lined sections, at an average depth of 250m bgl.
- Intermediate shafts installed along the route located approximately 8km, 24km and 29.5km from the minehead.
- A system of linked conveyor belts capable of transporting crushed polyhalite from the production shaft at the minehead to the MHF at Wilton.
- Operational phase surface buildings at the three intermediate shaft sites in the style of agricultural barns to house ventilation, man and equipment lifting, and maintenance equipment.
- A MTS Portal at Wilton, which would include a train shed, store for conveyor drives, control room, welfare facilities and car parking. The spoil, expected to be in the order of 1.2 to 1.4 million cubic metres, is anticipated to largely consist of mudstone. Arisings are proposed to be spread on land adjacent to the intermediate shaft locations (and at Wilton) and compacted, within the site boundaries, raising the local topography. Surface cover would then be restored on top of this landform.

4.1.4 The MTS tunnel is proposed to be driven through mudstone deposits, which are of low permeability. In addition, there is a lack of groundwater dependant features present along the route of the proposed MTS tunnel which could be affected. Based on the above, and the proposed depth of the tunnel, the tunnel itself was not considered in the Screening assessment as it does not have the potential to impact on European designated sites; moreover, no interactions or combined effects with other projects would arise on European designated sites or qualifying features due to the tunnel itself.

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Appendix 3.1

Bran Sands lagoon Mitigation and Monitoring Strategy

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Royal HaskoningDHV
Enhancing Society Together

York Potash Harbour Facilities: Bran Sands Lagoon Mitigation and Monitoring Strategy

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Checked by: Sian John
Date / initials check: 19/03/2015 SJ
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Contents

1 Introduction

Introduction

1.1 Bran Sands Lagoon Mitigation and Monitoring Strategy

This Bran Sands Lagoon Mitigation and Monitoring Strategy (MMS) has been prepared in response to consultation undertaken following provision (in December 2014) of the York Potash Harbour facilities Habitats Regulations Assessment (HRA) (Royal HaskoningDHV, 2014a) to Natural England (and the Environment Agency) for review. The consultation related, in particular, to the habitat enhancement and mitigation proposals for Bran Sands lagoon outlined within the HRA. The MMS should be read in conjunction with the Harbour facilities HRA and has been prepared in support of it.

The consultation comprised a telephone meeting on 15 January 2015 (meeting notes are included as **Appendix A**) and a subsequent advice letter from Natural England (dated 21 January 2015) that set out Natural England's expectations of the MMS (also **Appendix A**). On the basis of this consultation, a first draft of the MMS was produced. Subsequently, a site visit to Bran Sands lagoon and meeting was held on 5 February 2015 with Natural England, the Environment Agency, the Marine Management Organisation (MMO), Cefas and York Potash Limited to discuss the first draft of the MMS and the deliverability of the habitat enhancement proposals for Bran Sands lagoon. Comments made at the meeting (and subsequently in a letter from Natural England dated 9 February 2015 (see **Appendix A**)) have been incorporated into this version of the MMS (Revision 2).

1.2 Objectives

The key objectives of the MMS are to:

1. Further describe the aims of the habitat enhancement measures[1] proposed in the Harbour facilities HRA (and Environmental Statement (ES)).
2. Confirm the interest features of the Teesmouth and Cleveland Coast Special Protection Area (SPA) that are use Bran Sands lagoon and how the proposed habitat creation measures would affect the interest features.
3. Define how the habitat enhancement proposals can be delivered (practically) and the timing of delivery.

Natural England's letter dated 21 January 2015 set out a series of requirements and, in meeting the above three objectives, the MMS responds to these items.

[1] The draft Development Consent Order (DCO) proposes and, through the HRA, includes assessment of habitat enhancement measures in Bran Sands lagoon as part of the proposed Harbour facilities scheme. The HRA concluded that the habitat enhancement proposals would deliver an overall net benefit when considered in light of the adverse effects of the proposed scheme. The distinction between the use of the terms 'mitigation' and 'habitat enhancement' has been discussed with Natural England (and Natural England commented on this point in the letter of 21 January 2015); and this is further explained in this document (see **Section 3**).

2 SPA Interest Features and Potential Impacts

SPA Interest Features and Potential Impacts

2.1 Introduction

Section 7.5 of the HRA (Royal HaskoningDHV, 2014a) presented waterbird data to demonstrate the usage of Bran Sands lagoon (Dabholm Gut and the intertidal area at the location of the proposed port terminal). Reference should be made to the HRA for the full data set; however, **Sections 2.1** and **2.2** below summarise the interest features of the Teesmouth and Cleveland Coast SPA and the waterbird data for Bran Sands lagoon.

2.2 Interest features of the Teesmouth and Cleveland Coast SPA

The Teesmouth and Cleveland Coast SPA is of European importance because it is used regularly by at least 1% of the Great Britain population of the following species listed on Annex I of the Birds Directive (79/409/EC), as illustrated in **Table 2.1**.

Table 2.1 Annex I species of the Teesmouth and Cleveland Coast SPA

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

In addition, the SPA is used regularly by 1% or more of the biogeographical population of the migratory species (other than those listed in Annex I) in any season, as presented in **Table 2.2**.

Table 2.2 Non-Annex I migratory species

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

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

Furthermore, the SPA supports nationally important populations of cormorant *Phalacrocorax carbo*, shelduck *Tadorna tadorna*, teal *Anas crecca*, shoveler A*nas clypeata*, ringed plover *Charadrius hiaticula* and sanderling *Calidris alba*.

In addition to the SPA features cited above, (non-breeding) ringed plover were identified in the 2001 SPA Review as being present in numbers which would qualify them for further consideration as a new and additional feature of the SPA. An extension to encompass little tern and, potentially, common tern foraging is also being considered. Natural England has advised that through this review process, the SPA boundaries may also be proposed for extension to encompass the wintering waterbird assemblage that uses habitats within and adjacent to the DCO application site. The entire lagoon at Bran Sands and the adjacent

SPA Interest Features and Potential Impacts

Dabholm Gut are being considered in the proposed SPA Review in the context of supporting habitat for the SPA wintering waterbird assemblage.

2.3 Waterbird usage of Bran Sands Lagoon

Table 2.3 presents the annual peak counts for waterbirds within Bran Sands lagoon from 2009 to 2013. These data have been used to calculate a five year average of usage for these areas, which has been compared to the WeBS five year average data for the Tees WeBS site. This data is reproduced from the HRA; however, amendments have been made to the table to identify species that can be classified as dabbling and diving species, in response to a query from Natural England regarding the potential effect of the habitat enhancement proposals on these species (addressed herein).

Table 2.3 Peak counts and five year averages from 2009 to 2013 within Bran Sands lagoon, compared against five year average data for the Tees WeBS site

Species	Peak Counts					5-year average	WeBS 5-year average 2009 -13	% WeBS 5-year average
	2009	2010	2011	2012	2013			
Mute Swan	13	7	12	4	2	8	85	9%
Canada Goose	24	-	-	-	-	5	823	< 1%
Shelduck	189	104	106	68	73	108	451	24%
Gadwall	9	21	2	13	3	10	407	2%
Teal	97	176	185	32	194	137	1661	8%
Mallard	28	37	72	13	16	33	304	11%
Pochard	-	33	8	17	-	12	94	13%
Tufted Duck	-	2	1	-	-	1	266	< 1%
Scaup	-	3	-	-	-	1	2	50%
Long-tailed Duck	-	-	-	-	2	< 1	2	< 1%
Goldeneye	22	31	80	63	24	44	84	52%
Red-breasted Merganser	9	16	70	25	43	33	64	52%
Little Grebe	3	6	19	14	15	11	65	17%
Great Crested Grebe	-	2	3	-	-	1	42	2%
Cormorant	-	-	-	-	17	3	298	1%
Grey Heron	-	-	-	1	4	1	44	2%
Little Egret	-	-	-	-	11	2	30	7%

SPA Interest Features and Potential Impacts

Species	Peak Counts					5-year average	WeBS 5-year average 2009 -13	% WeBS 5-year average
	2009	2010	2011	2012	2013			
Oystercatcher	-	-	1	-	-	< 1	1262	< 1%
Lapwing	24	37	6	-	30	19	4218	< 1%
Dunlin	-	-	4	-	-	1	767	< 1%
Curlew	2	5	4	8	3	4	1195	< 1%
Redshank	82	86	30	13	99	60	1235	5%
Turnstone	13	-	7	1	7	6	233	3%
Common Tern	-	34	-	-	19	11	509	2%
Sandwich Tern	-	-	-	-	18	4	177	2%

Key:

Dabbling species
Diving species

It is clear from **Table 2.3** that Bran Sands lagoon constitutes an important habitat for waterbirds and represents a supporting habitat to the SPA. These points were acknowledged in the HRA and the assessment of potential effects of the proposed scheme was undertaken bearing in mind this context.

Natural England's letter dated 21 January 2015 (**Appendix A**) notes that the lagoon is of particular significance for redshank, shelduck, mallard, pochard, goldeneye, red-breasted merganser and little grebe; and this is agreed.

3 Objectives and Effects of the Proposals

Objectives and Effects of the Proposals

3.1 Effects of habitat enhancement in relation to SPA interest features

The habitat enhancement proposals comprise the placement of capital and maintenance dredged arisings within Bran Sands lagoon, and form part of the Harbour facilities DCO proposals. As set out in the HRA, it is considered that the net effect of the proposals (i.e. the overall effect of the proposed Harbour facilities, taking into account detrimental and positive impacts) would be beneficial in terms of waterbird habitat. This conclusion is further explored in this section through the examination of the aims of the habitat enhancement proposals.

In terms of direct effects (i.e. effects other than construction disturbance), the construction of the Harbour facilities would impact on habitats used by waterbirds. In particular, the intertidal area within the footprint of the proposed port terminal would be lost and there would be a (very minor) direct impact in Dabholm Gut or in Bran Sands lagoon due to the construction of the overland conveyor (the location that would be impacted is dependent on whether the conveyor is constructed along the southern or northern corridor). The implications of these direct effects on the interest features of the SPA are summarised in **Table 3.1**, and the objective of mitigation proposed is set out.

Table 3.1 Predicted direct effects of the Harbour facilities on SPA interest features and mitigation objective

Identified direct effect (port terminal and conveyor construction)	Relevant interest features of the SPA	Objective of the habitat enhancement proposals	Supporting evidence
Loss of intertidal foreshore (up to 3.6ha[2]) of low quality in terms of waterbird habitat and exposed for a cumulative average of 20% of the time.	The intertidal area is used by the following interest features of the SPA, but in low numbers: • Redshank • Waterbird assemblage.	To provide improved feeding, roosting and loafing habitat, thereby mitigating the direct impact of the port terminal.	HRA (see Table 7.5); ES (Sections 8.4 and 9.4)
Loss of habitat in Dabholm Gut or Bran Sands lagoon due to conveyor supports (approximately 3m^2 and 1m^2 respectively).	This impact is predicted to be insignificant in terms of implications for SPA interest features due to the very small and localised nature of the effect.	Not directly relevant in this case, however, the above objective applies.	HRA
Overshadowing and crossing of Bran Sands lagoon due to the (possible) construction of the conveyor in the northern corridor.	The HRA concluded that this impact would be of minor significance. The area of the lagoon that would be crossed is largely used by diving species; however, the following interest features use the wider lagoon: • Redshank • Common tern	Not directly relevant in this case, however, the above objective applies.	HRA

[2] Calculated based on the final dimensions of the quay as set out in the application ES.

Identified direct effect (port terminal and conveyor construction)	Relevant interest features of the SPA	Objective of the habitat enhancement proposals	Supporting evidence
	• Sandwich tern • Waterbird assemblage (waders and wildfowl).		

In addition to providing a function as mitigation for elements of the Harbour facilities proposals, the placement of dredged material in Bran Sands lagoon would provide habitat enhancement. The proposals would have direct beneficial effects on interest features of the SPA, as presented in **Table 3.2**. However, Natural England has requested that the potential negative impacts of the habitat enhancement proposals on SPA interest features are also identified, in acknowledgement of the fact that there is an existing waterbird interest at Bran Sands lagoon that contributes to the status of the SPA. These considerations are also included in **Table 3.2** and diving species are specifically considered below.

3.2 Diving species

The waterbird assemblage at Bran Sands lagoon includes a number of species that are categorised as diving ducks (based on their predominant feeding behaviour). These species are identified in **Table 2.3**, and are as follows:

- Goldeneye;
- Red-breasted Merganser; and,
- Little Grebe.

The following diving species are also recorded, but in very low numbers:

- Great Crested Grebe;
- Pochard;
- Tufted Duck;
- Scaup; and,
- Long-tailed Duck.

The Harbour facilities ES contains a series of distribution plots for several species of waterbird (key species, present in significant numbers) (presented in Appendix 9.1 of the ES). Distribution plots for all the diving species listed above are presented in **Appendix B** to this document (the data shown are composite data for 2013/2014).

Typically, diving species are concentrated in areas of the lagoon that are of sufficient depth for them to feed most successfully. The distribution plots enable the preferred locations of these species to be readily identified and, consequently, a conclusion to be drawn regarding the likely effect of the habitat enhancement proposals on this existing waterbird interest.

The following summarises the distribution of diving species in Bran Sands lagoon (refer to **Appendix B**):

- Goldeneye – widespread across the lagoon but with an apparent concentration in the northern half of the lagoon.

- Red-breasted Merganser – concentrated in the north-western quadrant of the lagoon, with some presence in the south-eastern quadrant.
- Little Grebe – concentrated in the north-western quadrant of the lagoon, outside of the footprint of the habitat enhancement proposals.
- Pochard – recorded in the location of the habitat enhancement proposals.
- Tufted Duck – not recorded in the lagoon for the period of surveys represented in the distribution plots.
- Scaup, Long-tailed Duck and Great Crested Grebe – located in the northern section of the lagoon, outside of the footprint of the habitat enhancement proposals.

On the basis of this analysis, it is concluded that diving species tend to concentrate in areas of the lagoon outside of the area proposed for the creation of new shallows. The distribution data does show that some diving species use the area in the footprint of the location identified for creation of new shallows, but no one species is concentrated in this area to the exclusion of the remainder of the lagoon. Therefore, the proposals are not expected to have an adverse effect on the existing populations of diving species that use Bran Sands lagoon, but would result in the redistribution of part of the population of those species that have been demonstrated to use the area proposed for the creation of new shallows.

Table 3.2 Objectives and predicted effects of the habitat enhancement proposals

Objective of the habitat enhancement proposals	Identified direct effect (placement of dredged material in Bran Sands lagoon)	Relevant interest features of the SPA	Supporting evidence
To provide improved feeding habitat within the lagoon and make a positive contribution to the waterbird populations of the SPA (notably redshank and components of the waterbird assemblage).	Creation of approximately 5.4ha of new shallows in Bran Sands lagoon (based on Option 2, as presented and discussed in **Section 4**).	The lagoon currently hosts several species of waterbird that form part of the SPA population and the new shallows are expected to provide feeding habitat for waders and dabbling species (the habitat would be too shallow to benefit diving species). Consequently, the new shallows would be of benefit to the following SPA interest features: • Redshank • Waterbird assemblage (waders and dabbling species).	HRA
To provide improved loafing, roosting and nesting opportunities for all components of the waterbird assemblage and make a positive contribution to the waterbird populations of the SPA.	Creation of a series of islands in Bran Sands lagoon	The lagoon currently hosts several species of waterbird that form part of the SPA population and the islands are predicted to provide loafing, roosting and nesting opportunities for all components of the waterbird assemblage. Consequently, the new shallows would be of benefit to the following SPA interest features: • Redshank • Common tern • Sandwich tern • Waterbird assemblage (waders and wildfowl).	HRA
To avoid significant adverse effects on existing interest features that use Bran Sands lagoon	Loss of existing habitat in the lagoon due to habitat enhancement. The concern raised by Natural England is that the lagoon currently represents an important habitat and the effect of the creation of new shallow water areas on habitat used by diving species requires consideration.	The lagoon currently hosts several species of waterbird that form part of the SPA population. The implementation of the habitat enhancement proposals has the potential to adversely affect existing habitats used by: • Waterbird assemblage (diving species).	HRA and **Section 3.2** of this MMS

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4 Description of Habitat Enhancement Proposals

Description of Habitat Enhancement Proposals

4.1 Introduction

This section provides further information to that contained within the ES and HRA with regard to the design and method of implementation of the habitat enhancement measures. This is intended to demonstrate that the proposals are able to be implemented in practice. The information included in this section has been informed by the guidance provided by Natural England (see **Appendix A**).

Three options (Options 1 to 3) for the habitat enhancement measures in Bran Sands lagoon were presented to Natural England, all of which would provide shallow water areas with intertidal fringes and could be designed to enable waterbird feeding across the area throughout the entire tidal cycle. Natural England indicated a preference for Option 2 because this design appears to offer the best opportunity to complement and augment the existing habitat and waterbird interest of the lagoon. An important part of this consideration is that Option 2 would offer the best opportunity to retain existing areas of deeper water, which represent feeding areas for diving waterbird species. Consequently, the MMS has taken this option forward as the preferred option (as shown in **Drawing PB1586-SK467**).

4.2 Description of construction sequencing

Drawing PB1586-SK466 sets out the proposed construction phasing for the habitat enhancement works. Royal HaskoningDHV has discussed and reviewed this sequence of work with one of the UK's leading dredging contractors, who confirmed that the approach illustrated is deliverable.

The following summarises the works that would be involved in each stage shown on **Drawing PB1586-SK466**.

Stage 0

Prior to undertaking the work, further site investigation would be undertaken, comprising:

- Further ground investigation to confirm the nature of the material that would arise from the capital dredging. The ground investigation may need to be extended to cover the lagoon.
- Confirmation of the bathymetry of the lagoon and range of variation in surface water levels.

Using the information above, a detailed engineering drawing would be prepared.

Stage 1

Marl would be excavated from the Tees using a backhoe excavator, placing material in a barge which could then be towed and placed at the Northumbrian Water (NWL) jetty. From this location, the material would be lifted from barge and carried to a stockpile within the lagoon. The exact method of bringing the material ashore would be confirmed by a preferred contractor, but is likely to include use of a conveyor or articulated dump trucks.

The marl is geological (i.e. uncontaminated) material that underlies contaminated sediment. A description of the sediment quality at the site of the proposed port terminal and within the footprint of the capital dredging is provided in Section 7.4 of the ES.

Description of Habitat Enhancement Proposals

Stage 2

A flow control structure would be constructed to maintain the range of water levels within the lagoon, thereby minimising the potential for impact on the landfill both during the creation of the habitat enhancement areas and on completion of the works. The position of the flow control structure included on **Drawing PB1586-SK466** is indicative only.

Using material from the stockpile, the existing spit/bund would be extended across the lagoon. The height of the spit/bund would be above the water level to provide access for the subsequent stages of construction and to contain the placement of dredged material in subsequent stages of the works. Marl would continue to be deposited in the stockpile.

Stage 3

The base of the islands would be formed along the same alignment as the bund.

Stage 4

The construction of the flow control structure would continue. Marl would continue to be deposited in the stockpile, the bund would continue to be extended and the islands formed using material from the stockpile.

Stage 5

The spit/bund would be completed; no further marl would be stockpiled.

Stage 6

The surface of the islands would be dressed with material specially selected from the capital dredging or imported (i.e. sand/gravel/cockle shell) to create island habitats. A membrane would also be deployed to suppress vegetation growth on the islands.

Stage 7

The flow control structure would be completed and become operational, with the existing outfall closed up.

A silt box would be installed. This is a temporary structure that would contain a number of tanks or baffles that would be used to minimise the volume of silt which would be discharged from the area where maintenance material is to be placed (in Stage 8) as the dredged material dewaters to the Tees estuary (i.e. a pollution prevention measure).

Stage 8

Uncontaminated and fine (i.e. silt) maintenance dredged material would be pumped into the placement area. This will be constructed to a level to be defined following monitoring of surface water level variation in the lagoon.

Stage 9

When the desired level has reached, pumping of dredged material would cease and the silt box would be removed.

