

7 MARINE BIOLOGY

This section describes the ecological quality of the proposed placement site and the surrounding area and considers the impacts of the placement operation on the ecology.

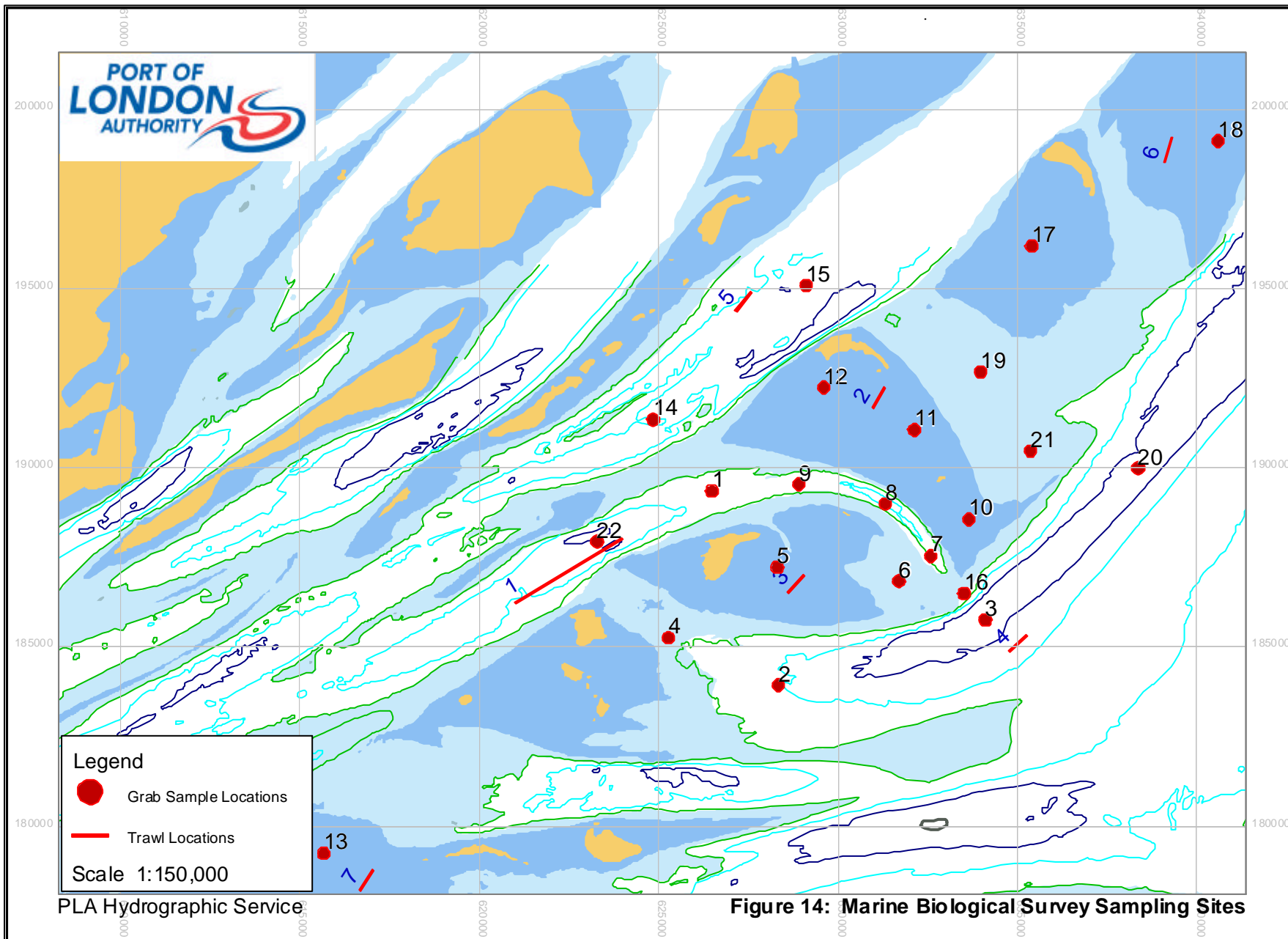
7.1 Existing Environment

A marine biological survey was carried out in early October 2003 to provide information of the numbers and types of species within the North Edinburgh Channel and surrounding area. The design of the survey was informed by the results of previous marine biological surveys undertaken in Princes Channel and for the proposed London Gateway Development. These previous surveys also provided information on seasonality as they covered differing times of the year. The survey comprised the collection of seabed material using Mini-Hamon and Shipek grab samples from 22 stations including two reference sites located beyond the limits of the tidal excursion. Replicates were collected from a number of sites to provide a total of 142 samples for analysis. Otter trawl tows were also carried out to assess the epifaunal communities and demersal fish within the survey area. The survey design and sampling locations were agreed in advance with CEFAS and the Environment Agency. The survey area and sample locations are shown on Figure 14. A detailed description of the survey methodology can be found in Appendix G on the accompanying CD-ROM.

7.1.1 Macrobenthic Conditions

A total of 109 species were recorded during the survey with only three of these being represented by sessile epifaunal taxa. The benthic macrofauna of the Edinburgh Channel survey area may be regarded as relatively typical of shallow water, gravely sand and silty sand substrates around the UK and particularly of the North Sea. The top ranking macrobenthic species recorded from the grab samples included species that are amongst the 30 most frequently recorded species in the North Sea as identified by Heip & Craeymeersch, 1995; including *Spiophanes bombyx*, *Scoloplos armiger*, *Goniada maculate*, *Mysella