12 FISHERIES AND FISHING ACTIVITY

12.1 CONSTRUCTION PHASE

12.1.1 Deterioration in the quality of fish feeding resource and loss of feeding habitat

1. Capital (and subsequent maintenance) dredging results in disturbance to the seabed and has an effect on the structure of the benthic community. Generally, it would be expected that a community that is of lower species richness would result due to dredging when compared with the pre-dredge situation. There is, however, often a high abundance of a small number of species that are adapted to survive in highly disturbed conditions. The predicted impact of dredging on benthic community structure was clearly demonstrated in the biological surveys for the FSR ES (Posford Haskoning, 2003b). In addition to this impact, reclamation of the intertidal and subtidal zone results in the permanent loss of potential feeding areas for fish.

2. The proposed Bathside Bay development would result in the loss of a total of 69ha of intertidal area due to the reclamation and the creation of a small boat harbour. The Felixstowe South Reconfiguration would result in the loss of 28.4ha of mainly subtidal and some intertidal area due to reclamation. Therefore, the in-combination effect would be a loss of 97.4ha of seabed, constituting 70.7ha of intertidal and 26.7ha of subtidal habitat.

3. The capital dredging for the proposed Bathside Bay development would have an impact on 39.5ha of subtidal area; this compares with an impact on 40ha due to the capital dredging associated with the Felixstowe South Reconfiguration. Therefore, in-combination, there would be an impact on 79.5ha of subtidal habitat.

4. The above impacts were assessed as part of the environmental assessments for both developments. The conclusions were that the effect on the quality of the feeding resource and the permanent loss of habitat were considered to be, at worst, of moderate adverse significance locally (i.e. within the affected area). The impact of the reclamation associated with the FSR development is considered to be of lower significance than this, as the reclamation would only affect benthic communities already highly disturbed by maintenance dredging; although the area of capital dredging to the west of the existing channel would affect a diverse biological community.

5. A study on the overall health of the estuarine ecosystem, focusing on the fisheries resource, and based on fisheries survey data collected over a number of years was commissioned by the HHA in 2002. The report concluded that the reclamation of potential fisheries habitat in the estuary (flatfish nursery grounds at Bathside Bay and the channel edges) is the most important permanent ecosystem effect. In addition, it suggested that the placement of sediment back into the estuary has the potential for chronic effects on both habitat integrity and species biodiversity.

6. It is believed that the effects of the proposed Bathside Bay development on the fisheries ecosystem can be mitigated through appropriate control of the sediment replacement programme (e.g. through the careful timing of placements) and, at a regional scale, the managed realignment of Little Oakley, as well as regular monitoring.

7. Taking into account the above, the in-combination impact is predicted to be of **moderate adverse significance** for the fishery.

12.1.2 Effect of dredging-induced suspended sediment on fish physiology

1. It is predicted that suspended sediment arising from the dredging works for the proposed Bathside Bay development would have an impact of minor adverse significance on fish physiology. This impact also applies for the proposed Felixstowe South Reconfiguration. Under a worst case scenario of both dredging activities commencing at the same time, a larger area of the system would be affected and, therefore, there is the potential for a greater proportion of the fisheries resource to be affected. The in-combination effect is considered to be of **minor to moderate adverse significance.**

12.1.3 Direct uptake of fish during dredging

1. A potential impact of minor adverse significance is predicted for both the proposed Bathside Bay development and the Felixstowe South Reconfiguration. It is, however, considered that in-combination there would not be a long-term impact on the fish populations of the system and the effect would also be of **minor adverse significance.**

12.2 OPERATIONAL PHASE

12.2.1 Potential effect on fish feeding resource

1. The impact of the proposed Bathside Bay development on the feeding resource for the fishery would be of minor adverse significance due to the impact on maintenance dredging on the invertebrate community (i.e. the community would be maintained in a state of low diversity). Although the Felixstowe South Reconfiguration involves relatively minimal widening of the existing approach channel, the benthic community is relatively diverse in this area and, therefore, the potential impact associated with maintenance dredging is considered to be of minor to moderate adverse significance. Overall, the in-combination effect is considered to be of **moderate adverse significance.**

12.2.2 Restriction of access to fishing grounds

1. The potential impact of the proposed Bathside Bay development on the restriction of access to existing fishing grounds would be of moderate adverse significance; the impact of the Felixstowe South Reconfiguration would be of minor adverse significance. In-combination, the impact on fishing activity is considered to be of **moderate adverse significance.**

12.2.3 Potential impact on fisheries due to sediment replacement

1. There is **no potential for an in-combination impact** given that there are no proposals for sediment replacement as part of the Felixstowe South Reconfiguration.

13 TRAFFIC AND TRANSPORTATION

13.1 CONSTRUCTION PHASE

1. The construction phases associated with the proposed Bathside Bay development and the Felixstowe South Reconfiguration would not affect the same part of the road network and, therefore, there is **no potential for in-combination effect**.

13.2 OPERATIONAL PHASE

13.2.1 Potential effect on the road network

1. The combined effect of the Felixstowe South Reconfiguration and the proposal for a new container port at Bathside Bay was considered for the Copdock junction and the A12(T)/A120(T) Crown interchange, the points on the road network where traffic associated with the schemes has the potential to interact.

2. The Highways Agency identified the Copdock junction as requiring assessment with respect to the Felixstowe South Reconfiguration. This junction may also be used by Bathside Bay-related traffic and was, therefore, assessed for combined effects. Similarly, the Highways Agency identified the Crown interchange as requiring assessment with respect to Bathside Bay, and this junction may be used by FSR traffic.

3. The changes in AM and PM peak hour flows from the combined traffic flows are given below in Table 9.

Table 9 Changes in AM and PM Peak Hour Flows from Felixstowe South Reconfiguration and Bathside Bay Traffic

Junction	AM Peak Hour	PM Peak Hour
A14(T)/A12(T)/A1214 Copdock Junction	Less than 3.3%	Less than 4.2%
A12(T)/A120(T) Crown Interchange	Less than 1.2%	Less than 1.2%

4. This table indicates that it is unlikely that the combined volume of traffic would have a material impact on the trunk road network, since the predicted changes in flows are less than 5%. In terms of the total number of vehicles, therefore, the overall impact is expected to be of **negligible significance**.

13.2.2 Potential effect on the rail network

1. The potential in-combination effect on the rail network associated with the Felixstowe South Reconfiguration has been considered in conjunction with future rail movements from the proposed Bathside Bay development.