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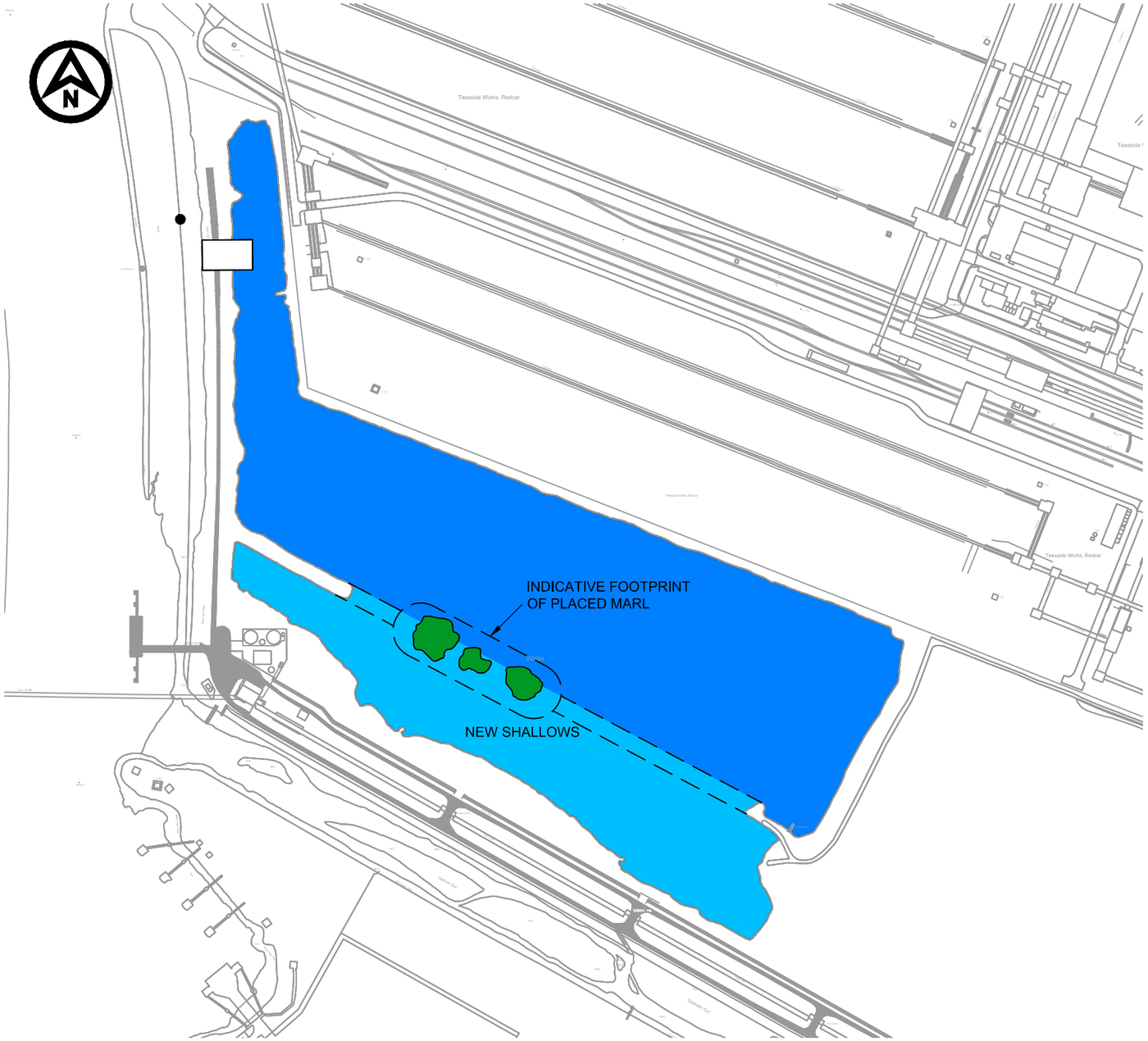

KEY

- PROPOSED NEW SHALLOWS
- OPEN WATER OF THE LAGOON
- PROPOSED ISLANDS

NOTES

1. THE TOP SURFACE AREA OF THE ISLANDS IS APPROXIMATELY 3,500m².
2. MAX HEIGHT OF ISLANDS TO BE +4.00mOD.
3. APPROXIMATE AREA OF NEW SHALLOWS IS 5.40ha.
4. THIS DRAWING IS ONLY INTENDED TO BE ILLUSTRATIVE OF THE FINAL SCHEME. SIZES AND POSITIONS OF THE VARIOUS ELEMENTS ARE SUBJECT TO FURTHER REVISION.
5. THIS DRAWING HAS BEEN PRODUCED TO ILLUSTRATE ONE POSSIBLE METHOD OF DELIVERING THE PROPOSED ENVIRONMENTAL ENHANCEMENTS TO THE BRAN SANDS LAGOON. HOWEVER, THE AREA AND HEIGHT PARAMETERS STATED WILL APPLY REGARDLESS OF HOW THE PROPOSALS ARE IMPLEMENTED.

REV	DATE	DESCRIPTION	BY	CHK	APP
A	12.03.15	ISSUED FOR APPROVAL	CH	MS	RWP

REVISIONS

YORKPOTASH
A Sirius Minerals Project

PROJECT

YORK POTASH

TITLE

BRAN SANDS LAGOON
PROPOSED HABITAT
ENCHANCEMENT

Royal HaskoningDHV
Enhancing Society Together

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+44 (0) 191 211 1300 Telephone
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DATE	MAR '15	CLIENT'S REF.	
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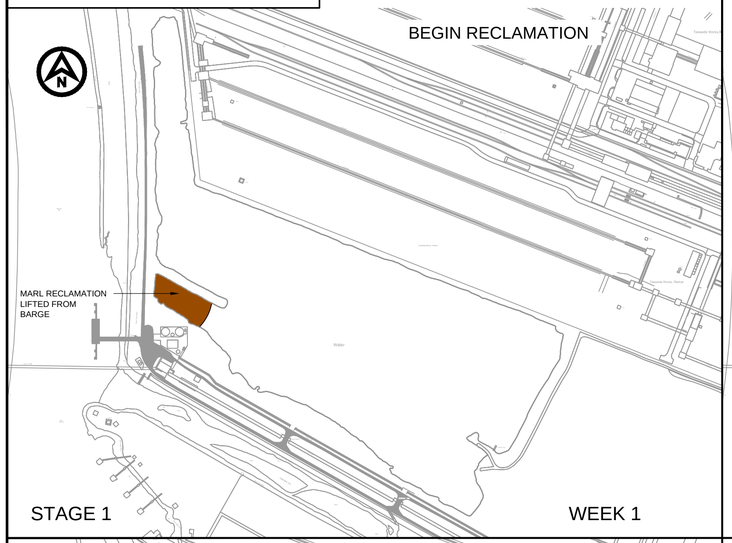
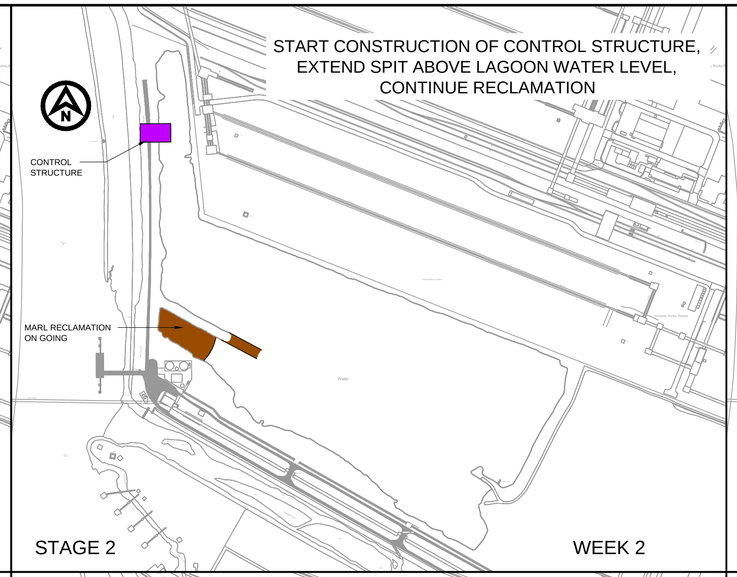
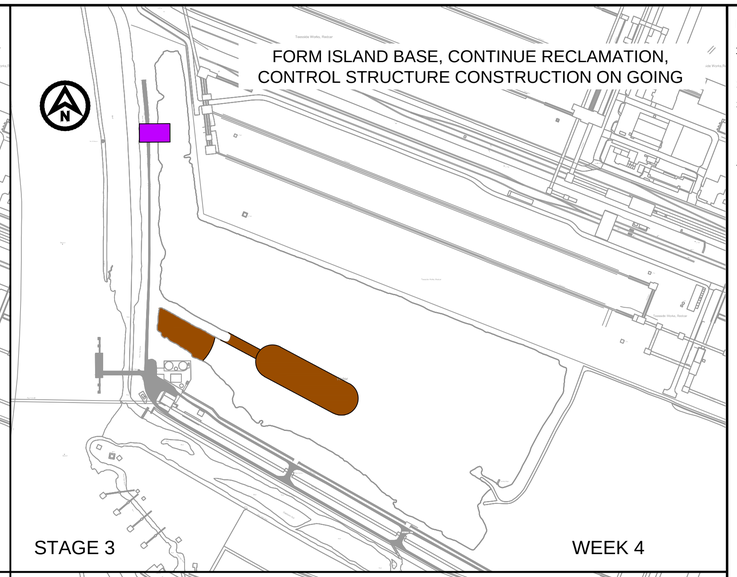
DRAWING No. PB1586-SK467

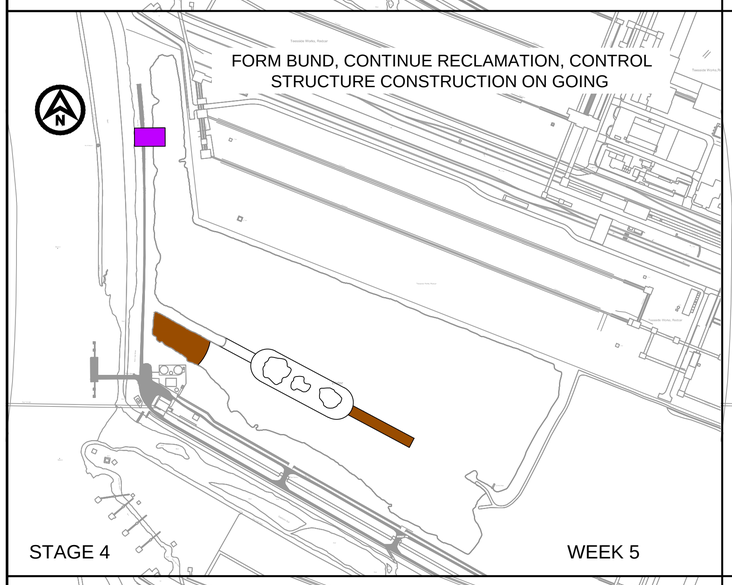
REVISION A

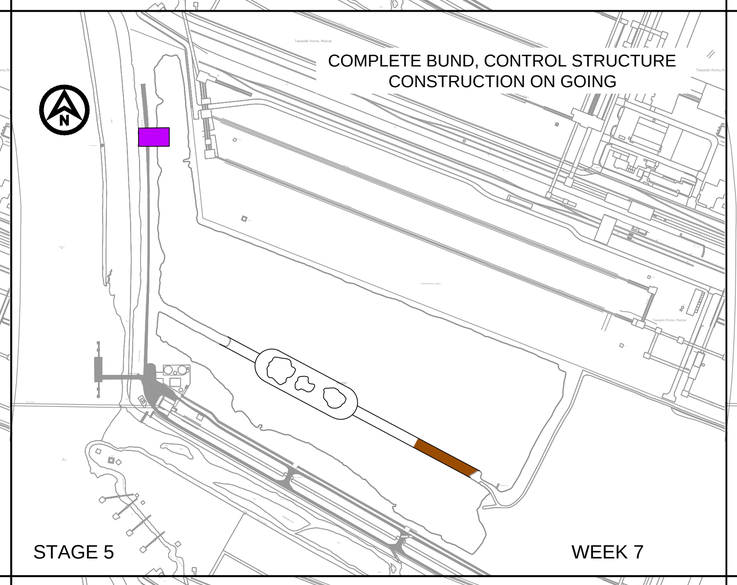
DRG No. PB1586-SK466

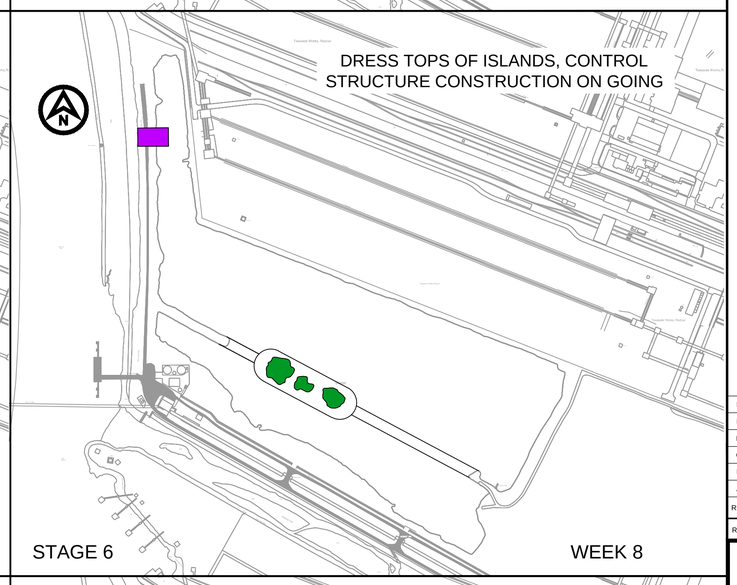


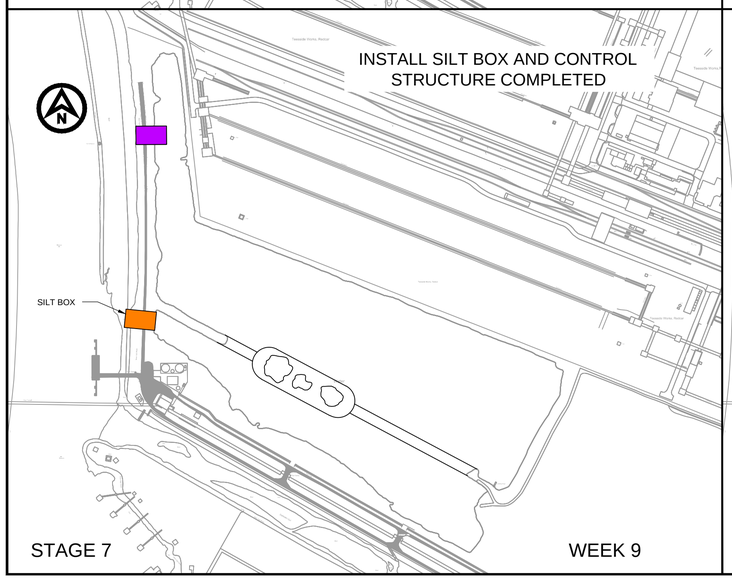


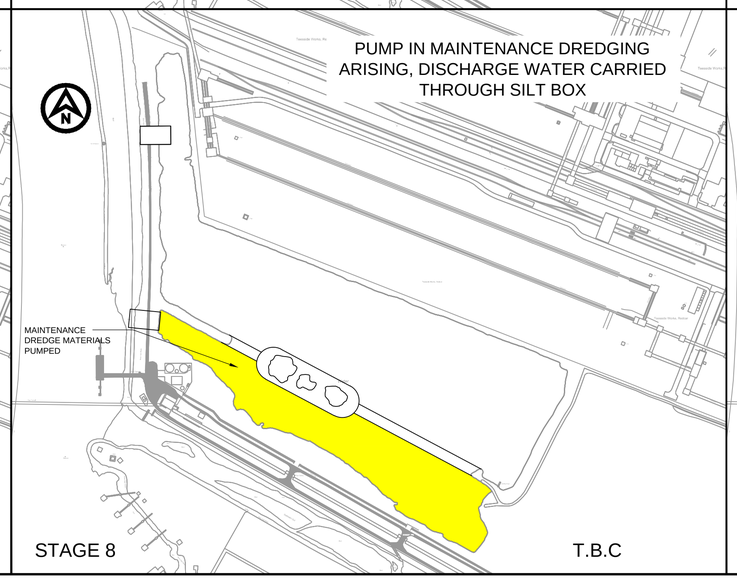


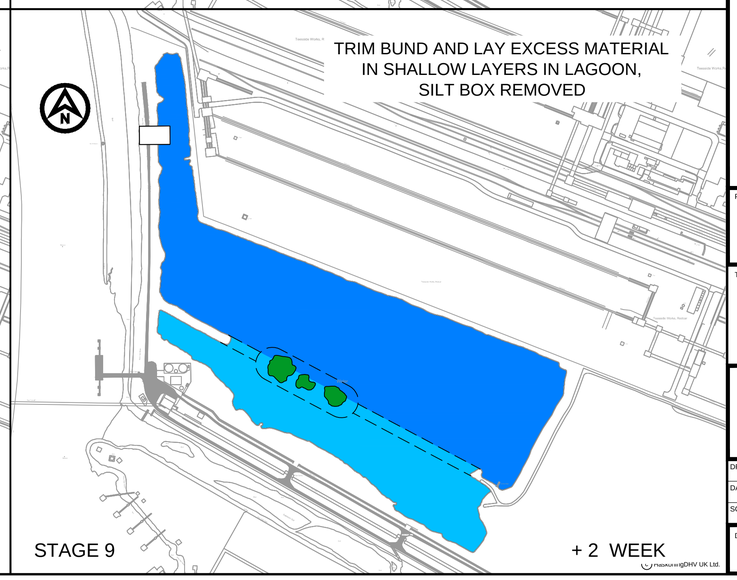












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F	12-03-15	FOR APPROVAL	SA	RWP	RWP
E	11-02-15	FOR APPROVAL	SA	RWP	RWP
D	09-02-15	FOR APPROVAL	SA	RWP	RWP
C	30-01-15	FOR APPROVAL	SA	RWP	RWP
B	28-01-15	FOR APPROVAL	SA	RWP	RWP
A	21-01-15	FOR APPROVAL	SA	RWP	RWP

REVISIONS

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PROJECT
YORK POTASH
HARBOUR FACILITIES

TITLE
BRAN SANDS LAGOON
PROPOSED HABITAT
ENHANCEMENT
DELIVERY METHODOLOGY

Royal HaskoningDHV
Enhancing Society Together

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DATE	21/01/15	CLIENT'S REF.	
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REVISION F

The level of the spit/bund would be reduced so that it is below the water level, with excess material incorporated into the islands.

The desired location of the proposed islands was discussed at the meeting held on 5 February 2015. It was concluded that it would be preferable for the islands to be constructed along the alignment of the bund itself rather than in the deeper water of the lagoon to the north of the proposed bund. Islands along the alignment of the bund would be easier to deliver (in terms of constructability) due to the shallower water depth, would be less vulnerable to erosion by waves, would increase the linear 'edge effect' for feeding waders and would avoid impacts on deeper water feeding habitats for diving birds.

4.3 Design parameters

The proposed area of the new shallows is dictated by the area of the lagoon that lies to the south of a line drawn between the two existing short spits of land that protrude into the lagoon and this area. This area is approximately 5.4ha in area and the 'islands' would comprise a combined area of approximately 0.35ha.

In order to accurately determine the design elevation of the new shallows, a programme of surface water level monitoring would be undertaken to fully define the water level variation in the lagoon over a cycle of spring and neap tides. The objective would be to achieve a maximum depth of water above the placed dredged material of 30cm. In addition, further survey of the bathymetry of the lagoon would be undertaken. A specification for this monitoring and survey is being developed.

4.4 Water exchange between the lagoon and the Tees estuary

It is proposed that the existing pipe that connects the lagoon with the Tees estuary would be replaced with a new pipe, with a flow control structure, during the construction of the port terminal. The aim of the control structure would be to maintain the current range of water levels experienced.

Depending on the form that the structure takes and the valve mechanism used, the invert level may be slightly different from that that exists at present. What is important is that the range of water levels remains consistent and close to those currently experienced, and the nature of water exchange between the lagoon and the Tees estuary does not change (so as not alter the ground water regime currently experienced within the landfill). Because solid material would be added to the lagoon, for the same range of water levels, the flow of water through the control structure would need to be reduced compared to what it is now. No active control of water levels is currently proposed beyond this. However, the lagoon would be able to be temporarily isolated from the Tees in the event of a pollution incident, for example.