bidenta*, *Bathyporeia elegans*, *Magelona johnstoni* and *Notomastus latericeus* (EMU, 2004). Species identified across the area comprised a mixture of sand-dwellers such as the polychaetes *Nephtys cirrosa* (and other *Nephtyidea* species), *Ophelia borealis*, *Urothoes* species and *Bathyporeia* species, and those species indicative of relatively stable substrate affected by mobile sediments such as the Sand Mason worm *Lanice conchilega*.

The Ross Worm *Sabellaria spinulosa* was recorded from the survey area but only occurred at 2 sites (samples locations 1 and 13). Numbers were extremely low and are not indicative of reef formations (EMU, 2004). *S. spinulosa* is naturally common around the British Isles with a wide distribution and in the majority of its range it does not form reefs but it mostly solitary living attached to small pebbles etc. No rare or protected macrobenthic species were noted during this study (EMU, 2004).



The similarity analysis of the macrobenthic data identified three main sample groupings (Clusters A and B and C) which exhibited biological differences. However, given that all three clusters supported a number of similar species, it would be more appropriate to describe these groupings as local faunal/sediment associations, rather than distinct communities (EMU, 2004).

Cluster A represented a patchy, gravely sand association, characterised by a relatively diverse macrobenthic community with high biomass. This Cluster contrasted with the more impoverished, mobile sand association of Cluster C, where the numbers of species, abundance and biomass were all low in comparison. Cluster B was indicative of a highly patchy silt and sand community with gravel influences, where the number of species was high in comparison to the clean mobile sand, but the abundance and biomass of these species was low suggesting the seabed environment was mobile in nature. The identity of dominant species within all clusters are recognised as mobile sand tolerant species (EMU, 2004).