2. As noted in the TA, the measurement of spare capacity on the rail network is a complex issue and one that is currently subject to ongoing work by the Strategic Rail Authority (SRA) and others. It is, however, acknowledged by various parties that there is currently some spare capacity on the routes out of the Haven Ports towards the West Coast Mainline.

3. Gauge clearance of the cross-country route via Nuneaton will create six additional paths by 2007/8. The Felixstowe South Reconfiguration, together with the Bathside Bay scheme, is forecast at this point to generate a maximum of six trains, which could therefore be accommodated.

4. Capacity improvements on the cross-country route will provide a further 13 paths as a minimum (i.e. a total of 19 additional paths) and possibly up to 26 additional paths (a total of 32). This work could potentially be completed by 2010/11. The two schemes together are forecast, at 2017 and beyond, to generate a maximum of 17 trains, which again could be accommodated. Under such a scenario, the significance of the in-combination growth in freight rail traffic on the rail network is therefore expected to be of **negligible significance**.

5. Whilst HPUK has confidence in its estimates of container traffic by rail for both Bathside Bay and the Felixstowe South Reconfiguration, it has nevertheless examined the question of the distribution of containers from the Haven to more distant parts of the UK. To this end, the viability and desirability of serving some parts of the north of the UK by means of additional transshipment at the Haven ports has been investigated. The effect of this would be that it is extremely unlikely that the forecast level of road-based container traffic would be exceeded, with the balance comprising rail and/or short sea shipping movements.

14 NOISE AND VIBRATION

14.1 CONSTRUCTION PHASE

1. The construction period for Bathside Bay is nominally January 2005 to May 2007 for completion of the Phase 1 development. This is the period associated with the noisiest construction activity, which would be tubular piling for the main quay wall and cofferdam. This could take place between May 2005 and June 2006. The Phase 2 development would follow from this date but does not have any significant noise implications. For Felixstowe South, the whole of the demolition and construction programme is assumed to be April 2004 to July 2007. Within this, quay wall piling would occur from May 2004 to November 2004 for Phase 1 and from December 2005 to April 2006 for the Phase 2 piling.

2. Thus there would potentially be an overlap of some 5 months when quay wall piling operations are proposed to take place at both Bathside Bay and the Port of Felixstowe. However, in reality, it is unlikely that the piling for both developments would occur at the same time. Furthermore, even under worst case conditions, due to the distances involved, the combined noise impact of piling operations would be slight.

3. At Bristol Hill, Shotley Gate, the highest predicted level of construction noise for the Bathside Bay development in the period November 2005 to April 2006 (which includes quay wall construction activity) would be 62 dB $L_{Aeq,\ 1h}$. Without piling this would reduce to 50 dB $L_{Aeq,\ 1h}$. Between December 2005 and April 2006, the predicted noise level at Shotley Gate from the Felixstowe South construction work (including Phase 2 quay wall tubular piling) is 41 dB $L_{Aeq,1h}$. Thus noise from Felixstowe South would only increase construction noise levels at Shotley Gate by 0.5 dB during the quieter periods, and there would be no increase in noise levels during the noisier periods.

4. In Harwich, the nearest properties to Felixstowe South are significantly closer to Bathside Bay. The old town of Harwich, which potentially would be most affected by any combined impact, lies between Bathside Bay and Felixstowe South. Therefore, this part of Harwich would not generally be downwind of both sites at the same time (unlike Shotley Gate). Consequently the resultant noise levels would not normally be additive. Pile driving for the quay wall at Felixstowe South would nevertheless be audible at Harwich. The natural topography of the Harwich peninsular would provide some acoustic screening on the Bathside Bay side of Harwich to Felixstowe South construction noise and *vice versa*.

5. Given this, any combined impact from construction activities is considered to be of **minor adverse significance**.

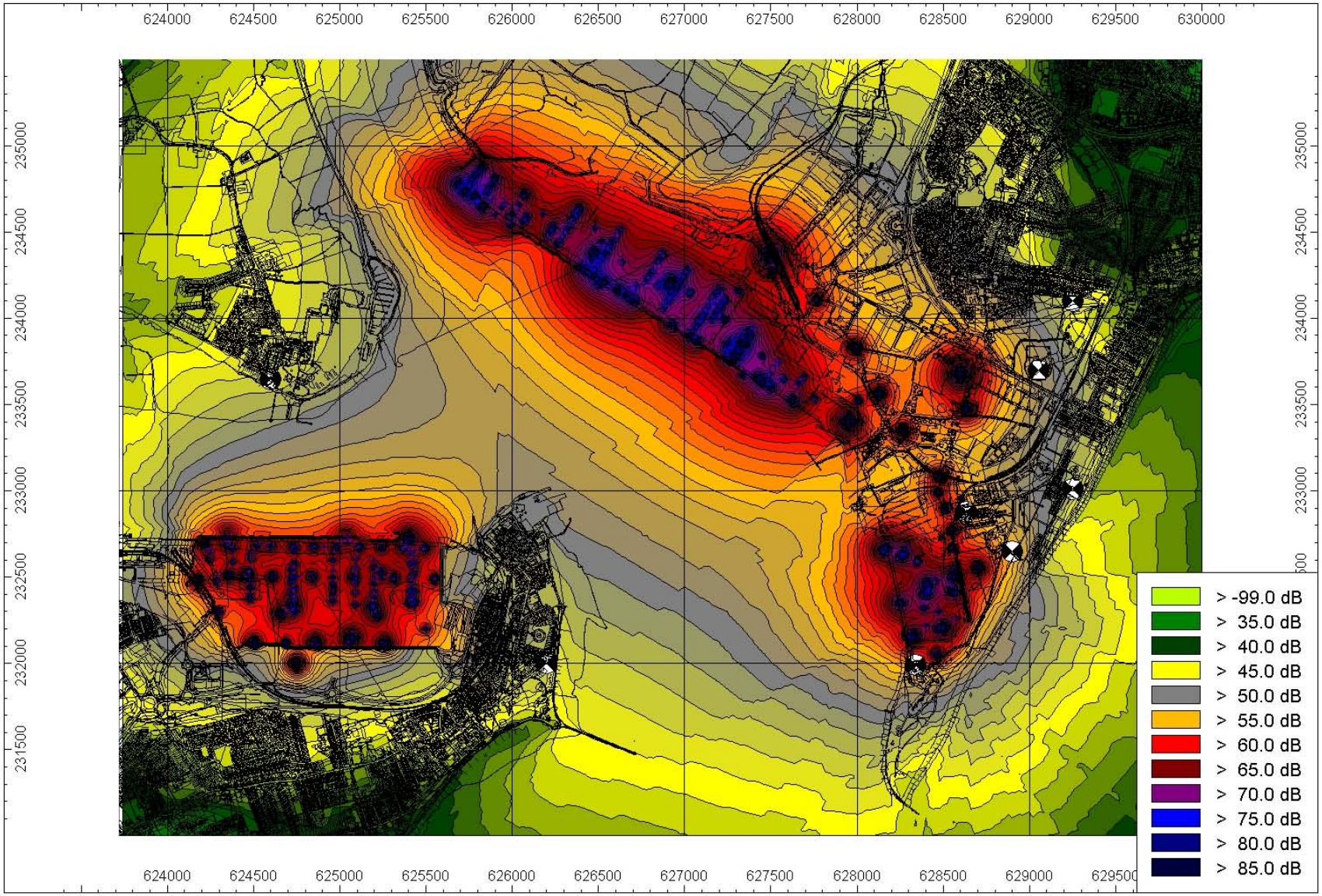


FIGURE 7: L_{night} Noise Contours for Existing Trinity and Landguard Terminals and Proposed Bathside Bay Terminal