At the meeting on 5 February 2015, the above proposals were discussed and the justification for not proposing to actively change the existing water level regime was acknowledged. However, it was agreed that having the ability to adjust water levels in the lagoon in the future would be desirable and would provide flexibility in future management. For example, increasing tidal exchange could provide further conservation benefit through increasing food supply and invertebrate colonisation of the new shallows. It is proposed, therefore, that a second flow control structure would be constructed when the existing pipe is replaced. This would not be operational initially, but could become active should this be desirable in the future and if the monitoring demonstrates that alteration of the water level regime would be acceptable (and the limits thereof). This should be able to be confirmed when the functioning of the lagoon, following the

implementation of the habitat enhancement, is understood through the proposed monitoring (in particular, the relationship between Bran Sands landfill and water exchange with the lagoon).

4.5 Programme for delivery of the habitat enhancement

The habitat enhancement works would be implemented in parallel with the capital dredging works. It is not possible to implement the habitat enhancement measures in advance of the capital dredging because the material required to form the bund to retain the maintenance dredged material and create the islands is to be derived from the capital dredged arisings.

Drawing PB1586-SK466 shows the proposed phasing of the creation of the new habitat, and includes an indicative timescale. There is an area of uncertainty in the overall timescale for the construction related to the timing of availability of maintenance dredged material. However, maintenance dredged arisings are deposited offshore each month (see **Table 4.1**; Royal HaskoningDHV, 2014b) and, therefore, material could reasonably expected to be available at the appropriate time in the construction sequence for the habitat enhancement. The general quantity of material deposited offshore each month far exceeds that which would be required for the habitat enhancement proposals.

It is estimated that the overall duration of the works for construction of the habitat enhancement proposals would be 3 to 4 months.

Table 4.1 Average disposal quantity per month from 2006 to 2013

Month	Disposal Quantity (m^3)	Month	Disposal Quantity (m^3)
January	107,660	July	113,638
February	105,918	August	105,710
March	104,518	September	121,143
April	116,146	October	118,050
May	109,154	November	113,109
June	97,281	December	70,861

4.6 Substratum

It is proposed that the new shallows would be created using uncontaminated, silty material that is dredged during the maintenance of the navigation channel in the Tees. The marine licence that authorises the disposal of maintenance dredged material in the marine environment requires that the quality of the sediments (i.e. concentrations of various contaminants) is routinely tested and the licence is only granted if the sediment meets appropriate standards.

Consequently, it is not expected that there would be a concern with regard sediment quality that would preclude the use of the material in the habitat enhancement proposals.

Maintenance dredging is undertaken within 13 reaches throughout the Tees estuary and the nature of the dredged material (in terms of particle size) varies according to location throughout the estuary. It would,

therefore, be possible to select silty material from maintenance dredging of an appropriate reach of the estuary for use within the habitat enhancement proposals.

Maintenance dredging and disposal is undertaken by PD Ports and the MMO has indicated that PD Ports' marine licence (for disposal of dredged material) could be varied to include Bran Sands lagoon as a location for the placement of maintenance dredged material. This would represent an alternative use of dredged material (i.e. other than offshore disposal); seeking alternative uses is a requirement of the marine licensing process for disposal of dredged material. Consultation with PD Ports will, therefore, be undertaken as part of the design of the habitat enhancement proposals.

4.7 Ecological development of the habitat enhancement proposals

4.7.1 Introduction

A number of habitat enhancement / improvement schemes have been implemented in the UK and the ecological development of these schemes is typically monitored over a period of years, with benthic invertebrate community development and waterbird populations normally forming part of the monitoring programme.

To inform this document, a review of the monitoring results for a habitat creation / improvement scheme that Royal HaskoningDHV was closely involved with for a number of years has been undertaken and is summarised below, along with results from monitoring of a newly created saline lagoon at Teesmouth (Evans and Lucas, 2000). It should be noted that any habitat creation / improvement scheme will evolve in response to the environmental conditions prevailing at the site.

4.7.2 Trimley Marshes managed realignment scheme (Orwell estuary, Suffolk)

The Trimley Marshes managed realignment was created in November 2000 on the east bank of the Orwell estuary. Since June 2001 the site has been monitored to assess the success of the realignment in terms of contributing to the status of the Stour and Orwell Estuaries SPA. At the time of creation, the realigned area was recharged with maintenance dredged silts.

This example is considered to have some parallels to the proposals at Bran Sands lagoon in that the managed realignment site (prior to breaching the seawall between the estuary and the site) was agricultural land and, therefore, had no intertidal/estuarine invertebrate interest. The monitoring therefore describes the evolution of a site that had no invertebrate value and was recharged with maintenance dredging. Although Bran Sands lagoon is tidally influenced, it is not directly connected to the Tees estuary and does not currently represent intertidal habitat.

The following provides a summary of the findings of the monitoring programme reported in Royal Haskoning and HR Wallingford (2011).

Description of Habitat Enhancement Proposals

Benthic invertebrate abundance

Invertebrate numbers have been increasing overall since the site was created, but fluctuations can be seen from year to year much of which can be attributed to the presence of the mud snail *Hydrobia ulvae* (see **Figure 4.1**). In survey 20, the decline in overall mean abundance was influenced more by the reduced numbers of other species, rather than the decline in *Hydrobia ulvae.*

Species diversity

Diversity is generally used as a measure to describe the structure and 'health' of a community and involves the consideration of two components: species richness and evenness. Species richness is the number of species present in the community, while evenness is the degree of similarity of abundances between species.

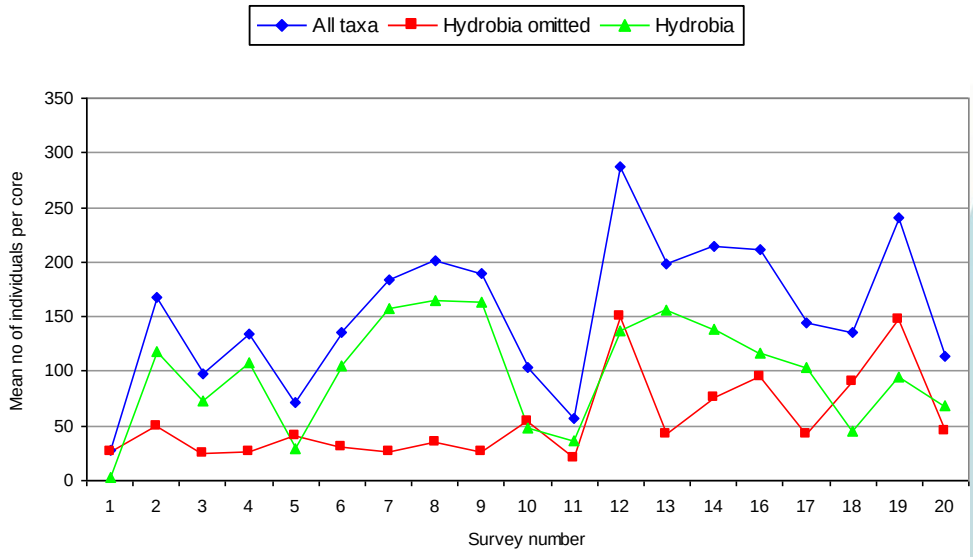

Figure 4.1 **Mean number of individuals of benthic macrofauna recorded per core for each survey between survey 1 (June 2001) and survey 20 (September 2010)**

The increase in species diversity at the site over the monitoring period is shown in **Figure 4.2**.

Benthic community biomass

Biomass (measured as weight of benthic invertebrates per core) can provide an important indicator of a habitat's ability to support predators such as birds.

The biomass of benthic invertebrates increased since the site creation in June 2001 as would be expected (**Figure 4.3**). The biomass of polychaetes present in the samples remained low but constant throughout the surveys and molluscs dominated the samples. There was a decline in biomass in survey 20 (September 2010) due to decreased abundance of mollusca, which is dominated by the mud snail *Hydrobia ulvae*.

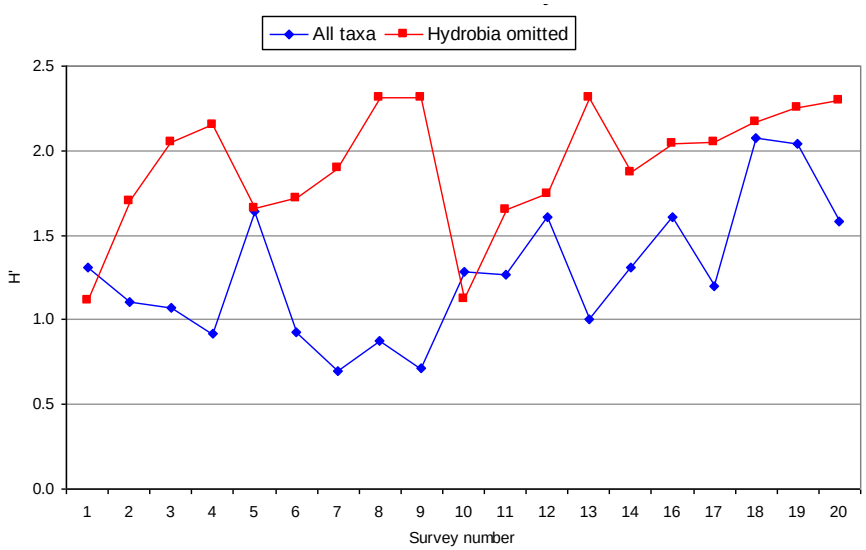

Figure 4.2 **Mean Shannon-Weiner diversity index (H') for each survey between survey 1 (June 2001) and survey 20 (September 2010)**

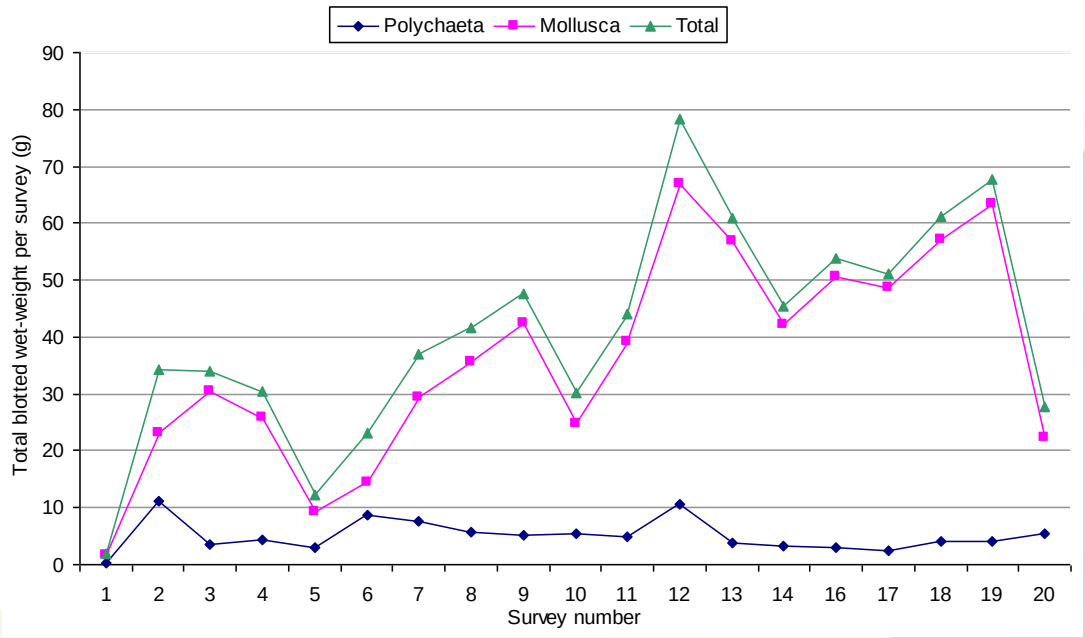

Figure 4.3 **Blotted wet-weight biomass (g) of polychaetes and molluscs in all samples between survey 1 (June 2001) and survey 20 (September 2010)**

Waterbirds

Since the monitoring began in 2000/01, the mean number of waterbirds increased from 1 up to 181 birds in 2009/10. Up to 2009/10, a total of 24 species were recorded on the site (excluding gulls) over all of the surveys.

The managed realignment site is now included within the Stour and Orwell Estuaries SPA and is considered to have successfully met its objectives.

4.7.3 Colonisation of a newly-created saline lagoon at Teesmouth

Evans and Lucas (2000) report the findings of monitoring of a newly-created saline lagoon at ICI No 4 Brinefield, Greatham Creek, Teesmouth. Sampling was undertaken in April, July, August and October 1999 and January 2000 for a range of physical and chemical parameters and invertebrate colonisation.

The study concluded that colonisation of the lagoon occurred rapidly since the baseline survey in April 1999, with a range of typical brackish water species recorded (e.g. *Nereis diversicolor, Corophium volutator, Neomysis integer* and *Palaemonetes varians*). A substantial increase in abundance occurred during the sampling period. It was noted that the density of *Nereis* (720 per m^2 in October 1999 and 660 per m^2 in January 2000 on average) was lower than that occurring in many silty intertidal habitats, but was expected to increase further as the organic content of the sediment increases (Evans and Lucas, 2000).

Evans *et al* (1998) (cited in Evans and Lucas, 2000) reported *Nereis* densities of over 2000 per m^2 in a recreated intertidal area at Teesmouth when new silt layers had deposited over compacted sediment created as a consequence of the engineering works required to create the habitat.

4.7.4 Likely mechanism of colonisation of habitat enhancement scheme at Bran Sands Lagoon

Bolam and Whomersley (2003) studied the nature of invertebrate colonisation of fine grained sediments (maintenance dredgings) placed in an area of eroding saltmarsh adjacent to a marina in the Crouch estuary, Essex. The study reported the mechanisms by which the invertebrate community may develop in maintenance dredged material recharged onto an intertidal area, namely:

1. Direct transfer within the dredged material.
2. Vertical migration up through the placed sediment.
3. Lateral migration from adjacent areas.
4. Planktonic recruitment (settlement of larvae).

The fourth mechanism (planktonic recruitment) was stated as being potentially the most important given that most estuarine invertebrates have a planktonic larval stage which develops in the water column and settle when ready to metamorphose (Bolam and Whomersley, 2003).

For the proposed habitat enhancement in the lagoon, vertical migration (mechanism 2) is highly unlikely to occur due to the smothering effect and depth of sediment associated with the placement of the dredged material. Some lateral migration (mechanism 3) may occur between the sediments of the lagoon and the habitat enhancement scheme, but this is likely to limited due to the level difference between the bed of the

lagoon and the surface of the proposed habitat enhancement, and the presence of a retaining bund. No lateral migration could occur between the lagoon and the Tees due to the lack of direct connection between sedimentary habitats in the estuary and lagoon.

In the case of the proposed habitat enhancement scheme, mechanisms 1 and 4 are considered the most likely means of colonisation of the maintenance dredged material. Planktonic recruitment is considered likely to occur through the exchange of water between the estuary and the lagoon, but also through larvae released from the benthic community within the lagoon itself.

4.7.5 Conclusion

It is considered that the habitat enhancement proposals for Bran Sands lagoon are likely to develop an initial invertebrate community rapidly, within weeks of creation, due to the direct transfer of invertebrates. Predation by waterbirds would decrease the biomass of the invertebrate community, with planktonic recruitment likely to represent the key mechanism for longer term establishment and development of an invertebrate community.

The speed of colonisation through planktonic recruitment would depend on the timing of the placement of dredged material, given that estuarine invertebrate reproduction is seasonal and restricted to late spring or early summer. However, colonisation would be effective once the first spring/summer season occurs.

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5 Other Mitigation Measures of Relevance to SPA Interest Features

Other Mitigation Measures of Relevance to SPA Interest Features

5.1 Mitigation for indirect effects

In addition to the direct loss of habitats used by waterbirds, the ES and HRA describe and assess a number of further indirect potential impacts on waterbirds related to disturbance, largely during the construction phase of the proposed Harbour facilities.

5.2 Noise

Noise attenuation barriers are proposed as mitigation for the potential impact of noise and visual disturbance during the construction phase. It is proposed that barriers would be positioned:

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

The noise attenuation barriers would most likely constitute a 3m high hoarding above ground level.

In addition, the proposed use of a noise reduction curtain over the hammer piling rig during percussive operations for the quay construction is to the investigated. This would further mitigate the predicted noise impact during quay construction. The ES and HRA were undertaken on the assumption that construction works would not be seasonally constrained.

5.3 Lighting

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

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

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

5.4 Conclusion

It is predicted that with these mitigation measures in place, the risk of indirect impacts on waterbirds would be reduced to an insignificant level and would not have an adverse effect on the waterbird population of the Teesmouth and Cleveland Coast SPA. This conclusion was discussed at the meeting on 5 February 2015, and Natural England's view was that the conclusion that the impact would reduce to an insignificant level could only be drawn if it could be guaranteed that the construction works would avoid the wintering period. However, Natural England accepted that these disturbance impacts would not have an adverse effect on the integrity of the Teesmouth and Cleveland Coast SPA due to the limited time period over which disturbance would occur (3 to 4 months) in combination with the mitigation proposed.

A further point raised at the meeting on 5 February 2015 was that the provision of artificial nesting platforms should be considered beneath the suspended deck of the quay (should an open quay structure be proposed). It was felt that such measures could be of particular benefit for nesting shags. YPL confirmed that they would be happy to implement such measures should the quay design allow it.

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6 Monitoring and Indicators of Success

Monitoring and Indicators of Success

6.1 A Monitoring Plan

It is proposed that a detailed pre- and post-construction monitoring plan will be developed and agreed with Natural England, the Environment Agency, Cefas and the MMO. However, the principles for the required monitoring programme are set out below.

Monitoring is required for two main purposes:

1. To inform the design of the habitat enhancement proposals.
2. To describe the baseline conditions and to monitor the success of the proposals.

Monitoring to inform the design would comprise measuring existing surface and groundwater levels in order to inform the development of a hydrogeological model, to test the conceptual model developed as part of the EIA process. A specification for this monitoring is currently being developed.

Ultimately, the success of the proposals would be defined by the value of the habitat provided for waterbirds and a key aspect of the monitoring plan will be to define how success is to be judged.

It is considered that the waterbird data currently available for the lagoon represents an appropriate baseline for further monitoring, and monitoring would need to continue pre- and post-construction. It should comprise waterbird counts, recording of activity (feeding, roosting and nesting) and the production of distribution plots. Waterbird counts would be undertaken simultaneously across Bran Sands lagoon, Dabholm Gut and the intertidal area to avoid double counting of birds that can otherwise occur.

In addition to waterbird monitoring, the development of the benthic invertebrate community would be monitored, that is, species diversity, abundance, biomass and community type would be measured. This would be undertaken on an annual basis at the same time of year (in autumn, following the settlement of invertebrate larvae) and it is envisaged that this would comprise taking replicate core samples along a series of transects distributed across the habitat enhancement area. This would include monitoring of the baseline situation, although it is acknowledged that the creation of the new shallows would result in a change in elevation of the substratum and, therefore, results of post-construction invertebrate monitoring would not be directly comparable to the pre-construction situation.

The elevation and profile of the placed dredged material would also be monitored (in part to establish item 1 above).

6.2 Indicators of success

Given the assessed impact of the proposed Harbour facilities, it is proposed that the indicators of success of the habitat enhancement should be related to:

1. Successful maintenance of the created shallows, and internal mud, and of the sand/gravel islands.
2. Delivering a level of usage by waterbirds equivalent to or exceeding that of the intertidal area that would be lost due to the construction of the port terminal.
3. Not adversely affecting the existing level of waterbird usage at the lagoon.

The success of the proposals (in the context of items 2 and 3 above) would be judged by analysis and comparison of peak and mean species counts before and for a number of years after implementation of the works. This would enable the usage of the habitat enhancement area and the effect of the proposals on the waterbird populations of the wider lagoon to be determined. A critical part of this analysis would be to assess any trends in the context of population changes in the Tees estuary, and regional and national population trends, given that many factors affect waterbird populations in addition to those operating at a local level.

Surface water level monitoring within the lagoon would continue post-construction.