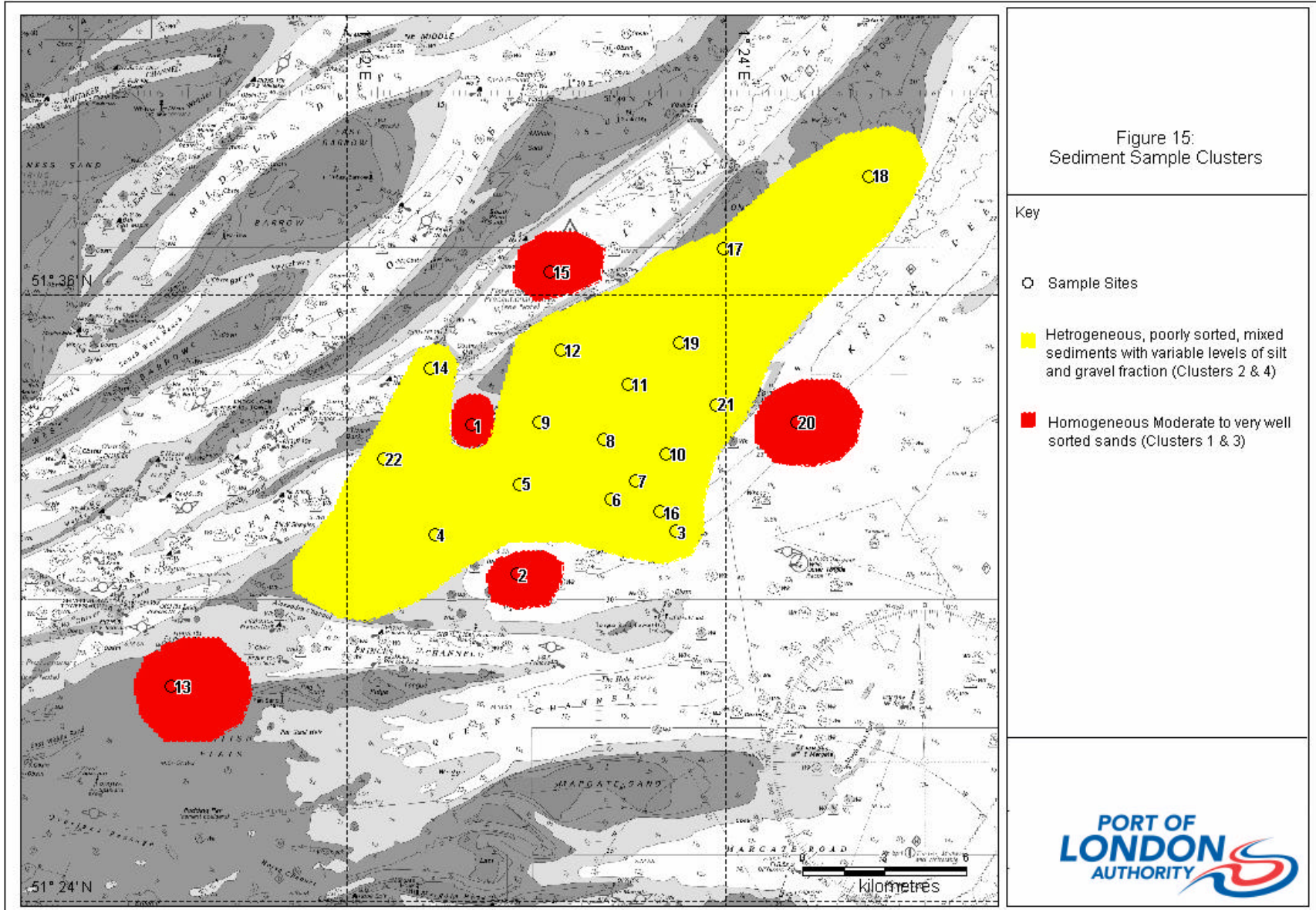
The seabed at the proposed sand placement site formed part of Cluster C, impoverished mobile sand (see Figure 15). However, sample 1 located outside the western end of the proposed site was identified as Cluster A, with its higher diversity and biomass associated with a gravely sand seabed.

7.1.2 Epifaunal Species

Fauna caught within the Otter trawls were broadly characteristic of the estuarine assemblage described by Rees *et al* (1999). The Otter trawl exercises revealed a number of other species that are capable of surviving the rigours of mobile sand banks in the survey area. These included larger epibenthic species, such as brown shrimps, hermit crabs and other crab species. These types of species may possibly avoid the compaction forces of the mobile sand sediments by living in the sediment surface rather than within the substrate (EMU, 2004).

Epibenthic species, which live on the seabed surface, were relatively typical of the estuarine and east coast gravely assemblages described by Rees *et al* (1999) and a reflection of the habitats evident from the grab samples within the vicinity of each trawl line. Generally, these assemblages were characterised by the brown shrimp, *Crangon crangon*, sessile epifauna, *Electra pilosa* (seamat), Hydroid turf (sea firs), hermit crabs (Paguridae), *Macropodia* spp, *Alcyonium diaphinum*, *Vesiculosa spinosa*, *Hydrallmania falcate*, *Flustra foliacea* and Gobies (Gobiidae spp.). This type of assemblage has been previously recorded from the Thames Estuary area and is considered typical for the region (EMU, 2004). Other epifaunal species, which are characteristic of the study area, included the swimming crab *Liocarcinus depurator* and the hydroid *Obelia bidentata*.