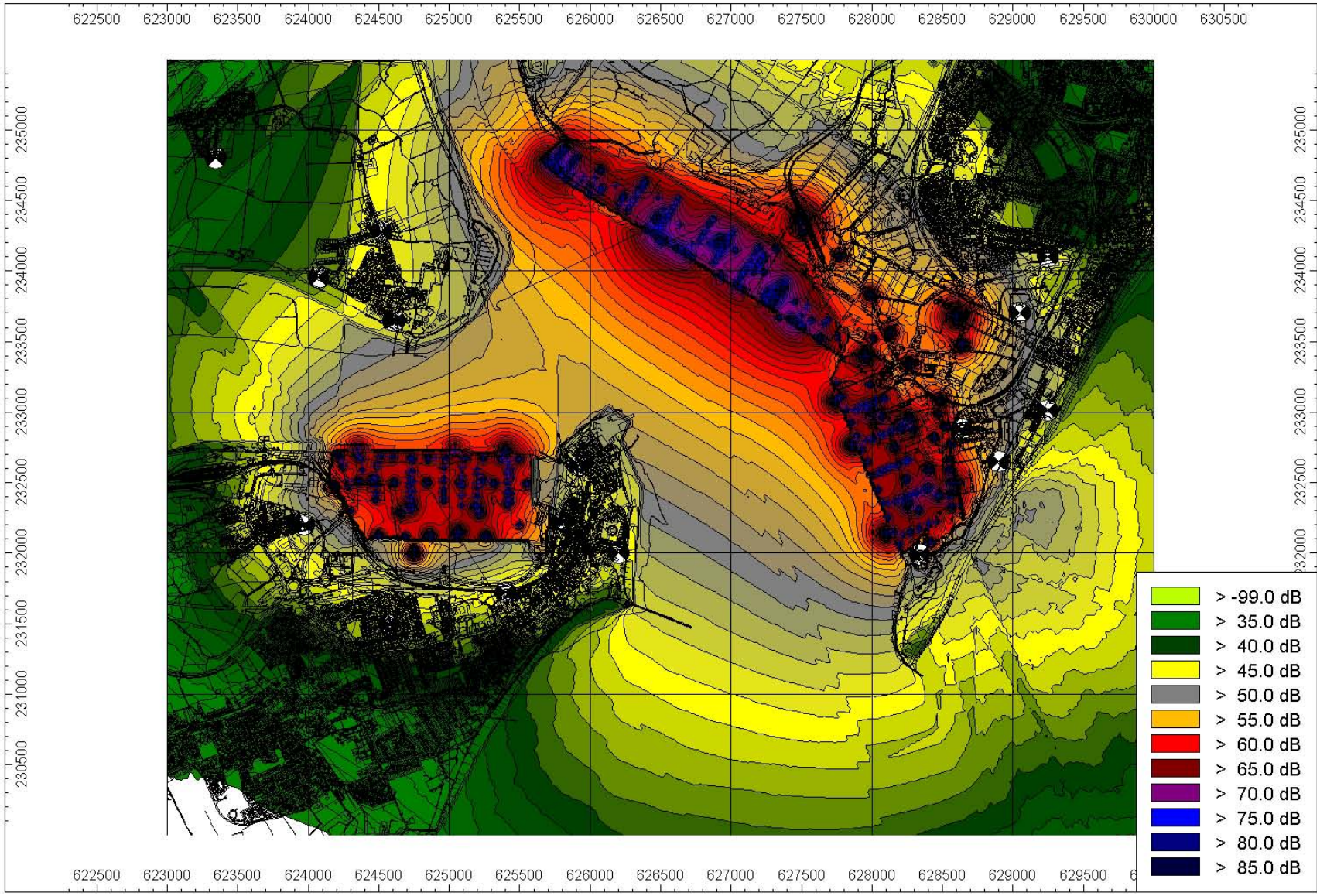


FIGURE 8: L_{night} Noise Contours for Existing Trinity and Proposed Reconfigured Felixstowe South and Bathside Bay Terminals

14.2 OPERATIONAL PHASE

14.2.1 Noise from the operational port

1. The Bathside Bay environmental noise assessment uses a modified form of the L_{night} parameter (long term night-time average L_{Aeq} between 24:00 - 04:00), and the change in this parameter, as one measure of the noise impact of the proposed container port. Similar long-term average night-time noise contours have been generated for the proposed Felixstowe South Reconfiguration using the Cadna noise modelling software. Figure 7 gives the predicted L_{night} contours for the Bathside Bay container port with existing Port of Felixstowe operations. Figure 8 gives the predicted L_{night} contours for Bathside Bay with Felixstowe operations, including the reconfigured Felixstowe South terminal.

2. Apart from changes locally to the southern part of the Port of Felixstowe there are no other significant changes to the noise contours at Harwich or Shotley Gate. This is not surprising as the noise emission from the fully operational reconfigured Felixstowe South terminal would be only marginally greater than that from the existing Landguard terminal, and each is less than the noise emission from the remainder of the Port of Felixstowe. The combined operational noise impact of Felixstowe South with Bathside Bay is, therefore, of **negligible significance**.

14.2.2 Transportation noise

1. Within the vicinity of the existing and proposed ports, and within the study area for the environmental noise assessments, HGV traffic would use a different road network for the Bathside Bay and Felixstowe South container terminals. Therefore, there would be **no combined noise impact** for road traffic noise. A similar argument applies for railway noise.

14.2.3 Increased shipping

1. There would be increased shipping activity within the Haven due to the developments; hence the noise from container ships has been included in the operational noise model (considered in Section 14.2.1 above).