6.3 Intervention measures

Should the monitoring indicate that the habitat enhancement proposals are not achieving their defined objectives (and this is agreed with Natural England, the Environment Agency, Cefas and the MMO), and that this is demonstrated to be due to reasons that are reasonably within the control of York Potash Ltd, intervention measures could be implemented. The measures applicable would depend on the reasons why the scheme was considered to not be meeting its objectives, but could include (for example) actively adjusting the rate of water exchange between the Tees and the lagoon, recharging the shallow water area with additional maintenance dredged material, and vegetation management (e.g. on the islands, should vegetation develop that is considered detrimental through reducing sight lines or impacting on ability to nest or roost).

Responsibility for the management of the habitat enhancement scheme (in terms of meeting the agreed objectives) would rest with York Potash Ltd.

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7 References

References

Bolam, S.G and Whomersley, P (2003). Invertebrate recolonisation of fine-grained beneficial use schemes: An example from the southeast coast of England. *Journal of Coastal Conservation 9: 159-169, 2003.*

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Royal HaskoningDHV (2014a). York Potash Project Harbour Facilities Habitats Regulations Assessment. Prepared for York Potash Ltd, December 2014.

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Royal Haskoning and HR Wallingford (2011). Mitigation and monitoring for the Stour and Orwell Estuaries SPA and Hamford Water SPA: Annual Review 2010/11. Prepared for the Harwich Haven Authority.

Appendix A
Correspondence with Natural England

Minutes

HASKONINGDHV UK LIMITED
INDUSTRY, ENERGY & MINING

Present	:	Deborah Hall (DH), Des O'Halloran (DO'H) (Natural England); Allan Gamble (AG), James Barrie (JB), Will Woods (WW) (York Potash Ltd);Sian John (SJ), Matt Simpson (MS) (Royal HaskoningDHV)
Absent	:	
Date	:	15 January 2015
Copy	:	
Our reference	:	9Y0989/C/303957/Leeds
Subject	**:**	**YPL/NE Strategy Meeting (telecon)**

SUMMARY OF KEY POINTS AND ACTIONS

1. Project update

SJ provided an overview of the status of the various YPP applications.

Mine and MTS: NYMNPA has not formally requested further information, but has raised a series of questions.

YPL is to provide supplementary environmental information (SEI) in connection with changes to the design at Dove's Nest Farm (DNF). AG clarified that the changes amount to an additional temporary screening bund in the area of the welfare building to accommodate additional excavated materials; this requires re-designing this area rather than wholesale changes. The basic scheme is unchanged. A proposed ventilation shaft at north is to be removed (incorporated in MTS and production shafts). Further details are to be provided on emissions mitigation at DNF and the MTS Intermediate Shaft Sites. The SEI will be submitted at the end of January or early February.

The implications of the changes will be assessed in the SEI, before determination of the Mine and MTS applications.

MHF application is unaffected by SEI. MHF application is progressing; RCBC will wait for the SEI before determining, but this application likely to be determined sooner than the Mine and MTS.

AG confirmed that YPL has withdrawn the DCO application following a Marron's telecom with PINS, which suggested that options that are presented for some aspects of the project need to be refined. PINS have not provided specific feedback yet, and a meeting is scheduled for 21 January with PINS to discuss the issues further.

YPL will then re-submit the DCO application, for validation.

PINS have stated that there were no issues with the ES or HRA, in terms of validation.

Application for Whitby P&R made, Construction Village and P&R application to be made by end of January 2015.

2. **DAS and likely future work (for Natural England)**

NE has reviewed/is reviewing the Harbour HRA under the DAS, however, the target fee for the DAS is about to be reached. Unsure as to what further work may be required under the DAS at present.

DH described the relationship between the DAS and NSIP process (there has been recent changes to the guidance). Up to examination, NE still work under the DAS, apart from dealing with Statements of Common Ground and preparing Relevant Representations.

Site visits and iterations on the habitat enhancement strategy for the port (for example) would be chargeable under DAS, as would any additional air quality or landscape consultation meetings outside of the statutory consultation process.

ACTION: DH to respond to YPL to advise on what NE feels would be an appropriate budget for a DAS extension, based on identified topics and deliverables.

3. **Harbour DCO mitigation (habitat enhancement in Bran Sands lagoon)**

DO'H stated that NE's view is that the documentation included excellent bird data.

DH raised questions about the mitigation (habitat enhancement) proposed and how this relates to impacts on the SPA interest features. In addition, there is an existing SPA interest at Bran Sands Lagoon and NE feel that a better understanding is required regarding how the measures proposed could affect this interest (i.e. diving ducks using deeper water areas of the lagoon).

The proposed habitat enhancements are welcomed by NE, but are still at the conceptual stage and NE's view is that a higher level of detail is required. NE indicated that Option 2 appears most desirable.

DH stated that there is a need to link the proposals - including habitat enhancement - specifically to the effects on the SPA interest features (present a table of interest features and clearly define the aims of the habitat enhancement), inclusive of clarification on what a successful proposal will look like; how it is to be practically achieved (deliverability); over what timescale and how this will be measured; countermeasures etc. (from email of 12/01/15 to SJ).

SAJ proposed that RHDHV develop a Mitigation and Monitoring Strategy for issue to NE, in advance of a site meeting, which would address the above. DH to provide specific feedback and further guidance on NE's expectations.

MS stated this would consider the effect of the proposals on the overall assemblage, including key groups of birds (e.g. diving ducks, dabbling ducks, waders). DH added it should specifically address curlew.

Following production of the Mitigation and Monitoring Strategy, a site meeting (NE/MMO/EA) is to be held. The meeting is to focus on deliverability of the habitat enhancement proposals. The EA's primary interest is interaction with the Environmental Permit for Bran Sands landfill; the MMO's interest is the fact that the creation of the habitat enhancements are a licensable activity under the Marine and Coastal Access Act 2009 (would be part of the deemed marine licence).

DO'H summarised by stating that in NE's view there are two key stages to come:

(1) Development and agreement of Head of Terms / Indicators of Success (and a Mitigation and Monitoring Strategy).
(2) YPL development of firm proposals for mitigation. However, on this latter point, NE is hopeful that that the Mitigation and Monitoring Strategy and site visit will give enough confidence that the mitigation is deliverable.

SJ proposed that the Strategy should form an Annex to the Harbour HRA.

ACTIONS:

a) DH to provide further feedback and guidance on the further information sought with respect to the habitat enhancement proposals (by 21/1/15).
b) MS to develop template for Mitigation and Monitoring Strategy (by 21/1/15) based on emailed advice already provided by NE.
c) MS/SJ prepare Mitigation and Monitoring Strategy (by 29/1/15), with the intention being that this would be issued ahead of the site visit.
d) RHDHV to contact the MMO and EA and fix a date for the site meeting (dates proposed are 5, 10 and 11 February)

4. Determination of the Mine / MTS and MHF applications

SJ questioned whether the HRA provided as part of the Harbour DCO application enabled NE to advise RCBC and NYMNPA that sufficient information now existed such that the Mine / MTS/ MHF applications could be determined.

DO'H stated that given the adoption of the approach set under item 3, and assuming that the Mitigation and Monitoring Strategy meets NE's requirements, NE is likely to be able to advise other authorities that there is sufficient information for them to determine the applications in terms of the Habitats Regulations. Subsequently, NE would formally respond to the SEI, which will include the Harbour HRA (accompanied by the together with the Mitigation and Monitoring Strategy). On the assumption that NE can get confidence in early February about the lagoon proposals, DO'H expected that NE could confirm that the SEI was acceptable by Early March.

5. Landscape impacts associated with the Mine and MTS

Following a brief discussion on NE's landscape objection it was proposed that YPL would consider the potential for further visual mitigation and that this, should such mitigation be forthcoming, would be covered in the SEI.

Date: 21 January 2015
Our ref: DAS 1093a/ 141561
Your ref: Doc 6.3 HRA Sian John

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BY EMAIL ONLY

Dear Sian

Discretionary Advice Service (Charged Advice) DAS 1093a/ 141561
Development proposal and location: York Potash – Dove's Nest Farm, Whitby to Wilton International site, near Redcar; and Bran Sands, Teesport

Thank you for your consultation on the above which was received by Natural England on 19 December 2014 and further advice in discussion on 15 January 2015.

This advice is being provided as part of Natural England's Discretionary Advice Service. Royal Haskoning DHV has asked Natural England to provide advice upon:

- York Potash Project Harbour Facilities Habitats Regulations Assessment Doc 6.3 and information to support the production of an outline Mitigation and Monitoring Strategy.

This advice is provided in accordance with the Quotation and Agreement dated 09 December 2013. The following advice is based upon the information within the above document and elements of the Environmental Statement available on the Planning Inspectorate website;

The revised HRA included in the application for the York Potash Project Harbour Facilities (now withdrawn) is a significant improvement on the previous version and we welcome the inclusion of matters raised in correspondence and meetings. However the proposal as described does not provide, in Natural England's opinion, sufficient confidence and certainty (for HRA purposes) to conclude that the mitigation is practically achievable. Following the teleconference with you on 15 January, we are working with you to address this shortcoming, which we think can be resolved by adding more detail on aspects of the evidence, assessment and mitigation in the HRA. To this end we welcome your offer to produce draft the Heads of Terms of a mitigation and monitoring strategy ahead of the proposed site visit. This would clarify what is actually intended and enable the meeting to focus on the deliverability of these measures.

Bird Data
Natural England welcomes the provision of the waterbird assemblage data previously not present in the assessment, which demonstrates that the area affected by the proposal supports approximately 5% of the Tees Estuary's waterbirds during the winter.

Section 7.5 of the HRA contains more detailed data, showing the relative importance of each species. These tables indicate for the sections of the site used by SPA/Ramsar site birds that:

- **Bran Sands Lagoon** - redshank, shelduck, mallard, pochard, goldeneye, red-breasted merganser and little grebe are most significant. Bird counts from the lagoon of those species which tend to forage on exposed mudflats, such as redshank and shelduck, do not all relate to roosting / loafing birds. Some redshank currently feed around the periphery of the lagoon and shelduck also feed in areas of shallower water.

- **Dabholm Gut** - redshank, shelduck and teal are key.

- **The river frontage** – supports a much smaller numbers of birds (Table 7.5 confirms) amongst which the handful of redshank are most notable.

- **The NWL jetty** - hosts a cormorant roost, up to 600 of these birds have historically been accommodated on the nearby ConocoPhillips jetty the loss of the structure is not considered to be of critical importance.

Other general points requiring further clarification contained in the HRA

- Natural England notes the use of an enclosed grab (to barge) for the contaminated section of the approach channel and berth pocket. Further details on the safe transport and disposal of these sediments should be given thorough consideration (10.3.36)

- Although it is clear from this section (10.3.49) that the product will not be exposed to the atmosphere Natural England still requires clarity on the impacts of polyhalite on the marine environment in case of accidental or unforeseen events. .

- From a Health and Safety (and dredging vessel availability) perspective how likely is it that these dredging operations will be allowed to coincide with the other consented schemes by the harbour authority? (11.3.10). It is also not clear if the combined dredging impacts (one commencing directly after another) of other consented schemes (e.g. Northern Gateway) have been considered in the HRA

Mitigation Measures - Construction

We are satisfied with the proposals for lighting and screening, but we still have some concerns around the overshadowing effect of the northern conveyor route on the Bran Sands lagoon as well as the potential for annexing the site. Section 10.3.79 does refer to potential fragmentation of the lagoon habitat – hopefully a discussion at the proposed site visit will usefully be able to address these issues.

10.3.50 of the HRA notes 'the conveyor would be covered or enclosed along its entire length due to the need to ensure the product is dry'. We suggest that this is full enclosure when near to the lagoon in order to prevent accidental spillages and consequent nutrient input to the lagoon environment.

Mitigation Measures - Operation

As we described during the teleconference of 15 January, we consider that the terminology used for the mitigation is confusing, notwithstanding your explanation that it is used because the enhancement proposals are built into the project. The enhancement proposals need to be devised and set out primarily – for Habitats Regulations purposes - as mitigation for the impacts of the scheme on SPA/Ramsar site birds using the sites, or at least demonstrate, *inter alia*, that they serve to achieve this. We do however recognise that some elements may also provide enhancement.

In order to avoid misunderstanding, we use the term mitigation throughout the rest of this response, with this purpose in mind. It is also worth re-stating that these types of proposals do need to ensure that at least like for like is deliverable and normally would require a 2:1 ratio of habitat creation. We have recognised that whilst ordinarily we would be looking for additional habitat, in this instance we

have indicated that this particular site has the potential to be improved through the creation of islands and intertidal shallows which could develop the quality of the site for a range of birds sufficiently to, at a minimum, maintain the existing bird populations. Obviously it would be preferential if wider benefits could be achieved with a higher quality of habitat present providing a long term sustainable future for the site and the birds it contains. The reinstatement of the islands could provide suitable nesting sites again for common tern for example.

It is important that the mitigation and monitoring strategy includes:

- **The aims of the mitigation and what a successful proposal will look like i.e.**
    - The interest features which are to be retained at the whole of the site affected and how they will be accommodated in the proposals including some detail on wildfowl such as shelduck and teal as well as diving species. It is important to note that the Lagoon currently holds the majority of the estuary's goldeneye and red-breasted merganser for example which need to be retained in the scheme. Please note that redshank is also a specific SPA interest feature. These interest features will need to be itemised in your Heads of Terms document.
    - Details of areas subject to loss and disturbance and the agreed areas for new roosting islands and shallows.
    - How the site will be managed e.g. the nature and scheduling of vegetation control on the islands, necessary to retain optimum conditions for roosting and nesting birds.

  In addition there are requirements to:
    - Describe the specific element of mitigation required for the loss of the habitats on the river frontage. Currently 9.6.6 of the ES asserts that feeding habitat up to double the area of lost to the construction of the port terminal (4.6ha) would be created. However, Bran Sands Lagoon already contains habitats of high value to significant numbers of waterbirds. Rather, the newly created shallows and margins will augment the existing suite of habitats present here, provided sufficient areas of deeper water are maintained – Option 2 (drawing PB1586-SK458) is the best design to achieve this based on our current knowledge.
    - Describe mitigation for the range of potential impacts affecting Bran Sands Lagoon and Dabholm Gut – these are for the most part disturbance impacts.

- **How this will be practically achieved**:
    - Over what timescale?
    - Detail on how careful calculations of levels and placement of bunds/dredgings will be undertaken to ensure success when there will not be a mechanism to tweak the degree of tidal exchange through the connecting pipe.
    - Details of suitable substrates – the non-toxic fines from maintenance dredgings – and the level of tidal exchange expected to ensure invertebrates will colonise to provide food for birds
    - To ensure the success of the mitigation proposal for Bran Sands lagoon Natural England suggests grab samples are taken at the proposed dredge site to ground truth the suitability of the sediment (particle size and lack of contamination) .(10.3.18)
    - Measures investigated to increase the regularity of inflow and outflow (assuming that the magnitude of water level changes cannot be increased due to the adjacent landfill site). For example, could more regulated pipes, only opened on low tides, deliver more exchange?
    - Natural England requires clarity on the time it will take for the mitigation proposal to provide habitat of sufficient maturity to support bird populations and consequently the amount of time the birds will be unable to utilise the habitat due to disturbance during its creation, smothering of existing habitat/prey and time to colonise the new habitat by invertebrates. As a general principle, establishment of mitigation should be created prior to habitat loss.

Monitoring Programme
The monitoring programme will need to define in more detail – some is already in the ES but is broad brush at present – the following:

- Monitoring to be undertaken to include bird survey data gathering, water level monitoring, invertebrate surveys (pre-construction and ongoing)
- Submission of a pre and post construction monitoring plan for the lagoon. This would seek to establish a baseline and assess the success of the mitigation in terms of invertebrate colonisation, bird usage etc (10.3.19)
- How this data is to be used for e.g. for the hydrogeological model the monitoring should be in place prior to construction so that the conceptual model can be confirmed and refined.
- Indicators of Success and over what timescale this is to be achieved – and how success is measured. Bird counts?
- Countermeasures should success not be achieved – options available.

I hope these clarifications help in the task. We are looking forward to seeing the draft Heads of Terms for the strategy and the opportunity to comment on them, as soon as possible. For clarification of any points in this letter, please contact Deborah Hall on 0300 0602259.

As the Discretionary Advice Service is a new service, we would appreciate your feedback to help shape this service. We have attached a feedback form to this letter and would welcome any comments you might have about our service.

☒ The advice provided in this letter has been through Natural England's Quality Assurance process

The advice provided within the Discretionary Advice Service is the professional advice of the Natural England adviser named below. It is the best advice that can be given based on the information provided so far. Its quality and detail is dependent upon the quality and depth of the information which has been provided. It does not constitute a statutory response or decision, which will be made by Natural England acting corporately in its role as statutory consultee to the competent authority after an application has been submitted. The advice given is therefore not binding in any way and is provided without prejudice to the consideration of any statutory consultation response or decision which may be made by Natural England in due course. The final judgement on any proposals by Natural England is reserved until an application is made and will be made on the information then available, including any modifications to the proposal made after receipt of discretionary advice. All pre-application advice is subject to review and revision in the light of changes in relevant considerations, including changes in relation to the facts, scientific knowledge/evidence, policy, guidance or law. Natural England will not accept any liability for the accuracy, adequacy or completeness of, nor will any express or implied warranty be given for, the advice. This exclusion does not extend to any fraudulent misrepresentation made by or on behalf of Natural England.

Yours sincerely

Deborah Hall
Land Use Operations
cc commercialservices@naturalengland.org.uk

Date: 09 February 2015
Our ref: DAS 5909/ 144213
Your ref: Mitigation and Monitoring Strategy

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Dear Sian

Discretionary Advice Service (Charged Advice) DAS 5909/ 144213
Development proposal and location: York Potash – Dove's Nest Farm, Whitby to Wilton International site, near Redcar; and Bran Sands, Teesport

Thank you for your consultation on the above which was received by Natural England on 30 January 2015.

This advice is being provided as part of Natural England's Discretionary Advice Service to York Potash Limited (YPL). Royal Haskoning DHV has asked Natural England to provide advice upon:

- York Potash Harbour Facilities Mitigation and Monitoring Strategy dated 29 January 2015

This advice is provided in accordance with the Quotation and Agreement dated 02 February 2015. The following advice is based upon the information within the above document and the subsequent site visit and meeting of 5 February 2015.

The Mitigation and Monitoring Strategy (MMS), site visit and meeting have most usefully addressed our remaining reservations about the proposal with respect to two elements of the provision of our advice to Competent Authorities: for the wider applications at the mine, MTS and MHF; for the Harbour NSIP proposal.

1.The wider applications for the project to be determined by North York Moors National Park Authority and Redcar & Cleveland Borough Council
We are now in receipt of a range of information on impacts arising from proposals for the York Potash Harbour Facilities. This includes information contained within the revised HRA / amended ES and now the MMS on the mitigation and monitoring. You have undertaken to update the MSS document in line with our 5 February discussion and agreement on a number of aspects (as recorded below). We consider that, once the MSS is so amended, the information provided is sufficient to satisfy the North York Moors National Park Authority and Redcar and Cleveland Borough Council that the in-combination impacts at the Harbour site can be considered within their appropriate assessment and any appropriate assessments for the whole of the York Potash Project. It is our view that it is possible to conclude that the proposal will not result in adverse effects on site integrity of Teesmouth and Cleveland Coast SPA.

We understand that YPL will submit a revised MMS document, along with a revised HRA, to the North York Moors NPA as part of the Supplementary Environmental Information (SEI) for the

minehead/MTS applications in the next week or so. We also understand that the Harbour NSIP application, along with an amended HRA is to be re-made in the next couple of months. In the absence of a currently active Port NSIP submitted application, we are satisfied that the SEI, as described above, will demonstrate that mitigation for HRA matters can be secured and is deliverable, and that it is YPL's intention to submit this as part of a re-made NSIP port proposal.

2. Detailed comments as discussed on 5 February and agreed revisions / suggested wording

Section 2.2 - The 'Teesmouth WeBS Sector' should actually be referred to as the 'Tees WeBS site'. The Tees WeBS site now comprises 28 individual count sectors, of which Bran Sands South is only one! This correction needs to be repeated in table 2.3.

Section 3.1, Table 3.1 – The table as we agreed needs to include the overshadowing / over-sailing impacts from the project and in particular the overhead conveyors.