A detailed description of the ecological conditions in the survey area is contained in Appendix G on the accompanying CD-ROM.



7.2 Change to Seabed Habitat

7.2.1 Impact Description

The seabed habitat in the vicinity of the disposal site is described as impoverished mobile sand with both infauna and epifauna characteristic of this type of habitat in the North Sea. The placement operation will result in a layer of mobile fine sand upon the existing mobile fine sand layer thus providing the same habitat to the species in the area. Dispersion of sand from the site will occur in the same manner as the present situation and local areas of accumulation outside of the placement site are not predicted. It is considered that there will be no change to the seabed habitat following the sand placement operation.

The presence of the more biologically diverse pocket of heterogeneous sand adjacent to the western boundary of the site cannot be easily explained as the particle size data indicates the sediment is the same as that found in immediately adjacent areas. Further, the area is subjected to the same tidal current and wave actions.

It is considered that placement of sand on this biologically diverse area would be of **moderate adverse significance**.

7.2.2 Mitigation

Direct impacts on the more diverse area will be avoided and the sand placement will take place at a minimum distance of 100m from the area. The existence of this localised diverse site will be noted in the Sand Placement Management Plan.

7.2.3 Residual Impact

The residual impact is considered to be of **minor adverse significance** due to the proximity of the area to the western boundary of the placement area.

7.3 Smothering of Epibenthos and Epifauna

Epibenthos and epifauna living on or within the sand in the North Edinburgh placement site will be smothered during the sand placement operation. Placement will occur for one minute, once every three hours and will affect only a small area of the placement site on each occasion. It is unlikely that species will be able to form escape tunnels through the 1.5m of sand although movement may be possible through the sides of the mound.

As the seabed habitat will not be changed by the operation, it is considered that epifauna and epibenthos will quickly recolonise each mound by moving from adjacent areas. The initial smothering of species is considered of **minor adverse significance** due to the impoverished nature of the habitat, the small area affected on each occasion and the short term duration of the effect.

7.3.1 Mitigation

It is not considered possible to mitigate for this impact.

7.3.2 Residual Impact

The residual impact of smothering epibenthos is of **minor adverse significance**.

7.4 Impact to Protected Species

No rare or protected species were recorded during the survey. The Ross Worm was observed in extremely low numbers at only two sites, one of which was on the Long Sand to the north east of the placement site and the other is located just outside the western boundary of the placement site. The findings are not considered indicative of reef formations but represent the common distribution of the Ross Worm. **No impacts** are predicted to rare or protected species.

7.5 South Falls Disposal Site

There is no available information on the marine biology of the South Falls site, however, as it is on a more stable seabed it may be expected to have a higher species diversity than the North Edinburgh Channel. Species diversity, abundance and biomass may be affected, to some extent, by the disposal activities but the site is not subject to a high degree of usage and such activities may provide crevices and other habitats. The placement of 2.5Mm³ of sand at the South Falls sites would blanket the existing habitats and smother species that may not be adapted to living in mobile sand conditions. However, the site is a recognised disposal area and such impacts within the site may be considered acceptable.

7.6 Summary of Predicted Impacts

Table 11 summaries the predicted potential impacts, any mitigation measures and the residual impact.

Table 11 Summary of Potential Impacts on Marine Biology

IMPACT TITLE	SIGNIFICANCE LEVEL	MITIGATION	RESIDUAL IMPACT	COMMENTS
Change in Seabed habitat	Moderate Adverse	Avoid biologically diverse area.	Minor Adverse	Applies only to 1 localised site
Smothering of Epibenthos/Epifauna	Minor Adverse	None	Minor Adverse	-
Impact to Protected Species	None	None Required	None	-

Given that the residual impacts of all impacts are considered to be minor adverse, no significant cumulative effects from the individual impacts are predicted.

7.7 Monitoring

As agreed with the Environment Agency, a repeat marine biological survey will be undertaken on completion of the placement operations to assess any changes in the study area. The survey design and specification will be based on the existing survey and details will be agreed with the Environment Agency and CEFAS in due course.