2. Pilot boat activity would increase, and there would be a combined noise impact particularly for those properties on the eastern side of Harwich. However, this impact is considered to be of **minor adverse significance** given the fact that pilot boat speeds have reduced for fuel economy reasons and noise levels from pilot boats can already be expected to be less than when speeds were higher.

14.2.4 Vibration

1. The two port schemes are too far removed from each other to have impact on each with respect to vibration (i.e. **no impact**).

14.2.5 Overall assessment

1. The combined environmental noise and vibration impact of the Bathside Bay and Felixstowe South schemes is of **negligible to minor adverse significance** with respect to the noise and vibration effects of each scheme individually.

15 AIR QUALITY

15.1 CONSTRUCTION PHASE

1. The in-combination effects of the construction phases for the proposed Bathside Bay development and the reconfiguration of Felixstowe South Reconfiguration were not considered in this assessment as it is unlikely that receptors in Felixstowe or Harwich would be affected by works on the opposite side of the estuary. The assessments for the proposed schemes in isolation concluded that the construction impacts from all modelled pollutant sources upon local receptors would not be significant. Generally, fugitive releases of particulate matter would be in the 'coarse' size range and would tend to rapidly fall from the airstream. Studies have shown that only around 20% of total suspended particulate matter from construction activity is in the PM_{10} size range and that the direct impacts would typically arise on site.

2. The DEFRA air quality Technical Guidance Note TG(03) recommends that fugitive dust releases from major construction sites are not significant beyond 1000m from the source. Furthermore, in a screening stage to determine the need for detailed assessment, TG(03) indicates that impacts would not be significant beyond 200m of the source if 2004 background PM_{10} concentrations are below 26µg/m^3. At both locations in Felixstowe and Harwich the background PM_{10} concentrations are well below this threshold (at 19.3µg/m^3 and 19.6µg/m^3 respectively). According to the DEFRA guidance, it is therefore unlikely that the construction activities would have an influence beyond 200m of the individual sites, and an in-combination study would not be required. TG(03) provides evidence of the fall-off in airborne dust levels at distance from fugitive sources and indicates that PM_{10} concentrations reduce to around 18% of the level at the source at a distance of 100m, and to around 8% at 200m.

3. Particulate matter released during construction phase activities typically causes nuisance to local receptors during poorly controlled operations and when dispersion conditions cause an impact on local receptors. These circumstances tend to be short-lived, particularly with a well-controlled dust management programme in place, and (in addition) any periods of elevated dust releases from the two constructions sites are very unlikely to coincide. Therefore, **no in-combination effects** would arise.

15.2 OPERATIONAL PHASE

15.2.1 Introduction

1. Air pollutant releases from the two schemes would vary temporally and spatially, and would mix, interact and be dispersed according to prevailing meteorological conditions. The resulting ground-level pollutant concentrations at receptor locations involves complex atmospheric chemistry, and these *receptor concentrations* are therefore not directly proportional to pollutant *source emissions*[7]. Consequently, an assessment of combined emissions from separate sources can not be made by simple addition or by combining the results for the individual studies. A model was, therefore,

[7] In particular, levels of nitrogen dioxide, a critical determinant of air quality impact, reflect the mix of total oxides of nitrogen, ozone and organic compounds that exist in an equilibrium dependent upon a variety of other atmospheric factors. An increase in total NOx emissions from a source would not necessarily give rise to an equivalent rise in NO_2 concentrations at receptors.

developed to assess the combined effects of emissions from the two developed container ports on receptors in and around the Port of Felixstowe and Bathside Bay.

15.2.2 Modelling approach

1. The base year for the dispersion modelling study was 2023, with the Felixstowe South Reconfiguration fully developed. The air quality assessment for Bathside Bay included a scenario for 2022, but for the purposes of this in-combination study the projected emissions were assumed to be the same in 2023. Model inputs for the combined model were therefore the same as those used in the Bathside Bay 2022 with-development case and the Felixstowe South 2023 with-reconfiguration case.

2. The principal roads and rail sources geographically diverge, and the in-combination effects modelling study focussed on local receptors in Harwich, Shotley and Felixstowe. Emission sources considered were therefore shipping, container port activities and road/rail emissions in the immediate vicinity of the two development sites.

3. Predicted benzene and carbon monoxide concentrations were not significant in either individual study, and so only nitrogen dioxide (NO_2), particulates (PM_{10}) and sulphur dioxide (SO_2) were modelled. The following emission sources at both new quays were considered:

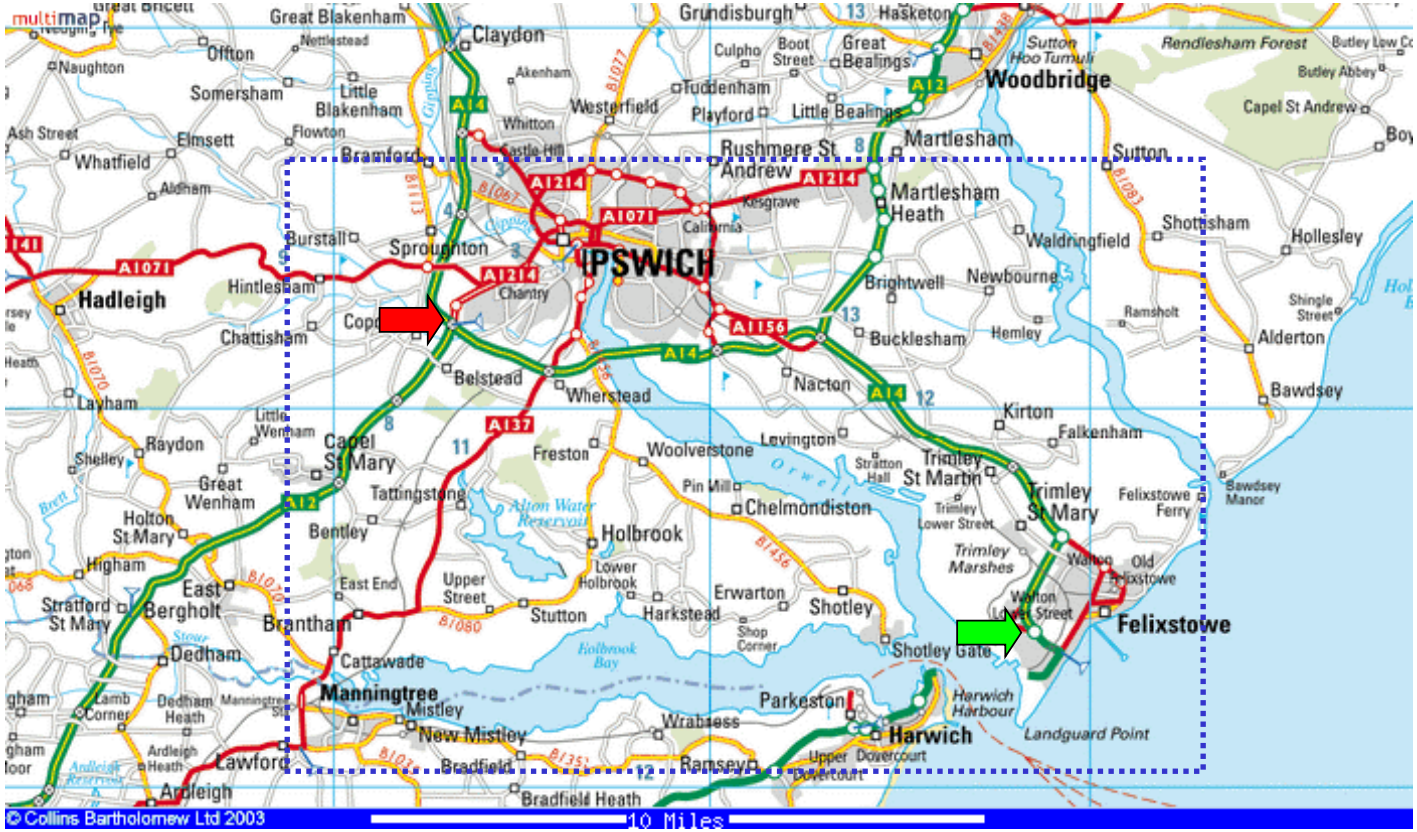
- Shipping movements;
- Berthed ships;
- Maintenance dredging;
- All container port topside activities;
- Rail emissions near to each site (the 2 separate line sources to Trimley, and the single line source to Parkeston); and,
- Road links near to each site (links 1-4 to Parkeston from the Bathside Bay study and links 1 and 2 to Candlet Road from the Felixstowe South Reconfiguration study).