Section 3.2 – We welcome the inclusion of consideration of the different elements of the bird assemblage and in particular the diving ducks that use the deeper water in the lagoon

Sections 4.1 & 4.2 – Whilst we fully support the selection of Option 2 as previously recommended, we provide the following words used in the meeting, which capture how we agreed the most suitable location for the islands:

> 'There is no need to create islands in deeper water. It would be preferable to construct them along the alignment of the bund itself (which was their original location before ICI removed them). Excess material from the bund could be incorporated into these islands. This is essentially what is proposed as a 'variation on Option 2'. Such islands would be easier to construct owing to the shallower surrounding waters, less vulnerable to erosion by wave action, increase the linear 'edge effect' for feeding waders and avoid greater impacts on deeper water feeding habitats for diving birds. A membrane should be deployed to suppress vegetation growth on the islands, and top-dressing with cockle shell applied.'

We discussed various elements of the phasing of works and the use of the silt box to ensure understanding and MMO confirmed the wording they would like to see used to include bullets on sediment quality and particle size i.e. only want 'uncontaminated fines' for this project.

Timing of the works in the Lagoon – we agreed that there would be no adverse effect, but that the potential disturbance from the activities should be captured within the HRA. The disturbance would be for a limited time – potentially 3-4 months in total. It would however be preferable to carry out these activities in the late summer months, if possible to avoid such impacts.

Section 4.4 – The replacement of the existing pipe with a new flow control structure is to be greatly welcomed, as was the positive discussion on site and in the meeting. We agreed in discussion that, whilst YPL needed to be precautionary due to the potential for unintended effects on groundwater flow associated with the adjacent landfill site, there could be considerable conservation benefit in being able to vary water levels. Specifically the area of intertidal habitat could be increased to the benefit of the bird assemblage.

Since a new pipe is to be fitted and a 'hole is to be dug' we agreed that two pipes could easily be put in at the beginning (it would not be possible to easily retro-fit another pipe) with the understanding that the second pipe's flow control structure would be closed in the immediate term. This would enable YPL in the future management of the site to have greater ability to further manipulate the flow, not only to isolate the lagoon in case of pollution events, but also to permit tweaking of water levels within the lagoon and to increase tidal exchange (thereby increasing invertebrate settlement and food supply). Indeed, this is implied by the text on page 23, which refers to "actively adjusting the rate of water exchange between the Tees and the lagoon".

Section 4.7.2 – Mike Leakey supplied Matt Simpson with a useful a monitoring report regarding the No4 Brinefield Saline Lagoon: *Colonisation of the newly-created saline lagoon at Teesmouth monitoring report: April 1999-January 2000* Evans P.R. and Lucas M.C., University of Durham Department of Biological Sciences, and details of the following recommend paper which focuses on an example of intertidal habitat restoration on the Tees Estuary: *Creation of Temperate Climate Intertidal Mudflats; Factors Affecting Colonization and Use by Benthic Invertebrates and their Bird Predators* Evans P.R. et al, Marine Pollution Bulletin 37: 535-545.

Section 5 - We note that no seasonal restrictions on construction activities are proposed here. Instead, reliance is placed on the efficacy of a suite of practical measures such as acoustic barriers, a noise reduction curtain over the hammer piling rig and controls over artificial lighting. We are not fully convinced that the overall result will be that 'the risk of indirect impacts on waterbirds would be reduced to an insignificant level. This could only be guaranteed if you avoided the winter period. However, at the same time we accept that these impacts are unlikely to have an adverse effect on integrity given the limited time period involved.

Section 6 - We broadly agree with the indicators of success presented here and recognise we will have an opportunity 'post-consent' to refine this in more detail to include advice on the baseline surveys needed. We recommend that invertebrate monitoring should take place in autumn (after the settlement of larvae etc). Vegetation control on the islands will need to be routinely undertaken.

We noted that the DCO requirements would need to ensure that the MMS was fully captured to satisfy ourselves and PINS of its deliverability. Indeed this is the case for the proposed BAP enhancement and contributions to wider initiatives.

Shags etc. - Please note that if YPL opt for an open quay structure, the provision of artificial nesting platforms for shags beneath the suspended deck should be considered, along with the other construction techniques that can be employed to create biodiversity benefits adjacent to the estuary.

In conclusion, with reference to HRA, we note that there are a number of Likely Significant Effects (LSE) on the bird assemblage in Bran Sands Lagoon. However, taking the draft HRA and MMS into account, we accept that some of these will be avoided through the YPL proposals and others will be satisfactorily mitigated for. We agree that an overall conclusion of No Adverse Effect on Integrity could be concluded by a competent authority in the event of these proposals, as set out currently, being advanced. Likewise we agree there is scope for delivering actual benefit to the assemblage, should the proposals as set out be consented and implemented.

Thank you for providing the MMS in advance of the very helpful site visit and meeting. We are hoping that resolving these issues now at pre-application stage will facilitate an easier written process through the Examination stage.

For clarification of any points in this letter, please contact Deborah Hall on 0300 0602259.

As the Discretionary Advice Service is a new service, we would appreciate your feedback to help shape this service. We have attached a feedback form to this letter and would welcome any comments you might have about our service.

☒ The advice provided in this letter has been through Natural England's Quality Assurance process

The advice provided within the Discretionary Advice Service is the professional advice of the Natural England adviser named below. It is the best advice that can be given based on the information

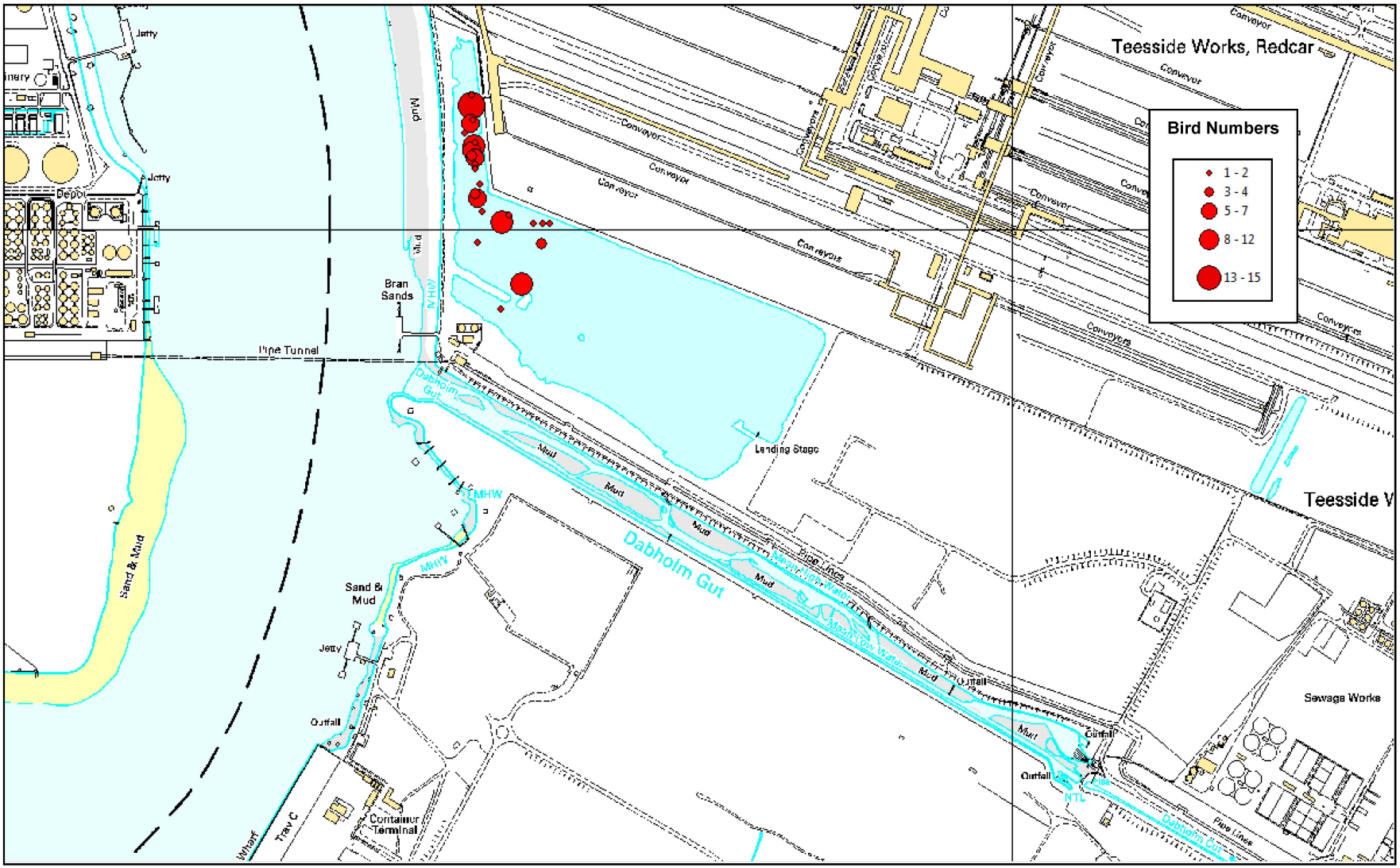
provided so far. Its quality and detail is dependent upon the quality and depth of the information which has been provided. It does not constitute a statutory response or decision, which will be made by Natural England acting corporately in its role as statutory consultee to the competent authority after an application has been submitted. The advice given is therefore not binding in any way and is provided without prejudice to the consideration of any statutory consultation response or decision which may be made by Natural England in due course. The final judgement on any proposals by Natural England is reserved until an application is made and will be made on the information then available, including any modifications to the proposal made after receipt of discretionary advice. All pre-application advice is subject to review and revision in the light of changes in relevant considerations, including changes in relation to the facts, scientific knowledge/evidence, policy, guidance or law. Natural England will not accept any liability for the accuracy, adequacy or completeness of, nor will any express or implied warranty be given for, the advice. This exclusion does not extend to any fraudulent misrepresentation made by or on behalf of Natural England.

Yours sincerely

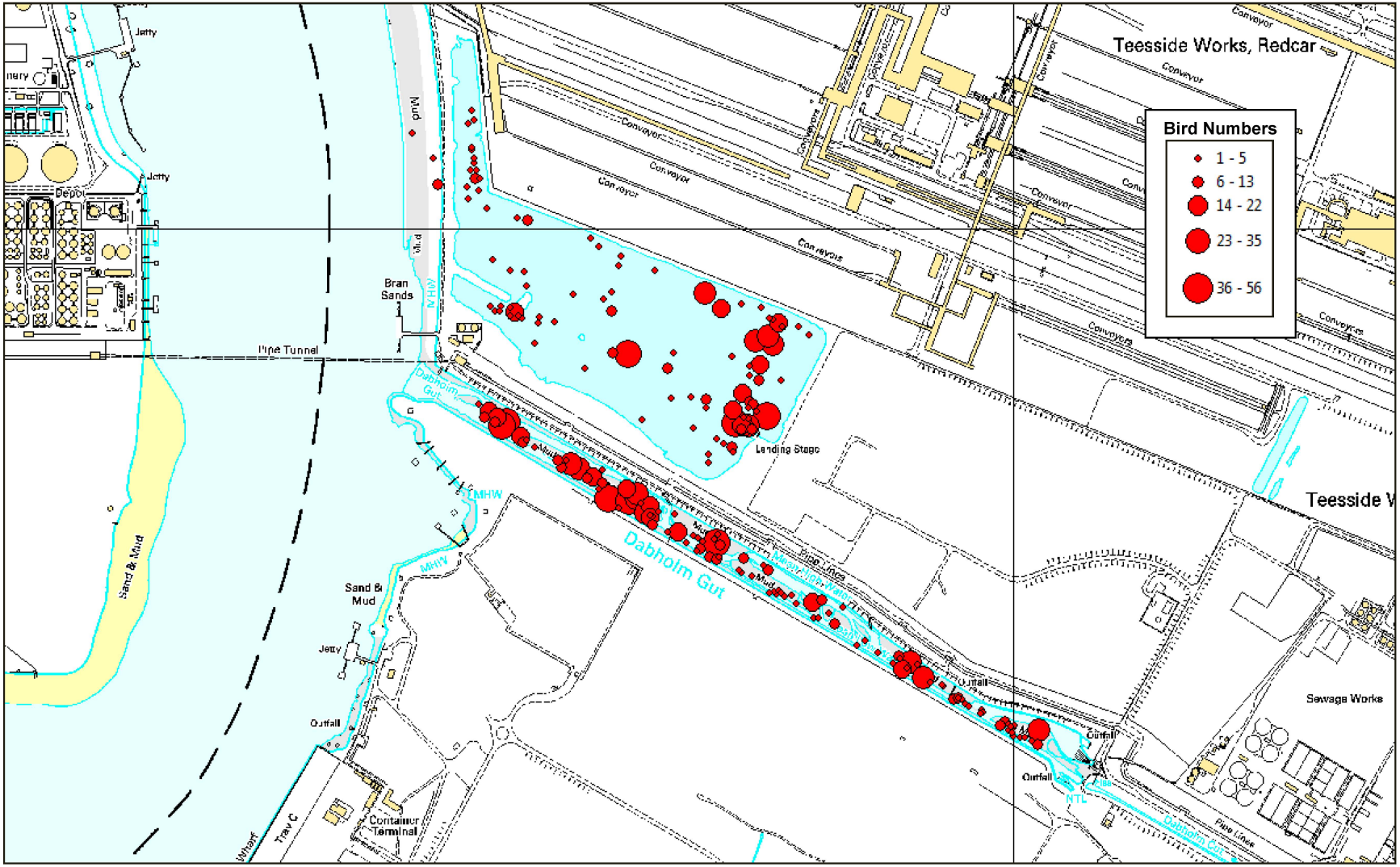
Deborah Hall
Land Use Operations
cc commercialservices@naturalengland.org.uk

Appendix B
Waterbird Distribution Plots

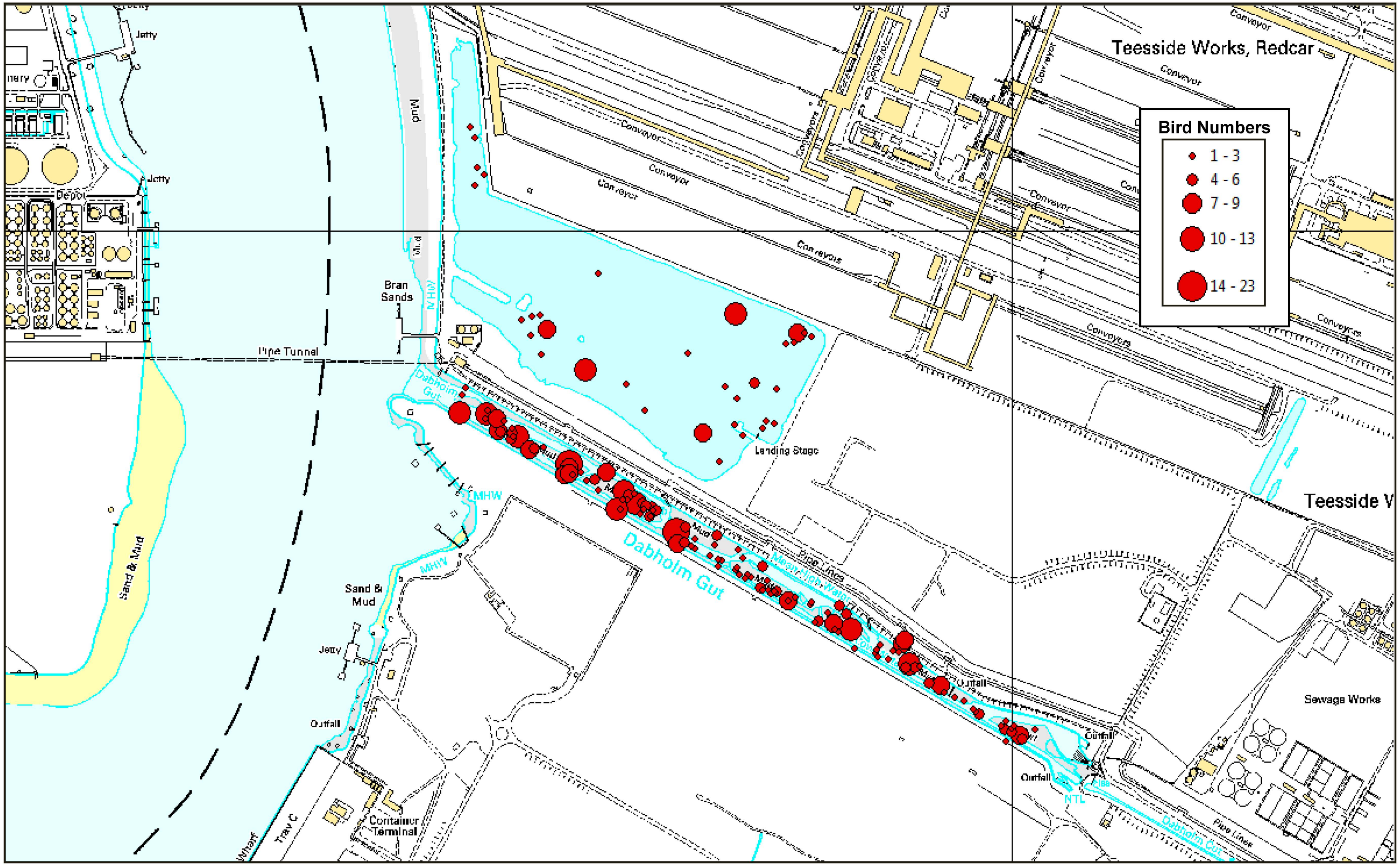
Little Grebe



Shelduck

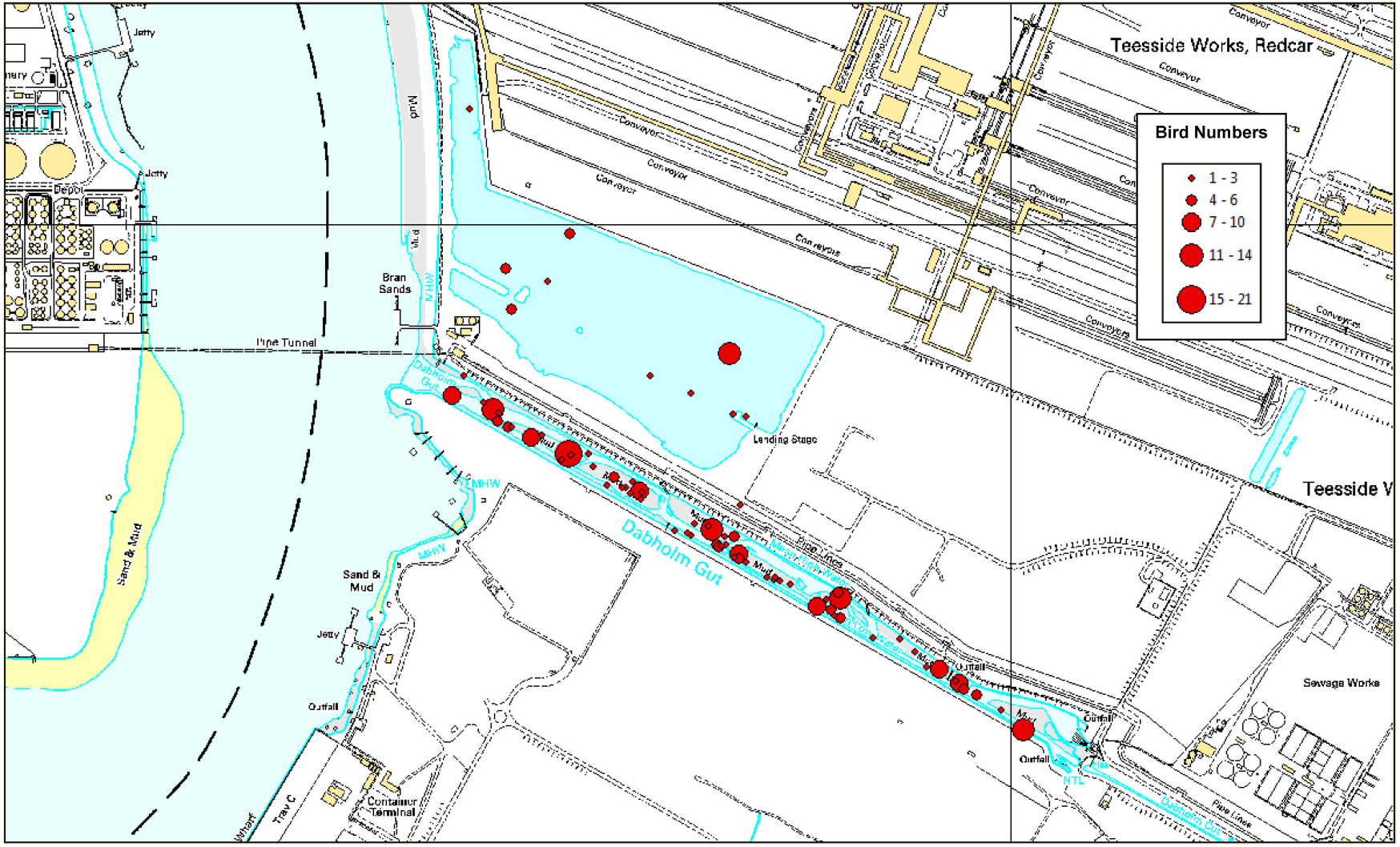

Teesside Works, Redcar
Bird Numbers
1 - 5
6 - 13
14 - 22
23 - 35
36 - 56
Jetty
Depot
Pipe Tunnel
Bran Sands
MHW
Dabholm Gut
Landing Stage
Conveyor
Teesside W
Sand & Mud
Jetty
Outfall
Container Terminal
Trav C
Wharf
Sewage Works
Pipe Lines
NTL