4. Figure 9 shows the modelling domain of Felixstowe and Harwich and the detail of the area, line and point sources in and around the two ports, and depicts the various emission sources for which input values were included.

5. Worst-case meteorological hourly sequential dispersion data from 2001 was used (as detailed in both individual assessment reports).

6. Pollutant background concentrations are higher in Felixstowe than in Harwich as shown by Table 10 below. For the combined modelling study, the higher background pollutant concentrations used in the FSR study were applied, as a worst-case approach.

7. A series of receptor locations were selected from those used in the individual studies which were in closest proximity to the two ports, where the greatest in-combination effects were likely to be encountered, and these are given in Table 11.



Key:

Key	Details	Source Type
	Model domain 24km x 17km (1km grid of results calculated for this area)	
	Start of modelled section of A14	
	End of modelled section of A14 (Additional grid of results calculated along this line)	

Notes:

- Map indicative only
- Based on Ordnance Survey map with the permission of the controller of H.M.S.O. © Crown Copyright. Reproduced under License.

Client: **Hutchison Ports UK Ltd.** HPH	Project: **M5665** **FSR:** **Air Quality Assessment**	Title: **Model overview map showing modelling domain**	ROYAL HASKONING POSFORD HASKONING	DATE: Sep 03 / Not to scale BY: JDE / CHKD: JD **Figure 9**

Table 10 Background pollutant concentrations applied in the individual and in-combination studies

	Felixstowe South	Bathside Bay	In-combination
NOX, mg/m^3	19.4	16.1	**19.4**
NO_2, µg/m^3	14.8	13.1	**14.8**
SO_2, µg/m^3	11.4	4.3	**11.4**
PM_{10}, µg/m^3	17.3	16.3	**17.3**

Table 11 Receptor locations applied in the in-combination study

Receptors in Felixstowe	
R1	Avocet House
R2	Landguard Common SSSI
R3	Landguard Fort Viewpoint
R4	Adastral Close
R5	Suffolk Sands Holiday Park
R6	Langer CP School
R7	Felixstowe Beach Holiday Village
R8	Routemaster Hotel
R9	The Dooley Inn, Ferry Lane
R10	The Downs, close to Port of Felixstowe Road
R11	Spriteshall Lane
Receptors in Harwich and Shotley Bay	
B0	Harwich Tourist Information Centre
B1	Residential Home, Shotley Gate
B2	Bristol Arms PH, Shotley Gate
B3	Harwich Community Primary School
B4	Mayflower Primary School
B5	Larksfield Crescent
B6	Spring Meadow
B7	Harwich High St
B8	Sweden Close

15.2.3 Results

1. The model outputs are given in Tables 12 to 14, presented as the 2022/23 modelled output from each of the individual studies, and the value derived from the in-combination effects study at the equivalent receptor, as follows:

- Table 12 gives the nitrogen dioxide annual means and 99.8th percentile hourly means;
- Table 13 gives the sulphur dioxide 99.7th percentile hourly means and the 99.2nd percentile 24-hour means; and,

Table 12 Modelled nitrogen dioxide annual and hourly means (Bathside Bay, Felixstowe South Reconfiguration and in-combination studies)

		Nitrogen Dioxide Annual Mean			Nitrogen Dioxide Hourly Mean (99.8th %ile)		
Objective, 2005		40 µg/m3 annual mean			200 µg/m3 hourly mean, (99.8th %ile)		
Background concentration		13.1	14.8	14.8	13.1	14.8	14.8
		Bathside Bay	Felixstowe South Reconfiguration	In-combination	Bathside Bay	Felixstowe South Reconfiguration	In-combination
R1	Avocet House	-	20.8	21.8	-	27.3	35.1
R2	Landguard Common SSSI	-	21.3	22.9	-	29.9	36.5
R3	Landguard Fort Viewpoint	-	21.4	23.0	-	29.0	34.9
R4	Adastral Close	-	21.8	23.1	-	28.9	34.5
R5	Suffolk Sands Holiday Park	-	21.1	22.1	-	28.7	32.5
R6	Langer CP School	-	20.8	21.4	-	28.8	30.3
R7	Felixstowe Beach Holiday Village	-	20.9	21.5	-	28.6	30.6
R8	Routemaster Hotel	-	22.9	23.7	-	49.6	50.2
R9	The Dooley Inn, Ferry Lane	-	21.0	21.8	-	30.2	32.2
R10	The Downs, close to Port of Felixstowe Road	-	30.5	30.6	-	70.4	74.4
R11	Spriteshall Lane	-	29.4	24.1	-	70.5	75.1
B0	Harwich Tourist Information Centre	15.8	-	20.6	24.4	-	32.5
B1	Residential Home, Shotley Gate	15.4	-	20.7	24.7	-	35.8
B2	Bristol Arms PH, Shotley Gate	15.5	-	20.7	22.1	-	35.3
B3	Harwich Community Primary School	15.7	-	21.4	21.7	-	36.9
B4	Mayflower Primary School	15.3	-	20.5	22.4	-	34.3
B5	Larksfield Crescent	15.7	-	20.7	23.6	-	32.9
B6	Spring Meadow	15.4	-	20.4	22.2	-	32.2