Mallard

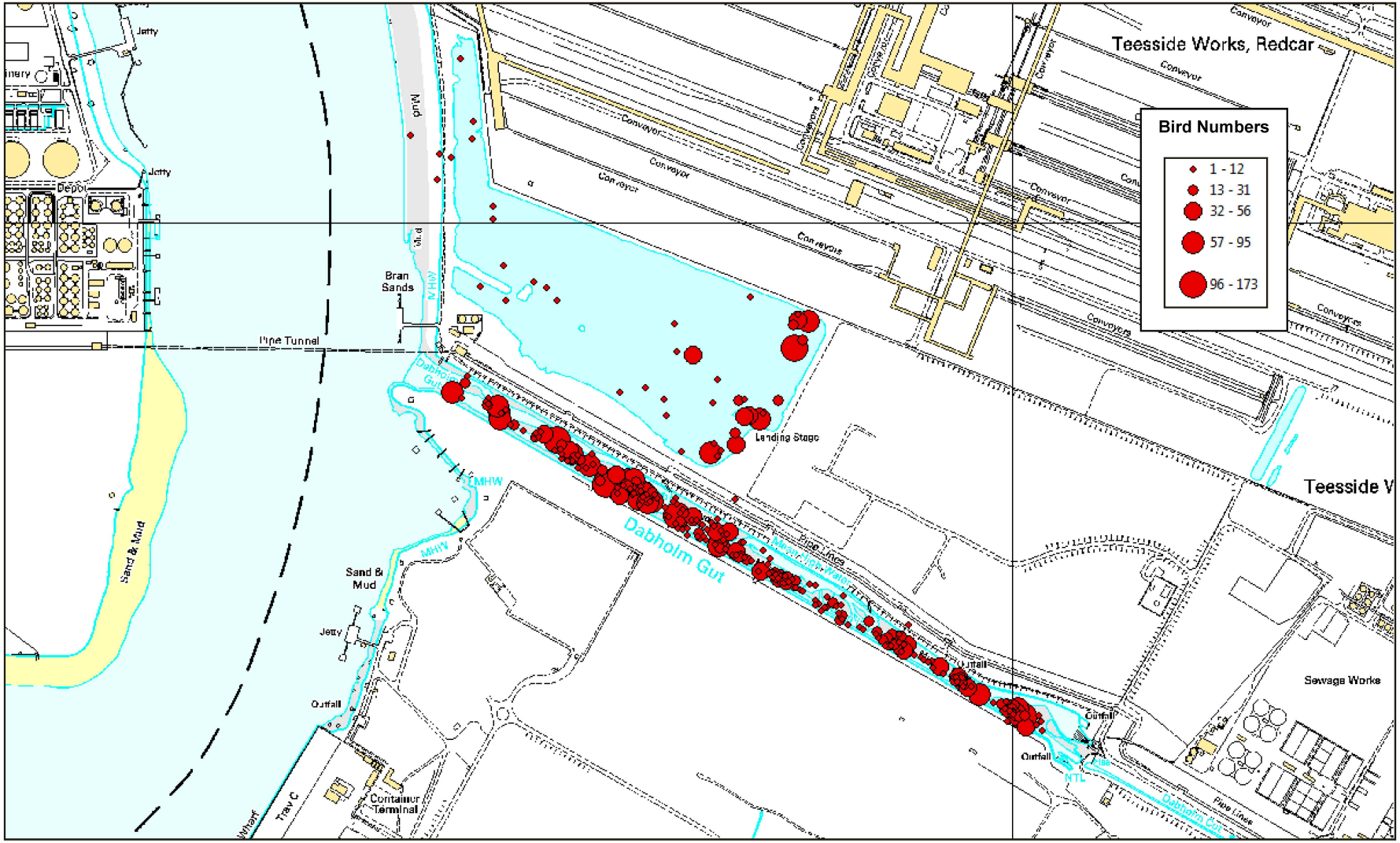


Teesside Works, Redcar
Bird Numbers
1 - 3
4 - 6
7 - 9
10 - 13
14 - 23
Conveyor
Conveyors
Mud
Bran
Sands
Pipe Tunnel
Jetty
Depot
Dabholm
Gut
Dabholm Gut
MHW
Landing Stage
Pipe Lines
Sand & Mud
Sand &
Mud
Outfall
Container
Terminal
Wharf
Sewage Works
NTL

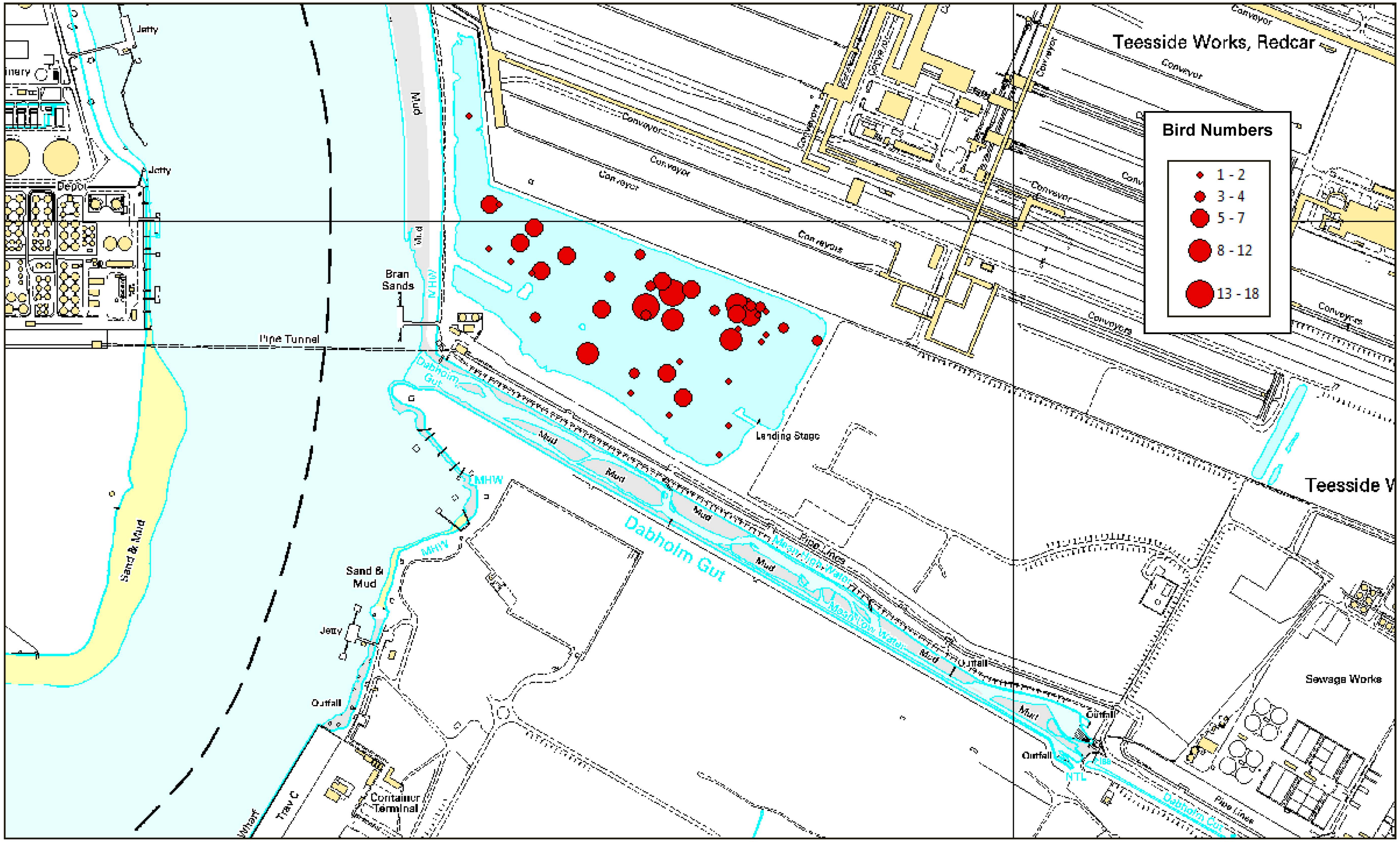
Gadwall


Teesside Works, Redcar
Bird Numbers
1 - 3
4 - 6
7 - 10
11 - 14
15 - 21
Jetty
Depot
Pipe Tunnel
Bran Sands
MHW
Landing Stage
Dabholm Gut
Sand & Mud
Jetty
Outfall
Container Terminal
Trav C
Pipe Lines
Sewage Works
NTL
Conveyor

Teal

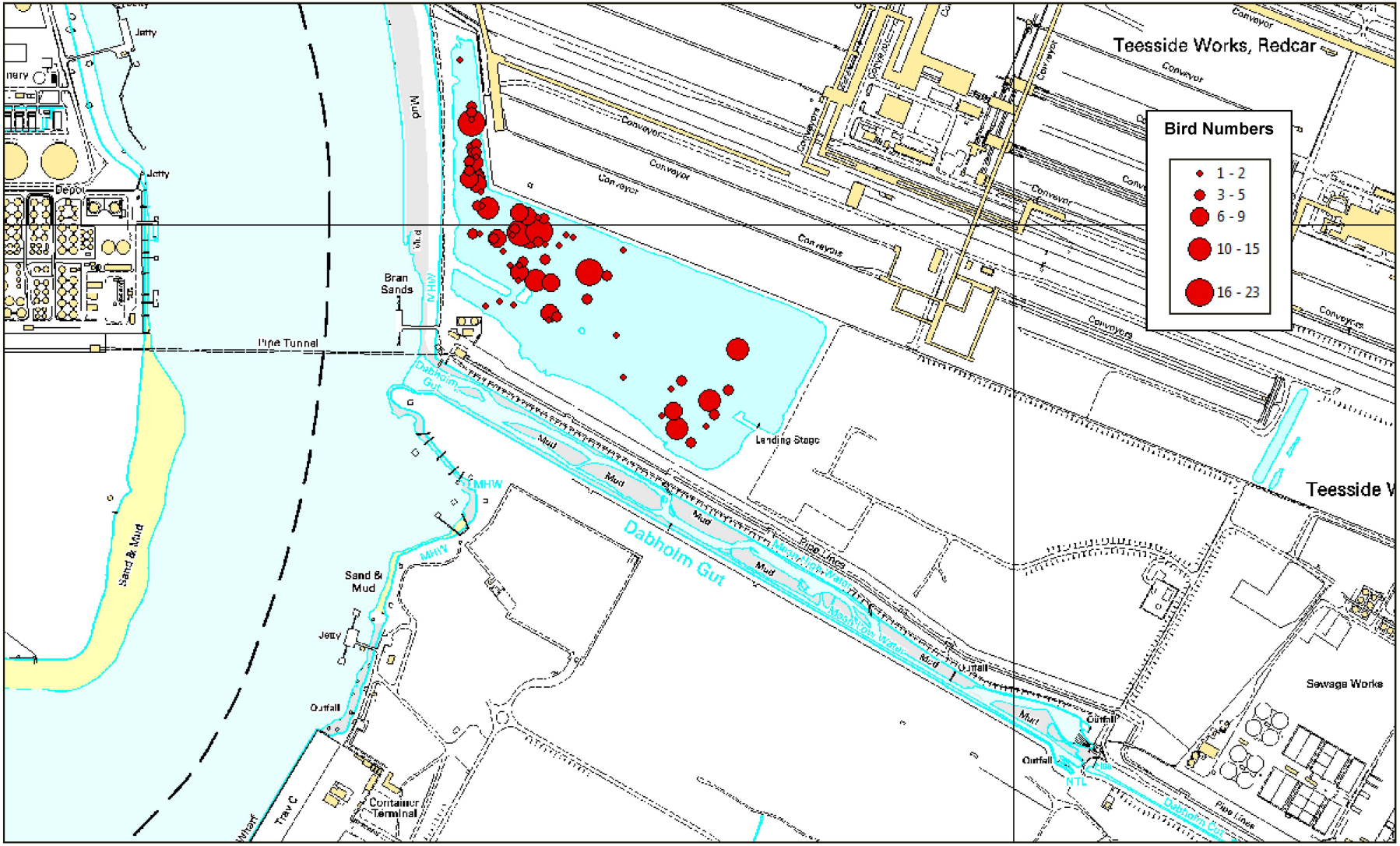

Teesside Works, Redcar
Bird Numbers
1 - 12
13 - 31
32 - 56
57 - 95
96 - 173
Bran Sands
Pipe Tunnel
Landing Stage
Dabholm Gut
Sand & Mud
Jetty
Outfall
Container Terminal
Sewage Works
Teesside W

Goldeneye

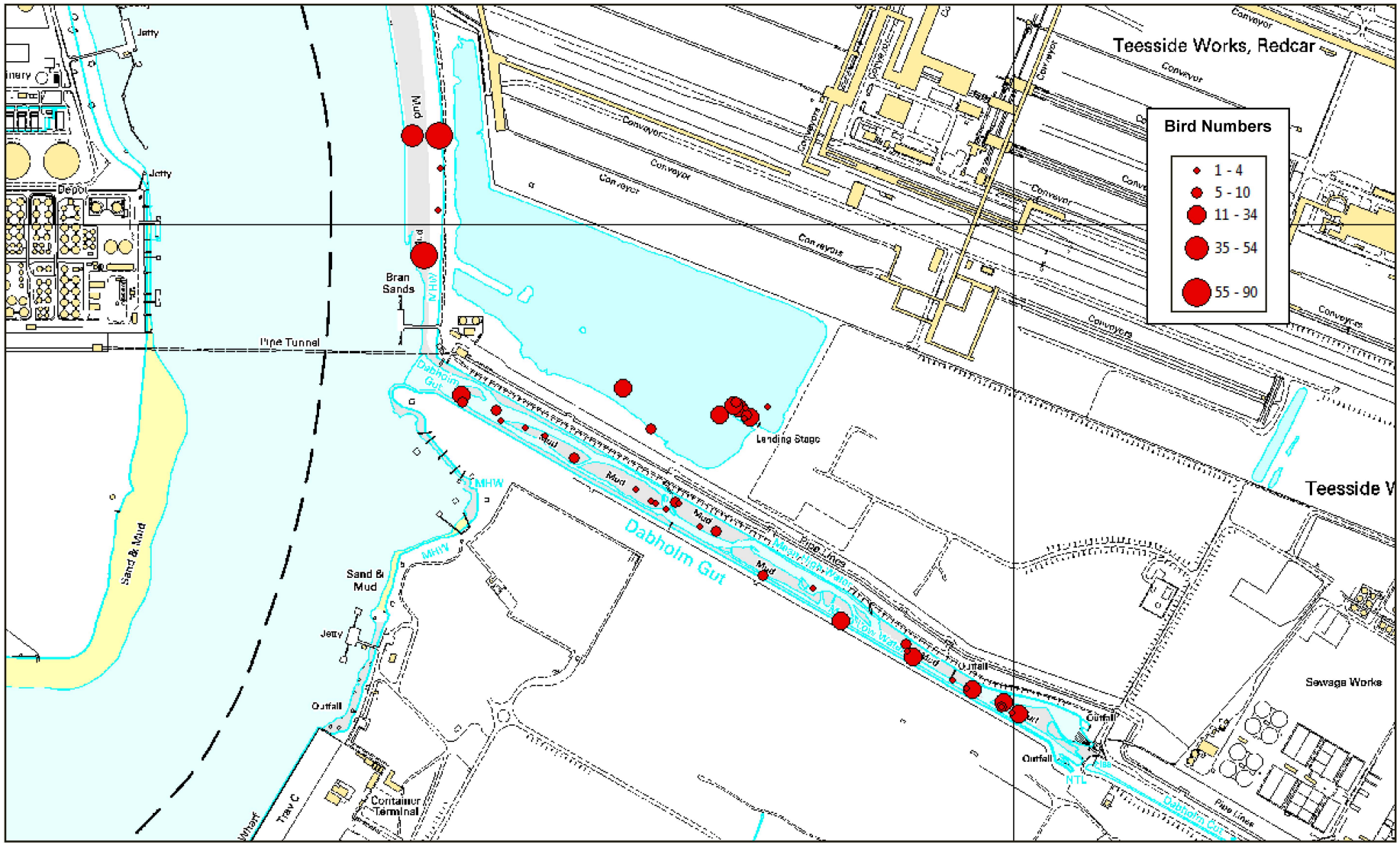


Teesside Works, Redcar
Bird Numbers
1 - 2
3 - 4
5 - 7
8 - 12
13 - 18
Bran Sands
Pipe Tunnel
Landing Stage
Dabholm Gut
Sand & Mud
Jetty
Outfall
Container Terminal
Sewage Works
Conveyor
Mud
MHW