		Bathside Bay	Felixstowe South Reconfiguration	In-combination	Bathside Bay	Felixstowe South Reconfiguration	In-combination
B7	Harwich High St	15.5	-	21.1	22.2	-	36.6
B8	Sweden Close	16.0	-	20.3	25	-	31.6
Difference (average of all receptors), %		**+33%**	**+1.6%**	**-**	**+48%**	**+11%**	**-**

Table 13 Modelled sulphur dioxide hourly and 24-hourly means (Bathside Bay, Felixstowe South Reconfiguration and in-combination studies)

		Sulphur Dioxide Hourly Mean			Sulphur Dioxide 24-Hourly Mean (99.2nd %ile)		
Objective, 2005		**350 µg/m3 hourly mean, (99.7th %ile)**			**125 µg/m3 24-hourly mean, (99.2nd %ile)**		
Background concentration		**4.3**	**11.4**	**11.4**	**4.3**	**11.4**	**11.4**
		Bathside Bay	**Felixstowe South Reconfiguration**	**In-combination**	**Bathside Bay**	**Felixstowe South Reconfiguration**	**In-combination**
R1	Avocet House	-	35.2	46.8	-	18.0	22.8
R2	Landguard Common SSSI	-	36.8	40.8	-	25.0	26.4
R3	Landguard Fort Viewpoint	-	42.5	44.2	-	23.9	24.9
R4	Adastral Close	-	27.0	37.8	-	19.7	21.8
R5	Suffolk Sands Holiday Park	-	27.4	34.1	-	18.7	21.6
R6	Langer CP School	-	28.7	32.7	-	17.1	18.8
R7	Felixstowe Beach Holiday Village	-	30.7	36.3	-	17.6	18.9
R8	Routemaster Hotel	-	26.4	36.0	-	17.0	19.3
R9	The Dooley Inn, Ferry Lane	-	33.6	45.4	-	19.3	21.9
R10	The Downs, close to Port of Felixstowe Road	-	30.0	39.7	-	15.9	17.5
R11	Spriteshall Lane	-	27.3	35.7	-	14.6	16.0
B0	Harwich Tourist Information Centre	19.4	-	32.5	9	-	19.9
B1	Residential Home, Shotley Gate	28.3	-	46.2	10.5	-	25.6

		Bathside Bay	Felixstowe South Reconfiguration	In-combination	Bathside Bay	Felixstowe South Reconfiguration	In-combination
B2	Bristol Arms PH, Shotley Gate	28	-	44.9	10.8	-	24.8
B3	Harwich Community Primary School	17.9	-	41.1	8.5	-	25.1
B4	Mayflower Primary School	17.7	-	35.4	8.1	-	18.9
B5	Larksfield Crescent	18.6	-	32.0	8.4	-	19.7
B6	Spring Meadow	18.3	-	36.9	7.8	-	18.3
B7	Harwich High St	19.8	-	38.6	8.1	-	22.6
B8	Sweden Close	18.6	-	35.1	8.6	-	18.8
Difference (average of all receptors), %		**+84%**	**+24%**	**-**	**+143%**	**+11%**	**-**

Table 14 Modelled PM_{10} particulate 24-hourly and annual means (Bathside Bay, Felixstowe South Reconfiguration and in-combination studies)

		PM_{10} 24-Hourly Mean			PM_{10} Annual Mean (99.4th %ile)		
Objective, 2005		**50 µg/m^3 24-hour mean, (90.4th %ile)**			**40 µg/m^3 annual mean**		
Background concentration		**16.3**	**17.3**	**17.3**	**16.3**	**17.3**	**17.3**
		Bathside Bay	**Felixstowe South Reconfiguration**	**In-combination**	**Bathside Bay**	**Felixstowe South Reconfiguration**	**In-combination**
R1	Avocet House	-	24.5	24.6	-	24.3	24.4
R2	Landguard Common SSSI	-	24.6	24.8	-	24.4	24.6
R3	Landguard Fort Viewpoint	-	24.6	24.8	-	24.3	24.6
R4	Adastral Close	-	24.6	24.8	-	24.3	24.5
R5	Suffolk Sands Holiday Park	-	24.5	24.7	-	24.3	24.5
R6	Langer CP School	-	24.4	24.6	-	24.3	24.4
R7	Felixstowe Beach Holiday Village	-	24.4	24.6	-	24.3	24.4
R8	Routemaster Hotel	-	24.7	24.6	-	24.3	24.4

		Bathside Bay	Felixstowe South Reconfiguration	In-combination	Bathside Bay	Felixstowe South Reconfiguration	In-combination
R9	The Dooley Inn, Ferry Lane	-	24.5	24.6	-	24.3	24.4
R10	The Downs, close to Port of Felixstowe Road	-	25.1	24.8	-	24.5	24.5
R11	Spriteshall Lane	-	25.1	24.6	-	24.5	24.5
B0	Harwich Tourist Information Centre	19.2	-	24.5	19.1	-	24.3
B1	Residential Home, Shotley Gate	19.2	-	24.6	19.1	-	24.3
B2	Bristol Arms PH, Shotley Gate	19.2	-	24.5	19.1	-	24.3
B3	Harwich Community Primary School	19.2	-	24.7	19.1	-	24.4
B4	Mayflower Primary School	19.1	-	24.5	19.1	-	24.3
B5	Larksfield Crescent	19.2	-	24.5	19.1	-	24.3
B6	Spring Meadow	19.1	-	24.5	19	-	24.3
B7	Harwich High St	19.2	-	24.6	19.1	-	24.4
B8	Sweden Close	19.1	-	24.5	19.1	-	24.3
Difference (average of all receptors), %		**+28%**	**+0.2%**	**-**	**+27%**	**+0.6%**	**-**

- Table 14 gives the PM_{10} 24-hourly 90.4th percentiles and the annual means.

2. These parameters reflect the statistical averaging periods applied in the statutory air quality Objectives to enable a direct comparison.