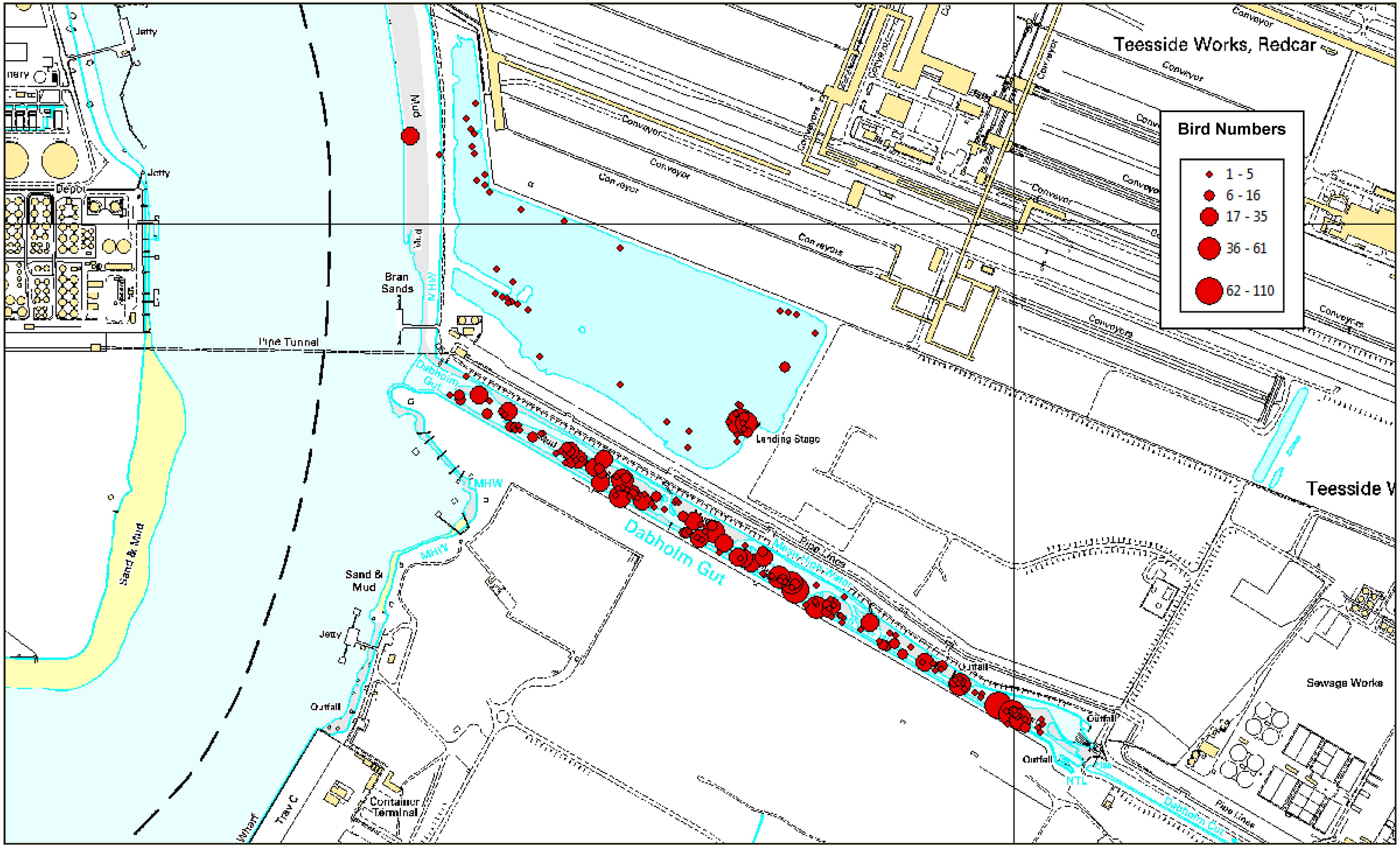
Red-breasted Merganser



Lapwing

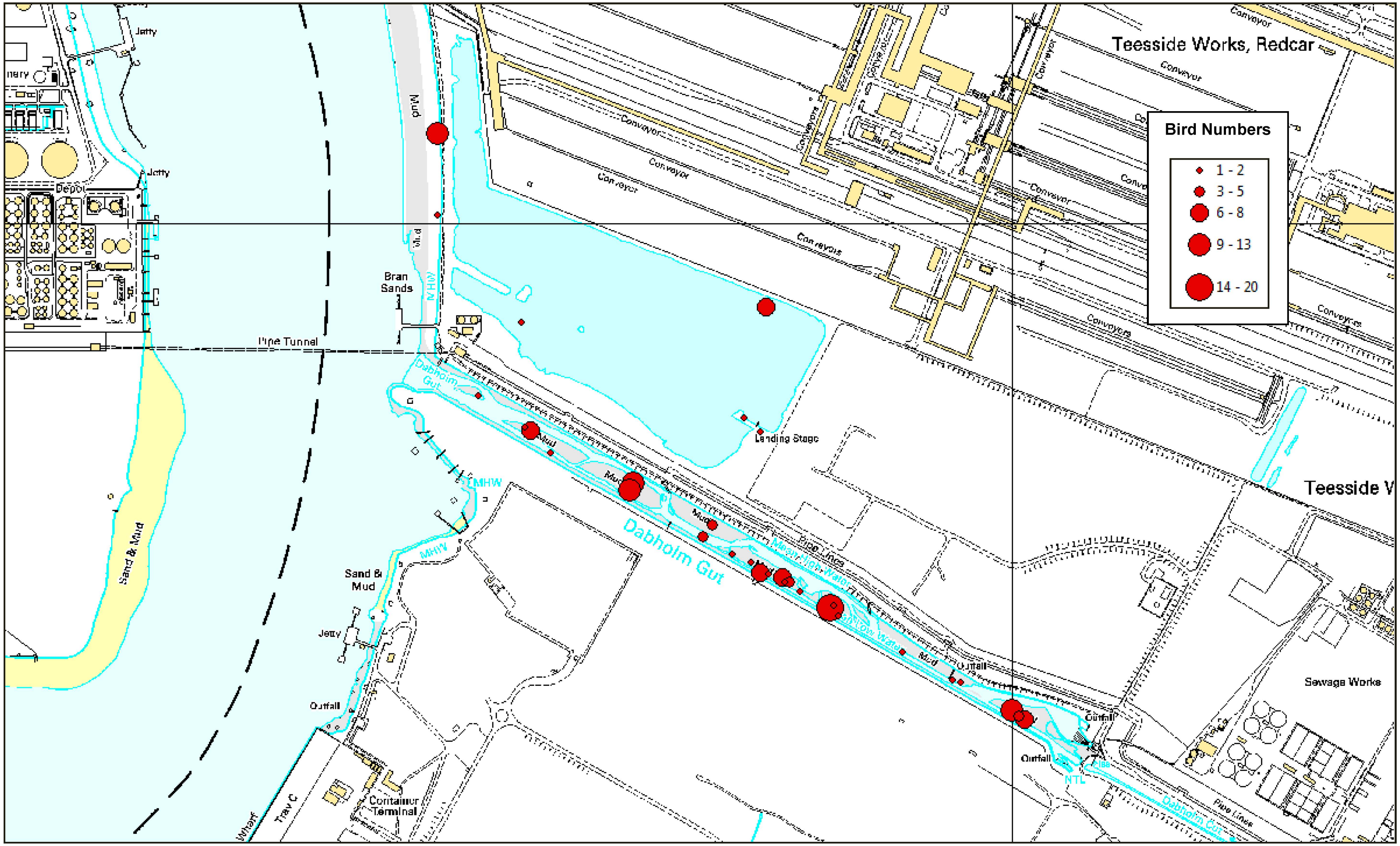

Teesside Works, Redcar
Bird Numbers
1 - 4
5 - 10
11 - 34
35 - 54
55 - 90
Jetty
Depot
Pipe Tunnel
Bran Sands
MHW
Mud
Dabholm Gut
Landing Stage
Sand & Mud
Jetty
Outfall
Container Terminal
Trav C
Pipe Lines
Sewage Works
NTL

Redshank



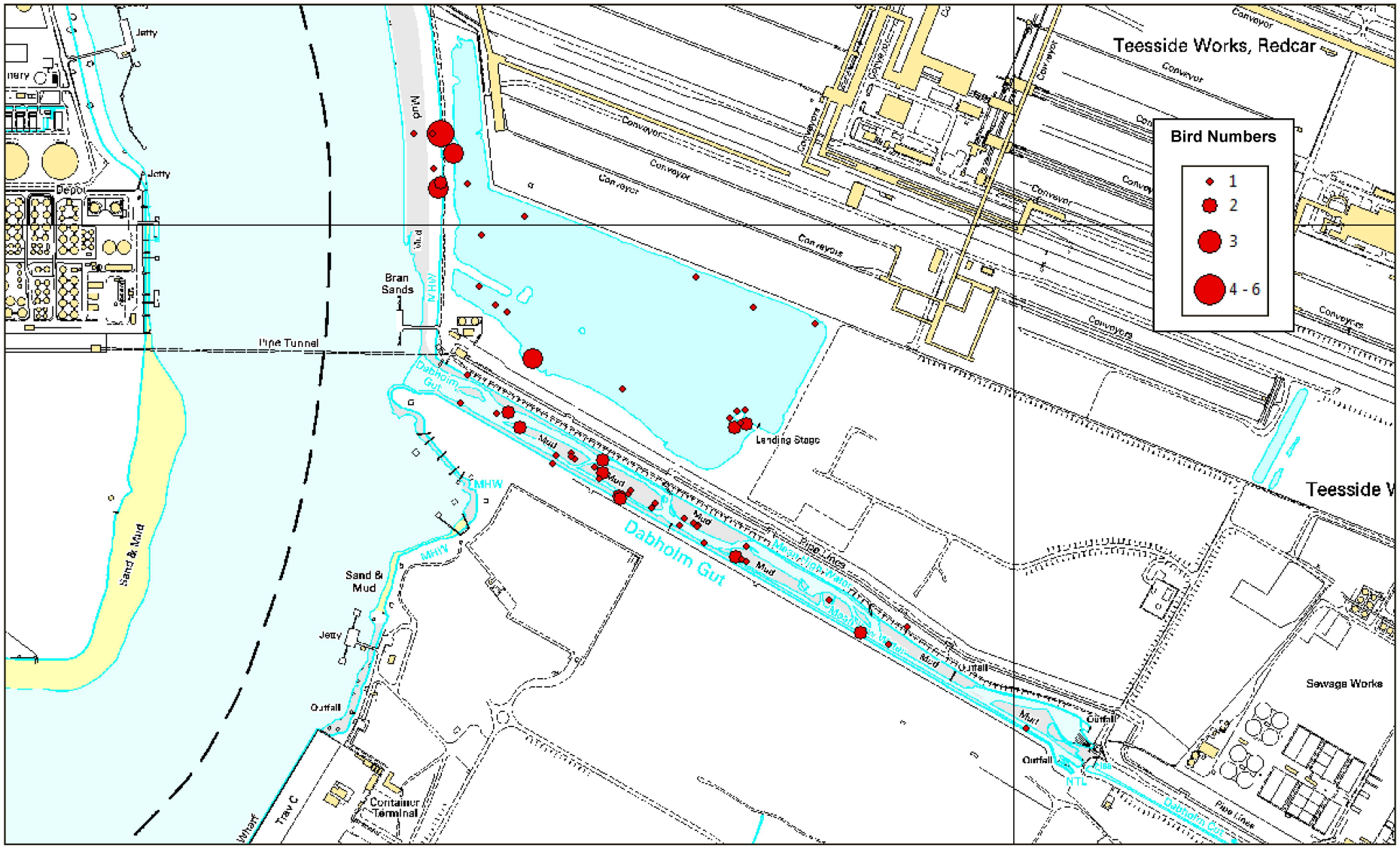
Teesside Works, Redcar
Bird Numbers
1 - 5
6 - 16
17 - 35
36 - 61
62 - 110
Conveyor
Conveyors
Jetty
Depot
Mud
Bran
Sands
MHW
Pipe Tunnel
Dabholm Gut
Landing Stage
Sand & Mud
Sand &
Mud
Pipe Lines
Mean High Water
Outfall
Sewage Works
Container
Terminal
Trav C
Wharf
NTL

Turnstone

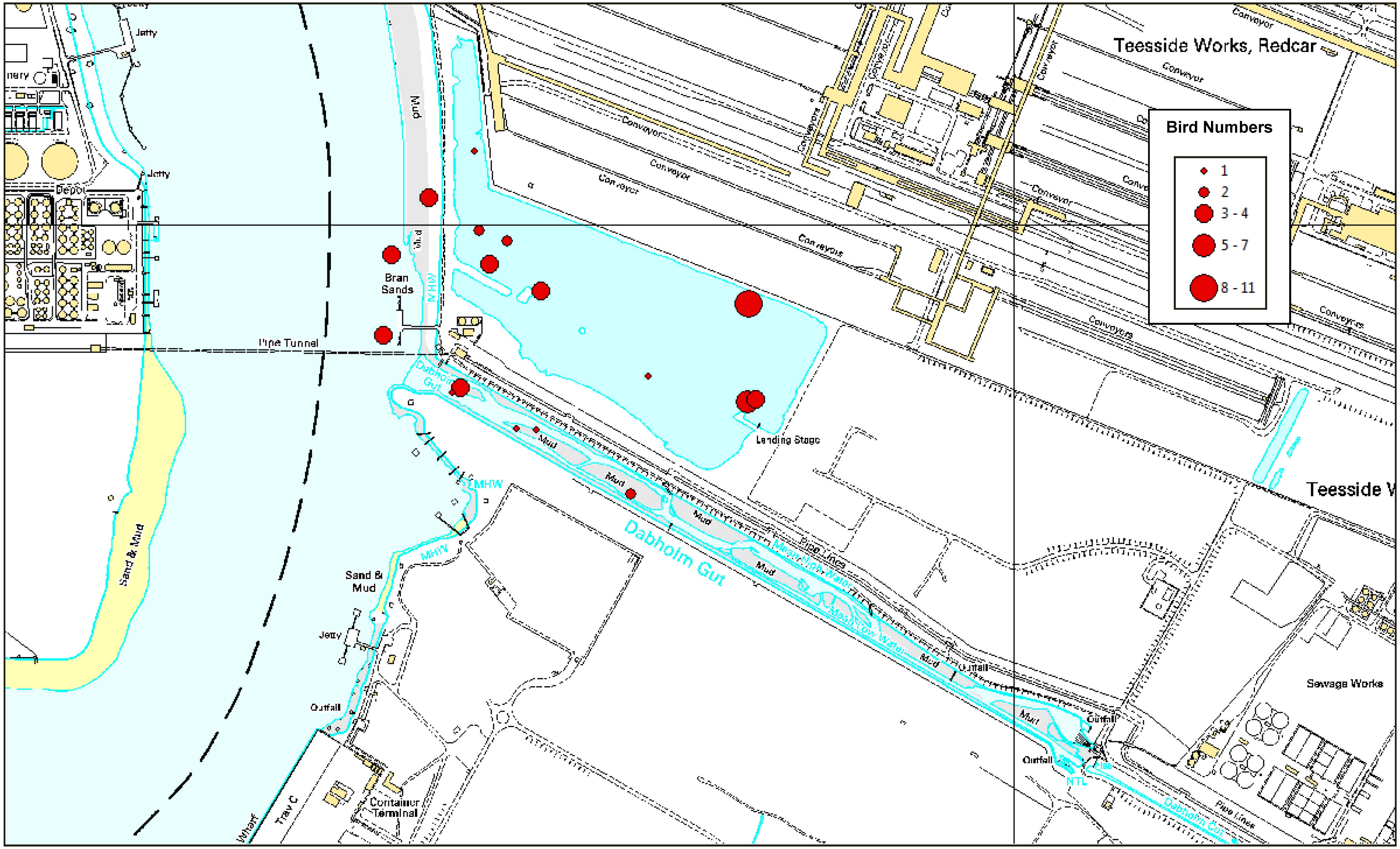


Bird Numbers
1 - 2
3 - 5
6 - 8
9 - 13
14 - 20
Teesside Works, Redcar
Teesside W
Conveyor
Conveyors
Landing Stage
Pipe Lines
Mean High Water
Dabholm Gut
Mud
MHW
Bran Sands
Pipe Tunnel
Jetty
Depot
Sand & Mud
Outfall
Sewage Works
Container Terminal
Trav C
Wharf
NTL
Dabholm Gut

Curlew

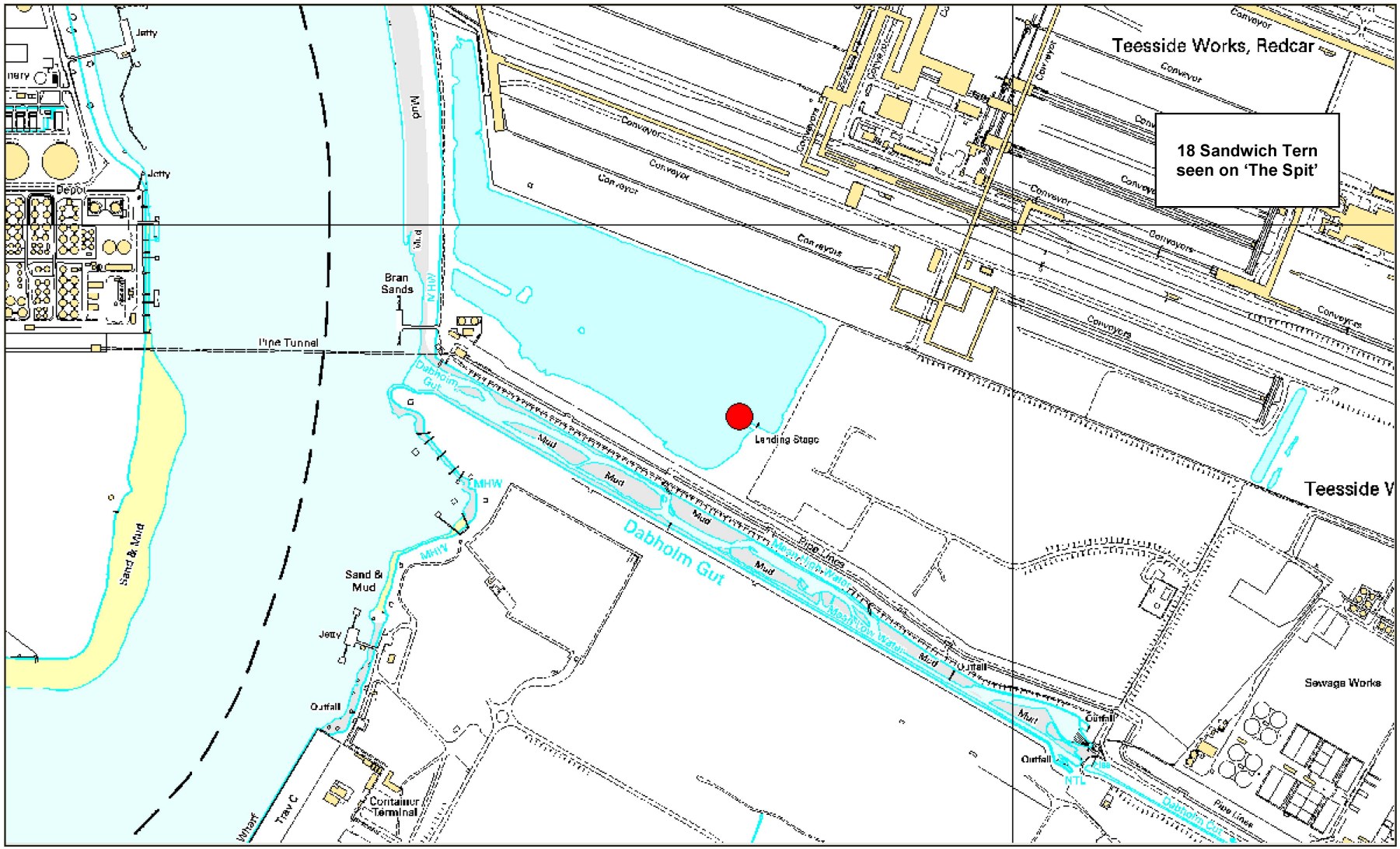

Teesside Works, Redcar
Bird Numbers
1
2
3
4 - 6
Jetty
Depot
Pipe Tunnel
Bran Sands
MHW
Dabholm Gut
Landing Stage
Mud
Sand & Mud
Jetty
Outfall
Container Terminal
Trav C
Wharf
Pipe Lines
Sewage Works
NTL

Common Tern

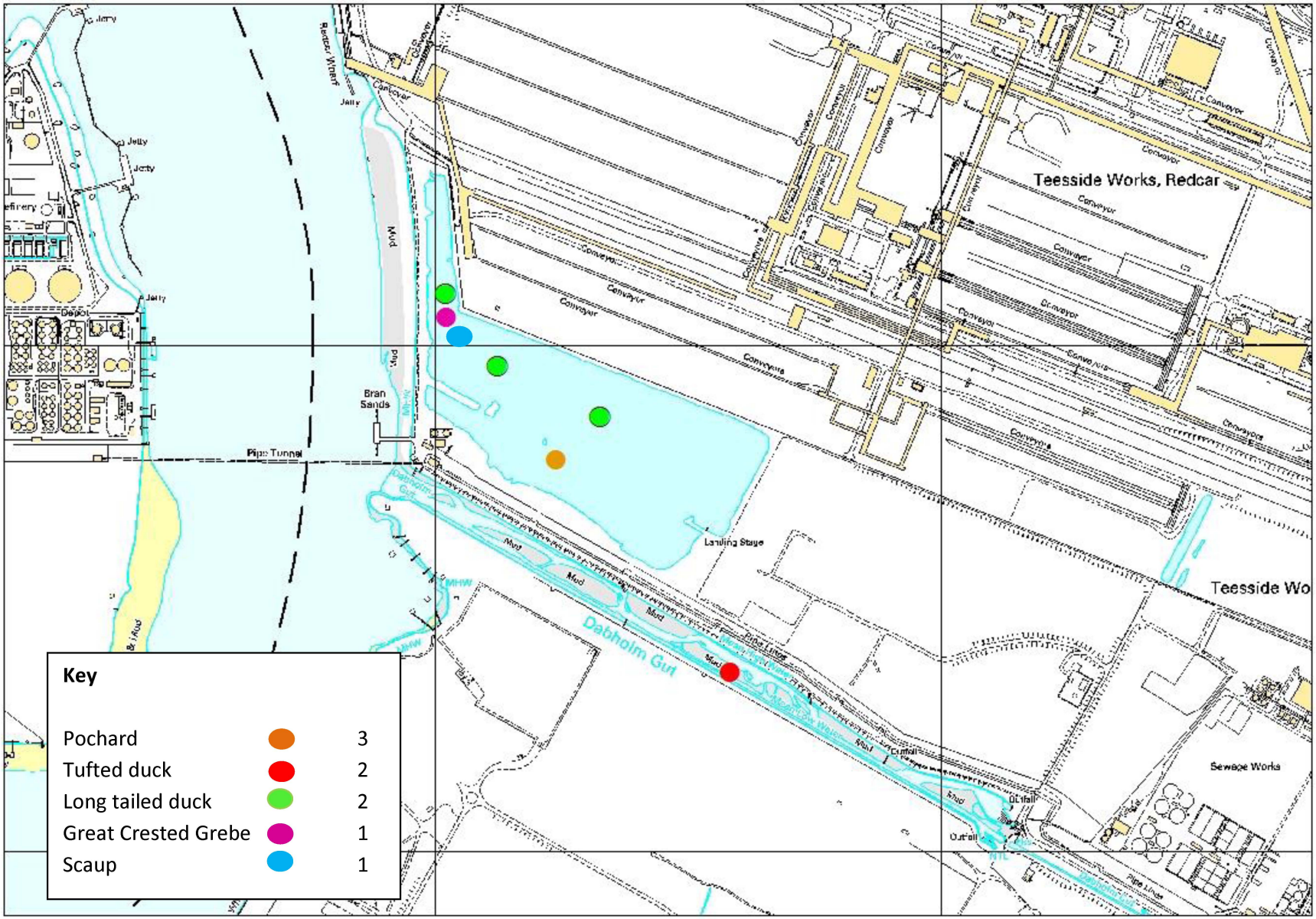


Teesside Works, Redcar
Bird Numbers
1
2
3 - 4
5 - 7
8 - 11
Conveyor
Landing Stage
Bran Sands
Mud
Pipe Tunnel
Dabholm Gut
Sand & Mud
Jetty
Depot
Outfall
Container Terminal
Sewage Works
Pipe Lines
Mean High Water
Mean Low Water
MHW
NTL
Teesside W

Sandwich Tern



Other diving ducks



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Appendix 5.1

Conservation Objectives and citation for the Teesmouth and Cleveland Coast SPA

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EC Directive 79/409 on the Conservation of Wild Birds
Special Protection Area (SPA)

Name: Teesmouth and Cleveland Coast SPA

Unitary Authority/County: Durham County Council, Hartlepool Borough Council, Redcar & Cleveland Borough Council, Stockton-on-Tees Borough Council.

Consultation proposal: The existing Teesmouth and Cleveland Coast SPA was classified on 15 August 1995; an extension to that area has been recommended to enlarge the area within the Tees Estuary and along part of the foreshore to the north because of the site's European ornithological interest.

The Teesmouth and Cleveland Coast Special Protection Area is a wetland of European importance, comprising intertidal sand and mudflats, rocky shore, saltmarsh, freshwater marsh and sand dunes. Large numbers of waterbirds feed and roost on the site in winter and during passage periods; in summer Little Terns breed on the sandy beaches within the site.

Boundary of SPA: The original SPA includes all or parts of Seal Sands SSSI; Seaton Dunes and Common SSSI; Cowpen Marsh SSSI; Redcar Rocks SSSI; and South Gare and Coatham Sands SSSI. The extended area is within or coincident with the above SSSI boundaries and will also include parts of Durham Coast SSSI and all of Tees and Hartlepool Foreshore and Wetlands SSSI. For boundary of extended SPA see map.

Size of SPA: The extension covers an area of 304.75 ha, giving a revised SPA area of 1247.31 ha.

European ornithological importance of SPA: The extended SPA is of European importance because:

a) the site qualifies under **article 4.1** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the GB populations of the following species listed on Annex I, in any season:

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

b) the site qualifies under **article 4.2** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the biogeographical populations of the following regularly occurring migratory species (other than those listed on Annex I), in any season:

Migratory species	5 year peak mean	% of population
Knot *Calidris canutus islandica*	5,509 individuals - wintering (1991/92 - 1995/96)	1.6% NE Can/Grl/Iceland/UK
Redshank *Tringa totanus totanus*	1,648 individuals - passage (1987 - 1991)	1.1% Eastern Atlantic (wintering)

c) the site qualifies under **article 4.2** of the Directive (79/409/EEC) as it is used regularly by over 20,000 waterfowl in any season:

Period	Season	Population
1991/92 - 1995/96	Wintering	21,312 individuals

d) The wintering waterfowl assemblage qualifying under **article 4.2** includes the wintering species of European importance, as well as the following species in numbers of national importance:

Species	5 year peak mean	% GB population
Cormorant *Phalacrocorax carbo*	140 individuals – wintering (1993/94 - 1997/98)	1.1%
Shelduck *Tadorna tadorna*	1,030 individuals - wintering (1993/94 - 1997/98)	1.4%
Teal *Anas crecca*	1,265 individuals - wintering (1987/88 - 1991/92)	1.3%
Shoveler *Anas clypeata*	129 individuals - wintering (1991/92 - 1995/96)	1.3%
Sanderling *Calidris alba*	601 individuals - wintering (1993/94 - 1997/98)	2.6%

Non-qualifying species of interest: Marsh Harrier *Circus aeruginosus* (Annex I species) occurs on passage in small numbers and once bred (1996).

Status of SPA:

1) Teesmouth and Cleveland Coast was classified as a Special Protection Area on 15 August 1995.
2) Consultations commenced on the proposal to extend the site on 29 September 1999.
3) The extended area of Teesmouth and Cleveland Coast SPA was classified on 31 March 2000.

European Site Conservation Objectives for Teesmouth and Cleveland Coast Special Protection Area Site Code: UK9006061

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features' listed below), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- **The extent and distribution of the habitats of the qualifying features**
- **The structure and function of the habitats of the qualifying features**
- **The supporting processes on which the habitats of the qualifying features rely**
- **The population of each of the qualifying features, and,**
- **The distribution of the qualifying features within the site.**

This document should be read in conjunction with the accompanying *Supplementary Advice* document, which provides more detailed advice and information to enable the application and achievement of the Objectives set out above.

Qualifying Features:

A143 *Calidris canutus*; Red knot (Non-breeding)
A162 *Tringa totanus*; Common redshank (Non-breeding)
A191 *Sterna sandvicensis*; Sandwich tern (Non-breeding)
A195 *Sterna albifrons*; Little tern (Breeding)
Waterbird assemblage

This is a European Marine Site

This SPA is a part of the Teesmouth and Cleveland Coast European Marine Site (EMS). These Conservation Objectives should be used in conjunction with the Regulation 35 Conservation Advice document for the EMS. For further details about this please visit the Natural England website at: http://www.naturalengland.org.uk/ourwork/marine/protectandmanage/mpa/europeansites.aspx or contact Natural England's enquiry service at enquiries@naturalengland.org.uk or by phone on 0845 600 3078.

Explanatory Notes: European Site Conservation Objectives

These Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2010 (the "Habitats Regulations") and Article 6(3) of the Habitats Directive. They must be considered when a competent authority is required to make a 'Habitats Regulations Assessment' including an Appropriate Assessment, under the relevant parts of this legislation.

These Conservation Objectives and the accompanying Supplementary Advice (where this is available) will also provide a framework to inform the management of the European Site under the provisions of Articles 4(1) and 4(2) of the Wild Birds Directive, and the prevention of deterioration of habitats and significant disturbance of its qualifying features required under Article 6(2) of the Habitats Directive.

These Conservation Objectives are set for each bird feature for a Special Protection Area (SPA). Where the objectives are met, the site will be considered to exhibit a high degree of integrity and to be contributing to achieving the aims of the Wild Birds Directive.

Publication date: 30 June 2014 (Version 2). This document updates and replaces an earlier version dated 29 May 2012 to reflect Natural England's Strategic Standard on European Site Conservation Objectives 2014. Previous references to additional features identified in the 2001 UK SPA Review have also been removed.

Appendix 8.1

Screening matrices (for the Harbour facilities, alone and in combination)

The following provides a key to the letters and symbols included in **Tables 1 and 2** below:

✓ = Likely significant effect cannot be excluded.

x = Likely significant effect can be excluded.

C = construction.

O = operation.

D = decommissioning.

Table 1 Potential for LSE on the Teesmouth and Cleveland Coast SPA

Teesmouth and Cleveland Coast SPA															
Distance to Proposed Scheme: 900m from the Harbour facilities															
European site features	**Likely effects of proposed scheme**														
	Coastal processes			***Habitat Loss / change***			***Disturbance***			***Water/sediment quality***			***In-combination***		
	C	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]
Little tern (breeding)	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [a]	✓ [a]	✓ [a]	✗ [c]	✓ [b]	✓ [b]	✗ [c]
Sandwich tern (passage)	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [a]	✓ [a]	✓ [a]	✗ [c]	✓ [b]	✓ [b]	✗ [c]
Knot	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [a]	✓ [a]	✓ [a]	✗ [c]	✓ [b]	✓ [b]	✗ [c]
Redshank	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [a]	✓ [a]	✓ [a]	✗ [c]	✓ [b]	✓ [b]	✗ [c]
Waterbird assemblage	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [a]	✓ [a]	✓ [a]	✗ [c]	✓ [b]	✓ [b]	✗ [c]

[a] see **Table 8.2** for evidence supporting conclusions.

[b] see **Table 8.7** for evidence supporting conclusions.

[c] Decommissioning of the Harbour facilities would only involve removal of the overland conveyor and therefore there is no potential for an effect on coastal processes, habitats or water and sediment quality. Given that the decommissioning works would take place in 100 years' time, in combination effects cannot be reasonably foreseen and have been screened out.

Table 2 Potential for LSE on the Teesmouth and Cleveland Coast Ramsar site

Teesmouth and Cleveland Coast Ramsar site															
Distance to Proposed Scheme: 900m from the Harbour facilities															
Ramsar site features	**Likely effects of proposed scheme**														
	Coastal processes			***Habitat Loss / change***			***Disturbance***			***Water/sediment quality***			***In-combination***		
	C	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]
Common redshank (passage)	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [a]	✓ [a]	✓ [a]	✗ [c]	✓ [b]	✓ [b]	✗ [c]
Red knot (wintering)	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [a]	✓ [a]	✓ [a]	✗ [c]	✓ [b]	✓ [b]	✗ [c]
Waterbird assemblage	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [c]	✓ [a]	✓ [a]	✗ [a]	✓ [a]	✓ [a]	✗ [c]	✓ [b]	✓ [b]	✗ [c]

[a] see **Table 8.2** for evidence supporting conclusions.

[b] see **Table 8.7** for evidence supporting conclusions.

[c] Decommissioning of the Harbour facilities would only involve removal of the overland conveyor and therefore there is no potential for an effect on coastal processes, habitats or water and sediment quality. Given that the decommissioning works would take place in 100 years' time, in combination effects cannot be reasonably foreseen and have been screened out.

Appendix 8.2

Screening matrices (for YPP, alone and in combination)

[Provided as information relating to the screening exercise undertaken for the YPP]

Introduction

The HRA Screening exercise included all elements of the YPP. The results of this exercise in relation to the North York Moors SAC, North York Moors SPA and Arnecliff and Park Hole Woods SAC (as well as the Teesmouth and Cleveland Coast SPA and Ramsar site) are set out in the tables below.

HRA Screening

Table 1 Summary of the potential effects associated with the YPP that could affect European designated sites

Designation	Potential effects	Presented in screening matrices as
North York Moors SAC	The direct effect of dust generated during construction, for example from the earthworks and use of the haul roads, and operation settling onto the habitats.	Dust
	Indirect effects associated with the emissions on and around the development sites (including vehicle emissions) and deposition of nitrogen from the generator ventilation stacks.	Emissions
	Indirect effects associated with airborne emissions associated with increased vehicular movements (road traffic) which could result in changes in nitrogen deposition (although because the prevailing wind is from the south west this change is not expected to be significant).	Emissions
	Indirect effects associated with lighting requirements for the construction and operation of the development on bird and bat populations using the SAC.	Disturbance
	Alteration to ground and surface water flows effecting water dependent habitats and species within the SAC.	Alteration to ground and surface water
North York Moors SPA	Disturbance to birds (merlin and golden plover) from noise and visual disturbance.	Disturbance
	Indirect effects associated with the emissions on and around the development sites (including vehicle emissions) and deposition of nitrogen from the generator ventilation stacks.	Emissions
	Indirect effects associated with airborne emissions in the form of dust generated from earthworks and haul roads and associated with the increased vehicular movements which could result in changes in nitrogen deposition rates.	Emissions

Designation	Potential effects	Presented in screening matrices as
	Alteration to ground and surface water flows effecting water dependent habitats and species within the SPA.	Alteration to ground and surface water
Arnecliff and Park Hole Woods SAC	The direct effect of dust generated during construction, for example from the earthworks, and operation settling onto the habitats.	Dust
	Indirect effects associated with the emissions on and around the development sites (including vehicle emissions) and deposition of nitrogen from the generator ventilation stacks.	Emissions
	Alteration to groundwater effecting water dependent habitats within the SAC.	Alteration to ground and surface water
Teesmouth and Cleveland SPA and Ramsar site	Changes in coastal processes affecting the extent of feeding habitat. Disruption to the sediment budget (e.g. loss of fluvial sediment to offshore disposal sites due to maintenance dredging and potential impacts to bird feeding and interruption of sediment flow to Coatham Sands due to offshore disposal of maintenance dredged material).	Coastal processes
	Potential for direct take or physical disturbance of contributory habitat (e.g. the intertidal foreshore, Bran Sands lagoon and Dabholm Gut). Potential implications for water levels in Bran Sands lagoon due to changes in permeability of the existing embankment between the lagoon and the Tees estuary due to construction of the proposed port terminal.	Habitat loss / change
	Disturbance to feeding and roosting areas for overwintering and passage birds (e.g. visual disturbance arising from personnel movements and lighting).	Disturbance
	Effects on food resources due to reduced water quality following dredging and deposition of sediment disrobed during dredging in intertidal areas. Effect on water quality in Bran Sands lagoon.	Water and sediment quality

Table 2 Potential for LSE on the North York Moors SAC

Distance to Proposed Scheme: Adjacent to the Mine surface site and Lockwood Beck Intermediate Shaft Site													
European site features	**Project Element**	**Likely Effects of Proposed Scheme**											
		Dust			***Alteration to (surface water) [c] and groundwater***			***Emissions***			***In-combination***		
		C	***O***	***D [d]***	***C***	***O***	***D [d]***	***C***	***O***	***D [d]***	***C***	***O***	***D [d]***
Northern Atlantic wet heaths with Erica tetralix	Mine	✗[a]	✗[a]	✗[a]	✓[a]	✓[a]	✓[a]	✓[a]	✓[a]	✓[a]	✓[b]	✓[b]	✓[b]
	Lady Cross Plantation												
European dry heaths	Lockwood Beck	✗[a]	✗[a]	✗[a]	✗[a]	✗[a]	✗[a]	✓[a]	✓[a]	✗[a]	✓[b]	✓[b]	✗[b]
Blanket bogs	Tocketts Lythe												
	MHF												
	Harbour facility												

NOTE: The cross references to Tables and supporting evidence below relate to the HRA that was submitted with the planning applications for the Mine and MTS and MHF which accompanies this DCO application (as Appendix 3 to **Document 7.3** – Project Position Statement).

[a] see Table 8.2 for evidence supporting the conclusions.

[b] see Table 8.6 for evidence supporting the conclusions.

[c] no effects are predicted with respect to surface water.

[d] for the purposes of this exercise, effects during the decommissioning phase at the Mine are taken to be as for the construction phase; at the Intermediate Shaft Sites effects during decommissioning are predicted to be very limited (as the works would be limited) and hence LSE has been 'screened out'.

Table 3 Potential for LSE on the North York Moors SPA

Distance to Proposed Scheme: Adjacent to the Mine and Lockwood Beck Intermediate Shaft Site													
European site features	**Project Element**	**Likely Effects of Proposed Scheme**											
		Disturbance			***Emissions***			***Alteration to (surface water)[c] and groundwater***			***In-combination***		
		C	***O***	***D*** [d]	***C***	***O***	***D*** [d]	***C***	***O***	***D*** [d]	***C***	***O***	***D*** [d]
Golden Plover *Merlin*	Mine	✓[e]	✓[e]	✓[e]	×[e]	×[e]	×[e]	×[e]	×[e]	×[e]	✓[b]	✓[b]	×[b]
	Lady Cross Plantation												
	Lockwood Beck	✓[e]	✓[e]	×[e]	×[e]	×[e]	×[e]	×[e]	×[e]	×[e]	✓[b]	✓[b]	×[b]
	Tocketts Lythe												
	MHF												
	Harbour facility												

NOTE: The cross reference to Table 8.3 relates to the HRA that was submitted with the planning applications for the Mine and MTS and MHF which accompanies this DCO application (as Appendix 3 to **Document 7.3** – Project Position Statement).

[e] see Table 8.3 for evidence supporting the conclusions.

Table 4 Potential for LSE on the Arnecliff and Park Hole Woods SAC

Distance to Proposed Scheme: 3km from Lady Cross Plantation Intermediate Shaft Site										
European site features	**Project Element**	**Likely Effects of Proposed Scheme**								
		Dust [f]			***Alteration to (surface water)*** [c] ***and groundwater*** [f]			***In-combination*** [f]		
		C	***O***	***D***	***C***	***O***	***D***	***C***	***O***	***D***
Old Sessile Oak woods with Ilex and Belchnum *Trichonmanes speciosum, Killarney Fern*	Mine									
	Lady Cross Plantation									
	Lockwood Beck									
	Tocketts Lythe									
	MHF									
	Harbour facility									

NOTE: The cross reference to Table 8.4 below relates to the HRA that was submitted with the planning applications for the Mine and MTS and MHF which accompanies this DCO application (as Appendix 3 to **Document 7.3** – Project Position Statement).

[f] see Table 8.4 for evidence supporting conclusions.

Appendix 10.1

Integrity matrices for the Harbour facilities

For the Harbour facilities likely significant effects have been identified for the following sites:

- Teesmouth and Cleveland Coast SPA.
- Teesmouth and Cleveland Coast Ramsar site.

These sites have been subject to further assessment in order to establish if the Harbour facilities NSIP could have an adverse effect on their integrity. Evidence for the conclusions reached on integrity is detailed within the footnotes to the matrices below.

Matrix Key:

✓ = Adverse effect on integrity cannot be excluded

✕ = Adverse effect on integrity can be excluded

C = construction

O = operation

D = decommissioning

Stage 2 Matrix 1: Teesmouth and Cleveland Coast SPA

Teesmouth and Cleveland Coast SPA															
Distance to Proposed Scheme: 900m from the Harbour facilities															
European site features	**Adverse effect on integrity**														
	Coastal processes			***Habitat Loss / change***			***Disturbance***			***Water/sediment quality***			***In-combination***		
	C	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]
Little tern (breeding)	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [b]	× [b]	× [b]
Sandwich tern (passage)	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [b]	× [b]	× [b]
Knot	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [b]	× [b]	× [b]
Redshank	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [b]	× [b]	× [b]
Waterbird assemblage	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [b]	× [b]	× [b]

[a] Section 10.3 and Section 10.4

[b] Section 11.3 and Section 11.4

Stage 2 Matrix 2: Teesmouth and Cleveland Coast Ramsar site

Teesmouth and Cleveland Coast Ramsar site															
Distance to Proposed Scheme: 900m from the Harbour facilities															
Ramsar site features	**Adverse effect on integrity**														
	Coastal processes			***Habitat Loss / change***			***Disturbance***			***Water/sediment quality***			***In-combination***		
	C	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]	***C***	***O***	***D*** [c]
Common redshank (passage)	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [b]	× [b]	× [b]
Red knot (wintering)	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [b]	× [b]	× [b]
Waterbird assemblage	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [a]	× [b]	× [b]	× [b]

[a] Section 10.3 and Section 10.4

[b] Section 11.3 and Section 11