3. As would be expected, the effect of combined emissions from the two fully developed container ports is to raise the pollutant concentrations at all receptors. The percentage increase over the individual assessment value, as an average of the selected receptor locations in Harwich / Shotley and Felixstowe, is given for each pollutant and parameter in Tables 12 to 14.

Summary of the salient features of the results

4. It appears that receptor locations in Harwich and Shotley would experience a greater impact as a result of the combined developments than would those in Felixstowe (when compared to the impacts of the individual schemes). However, one factor causing this effect is the use of higher background concentrations in the combined modelling than those used for the individual assessment of Bathside Bay. The pollutant contributions from the combined operations have been added to background levels that exist in Felixstowe, rather than the lower levels in Harwich. Application of the 'true' background levels in Harwich would reduce the difference between the individual and in-combination assessments.

5. The greatest impact on both sides of the Stour estuary is on levels of sulphur dioxide, as a result of emissions from the combined shipping movements. The primary impact on both individual schemes was road traffic emission sources. As the routes along the A120 from Bathside Bay and the A14 from Felixstowe diverge, emissions from one road are unlikely to impact on receptors close to the other road, and the combined effect would be similar to the individual effect. However, emissions from ships at either container port would be expected to have an impact on receptors on both sides of the estuary.

6. The combined emissions affect the hourly average values (for NO_2 and SO_2) more than the longer-term daily and annual mean concentrations. Again this is to be expected, as short term peak pollutant concentration values are more influenced by variable short-term meteorological dispersion effects than are the underlying long-term average values.

7. Although the 2023 pollutant concentrations are predicted to be higher with both container ports in operation, at no receptor location does the combined impact cause a breach of the relevant health-based statutory air quality Objectives. The largest effect of the combined operations when compared to the individual assessments is on the Harwich sulphur dioxide values. However, at the receptor in Harwich where the largest impact is shown (B3, Harwich Community Primary School), the in-combination modelled SO_2 concentration is only 7% of the hourly Objective, and 33% of the 24-hourly Objective value.

8. The impact of combined nitrogen and sulphur oxides releases on the Landguard Common Site of Special Scientific Interest (SSSI) is shown in Table 15 below.

Table 15 Modelled annual mean nitrogen oxides and sulphur dioxide concentrations at Landguard Common

Year	Scenario	Receptor: Landguard Common SSSI	
		NOx annual mean, $\mu g/m^3$	SO_2 annual mean, $\mu g/m^3$
Objective (annual mean)		**30**	**20**
2023	FSR	21.3	13.6
2023	Bathside Bay and FSR in combination	22.9	15.8

9. The in-combination modelling results show that NOx and SO_2 annual mean values at the SSSI would be increased with both container ports in use. However, the increases are not significant, and the predicted in-combination concentrations would remain below the relevant vegetation and ecosystems objective value.

15.2.4 Summary

1. The combined effects on air quality of the proposed container port facilities at Felixstowe South and Bathside Bay were assessed using dispersion modelling to determine predicted pollutant concentrations at receptors on either side of the Stour and Orwell estuaries.

2. The results indicate that concentrations of nitrogen dioxide, sulphur dioxide and particulate PM_{10} would be higher at all receptor locations than would be the case for the individual developments.

3. Pollutant concentrations at receptors in Harwich and Shotley appear to be more influenced by the combined operations than do those receptors in Felixstowe. However, this is largely an effect of using the higher background concentrations of Felixstowe in the combined model than those (more locally accurate) values used in the individual modelling of Bathside Bay.

4. The greatest impact would be on sulphur dioxide concentrations, as receptors close to either port are likely to be influenced by shipping emissions in the estuary from both operations. The largest effect of the combined operations when compared to the individual assessments is on the Harwich sulphur dioxide values. However, at the receptor in Harwich where the largest impact is shown, the in-combination modelled SO_2 concentration remains well below the statutory Objective values (7% of the hourly Objective, and 33% of the 24-hourly Objective).

5. At no modelled receptor location does the combined impact cause a breach of any of the statutory SO_2, NO_2 or PM_{10} air quality Objectives.

6. The impact of nitrogen dioxide, sulphur dioxide and PM_{10} particulate matter releases from the Felixstowe South Reconfiguration and the Bathside Bay development were each considered to be of minor adverse significance. This assessment has considered any combined impact of the two schemes and concluded that any in-combination effects are expected to be of **negligible significance**.

16 LANDSCAPE AND VISUAL ENVIRONMENT

16.1 CONSTRUCTION PHASE

1. The magnitude of the effect of construction works for the proposed Bathside Bay development was considered to be slight to substantial, subject to the location of the viewer. However, the significance of the visual impact was considered to be of minor adverse significance overall due to the temporary nature of the works.

2. The magnitude of the effect of the construction works for the Felixstowe South Reconfiguration would vary from slight to moderate, subject to location. However, again, the visual impact is considered to be of minor adverse significance overall due to the temporary nature of the works. The effect on the viewing area car park and Adastral Close is, however, recognised.

3. The magnitude of the in-combination effect, assuming a worst case scenario of Bathside Bay and Felixstowe South Reconfiguration being constructed simultaneously, would also vary subject to location. The intensity of port construction activity with heavy construction plant on local roads, within the sites and within the estuary, as well as the process of reclamation and the erection of cranes and lighting masts, would be marked. Nevertheless, the significance of the combined effect, due to its temporary nature, would remain of **minor adverse significance**. The physical separation of the sites by the estuary mouth itself would minimise impacts. Furthermore, the works would be viewed in conjunction with regular estuary traffic movement on local roads and within the estuary itself.

16.2 OPERATIONAL PHASE

16.1.1 Effects on vegetation and land cover

1. Generally, the significance of the development of Bathside Bay and the reconfiguration of Felixstowe South on vegetation and land cover would lead to relatively minor effects on the wider landscape, however, the impact of both proposed developments would be of **moderate adverse significance locally**. The loss of intertidal mudflats and associated grassland and port hardstanding would have noticeable effects in the local landscape.

16.1.2 Effects on topography

1. The significance of development of both ports on topography would generally have relatively moderate effects on the wider landscape, however, the impact would be of **moderate to major adverse significance locally** with the loss of intertidal habitat, open water and shingle foreshore; all elements that characterise the local landscape.

16.1.3 Effects on landscape character

1. The following landscape character areas have been identified in the assessments for Bathside Bay and Felixstowe South.

Felixstowe and Harwich promontories and Ports

2. The range of views available to the proposed developments from this landscape character area records a wide variety of effects. In general, the overall effect would be of **moderate adverse significance**, with the estuary displaying a more uniform quayside character and hard estuary and river edges, as well as a sense of intensification of port activity. The local impacts at the Shotley Gate end of the Suffolk Coast and Heaths Area of Outstanding Beauty (AONB) would be of **major adverse significance**, with the foreground dominated by the Bathside Bay Container Port and a consistent and intensified container quayside visible at Felixstowe, down the estuary.

Ramsey Creek

3. The in-combination effect on the Ramsey Creek landscape character area would be of **moderate adverse significance**, with the Bathside Bay proposals in foreground views and the intensified skyline and backdrop (to Harwich) of the Felixstowe South Reconfiguration.

Stour and Orwell Estuaries

4. The transitional area of the estuaries would experience significant change with the development of both ports. Generally, the in-combination effect would be of **moderate adverse significance**. See Photomontage Panel B (2 of 4), which follows.

Coastal Sandings

5. The in-combination effect on this area would be of **minor adverse significance** with Bathside Bay contributing most to the intensification of port activity in the estuary. The effect on the Stour and Orwell Estuaries (considered above) would be greater due proximity to the sites and the more direct visual relationship.

Deben Estuary

6. This area was identified as part of the FSR ES as a potential zone of influence, which was not the case for Bathside Bay. The in-combination effect would, therefore, be limited to the impact of the Felixstowe South Reconfiguration, where the effect has been recorded as of **moderate adverse significance**.

16.1.4 Effects of lighting

1. The in-combination effects of the developments associated with lighting are not generally significant, with the main landscape and visual impact generated by the Bathside Bay project. The lighting effects of this development were recorded as being of moderate to major adverse significance, subject to location. The improved lighting design that is proposed as part of the Felixstowe South Reconfiguration, compared to the existing lighting provided at Landguard Terminal, has a neutral effect.

2. Photomontage Panel B (4 of 4), which follows, shows the modelled combined lighting effect of the development of both Bathside Bay and FSR.

Existing View

Proposed Development

Photograph Panel B (2 of 2)

Day-time Photomontage View B
including proposed Bathside Bay development

LANDSCAPE DESIGN ASSOCIATES

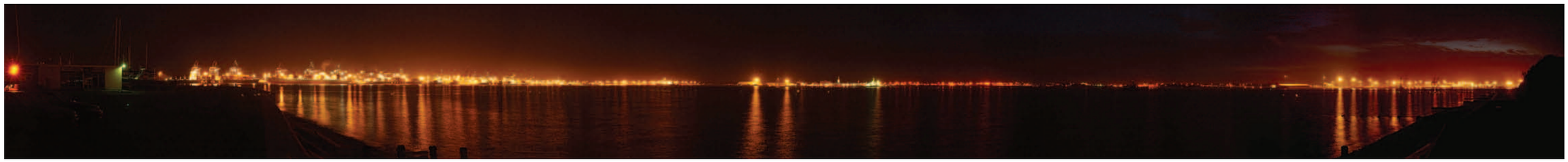
Oxford
Tel : 01865 887050

CHKD. AK APP. AK DATE September 2003

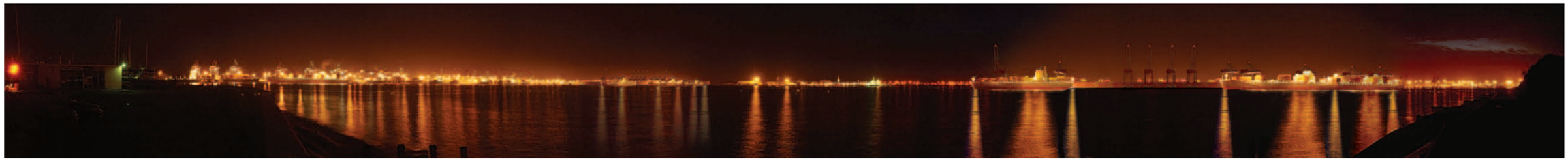
SCALE na STATUS Final DWG. No. 1733/LO

Felixstowe South Reconfiguaration

x/Graphics/Photopanels/0000/0000_a-



Existing View



Proposed Development

Night-time Photomontage View B
including proposed Bathside Bay development

Photograph Panel B (4 of 4)

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x/Graphics/Photopanels/0000/0000_a-

2. Therefore, the in-combination effect is considered to be of **moderate to major adverse significance**, again dependent on the location of the receptor, due to the effect of the Bathside Bay development alone.

16.1.5 Effects on setting of settlements

Felixstowe

1. The combined impact of the development of Bathside Bay and the reconfiguration of Felixstowe South on Felixstowe itself is considered to be of **moderate adverse significance**.

Harwich

2. The in-combination impact of the two developments on Harwich is considered to be of **major adverse significance**, with the west and north faces of the town impacted by Bathside Bay and the east affected, to a slightly lesser degree (i.e. of moderate significance), by Felixstowe South. The setting of the town would become more 'heavy port' dominated, no longer overlooking Felixstowe across the estuary but becoming part of the headlands port industrial landscape. The recreational, eastern face of the town would retain its observer character, overlooking a cleaner port and estuary backdrop.

Shotley Gate/Shotley and Church End

3. The in-combination impact on Shotley Gate, Shotley and Church End is considered to be of **moderate to major adverse significance**. The intensification of port character would be evident in the estuary.

Dovercourt

4. The in-combination effect is considered to be of **moderate to major adverse significance** due to the impact of the Bathside Bay development. The southern, front face side of the town overlooks the North Sea and estuary, where the significance of the reconfiguration of Felixstowe South is considered to be minor. The combined effect would be to intensify the industrialised port character of part of Dovercourt's immediate setting, as well as its wider setting.

Bathside

5. **No in-combination effects** are predicted, with the impact on this settlement being due to the effect of the Bathside Bay development only.

Parkeston

6. The in-combination effect of the proposed Bathside Bay development and the Felixstowe South Reconfiguration is predicted to be of **negligible significance** on Parkeston. The significance of the impact on the immediate setting of the town caused by the Bathside Bay proposals was recorded as being of **moderate adverse significance**; this would be the dominant impact.

17 ARCHAEOLOGY AND CULTURAL HERITAGE

1. The land-based archaeological and heritage effects associated with the development of Bathside Bay and, separately, the reconfiguration of Felixstowe South would all occur locally. Therefore, the potential for in-combination effects to arise is limited.

17.1 CONSTRUCTION PHASE

17.1.1 Removal of features of land-based archaeological interest

1. **No in-combination effects** would arise in the construction phase.

17.1.2 Removal of features of marine archaeological interest

1. The geophysical assessment for FSR revealed the existence of a number of anomalies that are considered to be of either very low, low, medium or high archaeological potential. In addition, one confirmed wreck is present within the area to be dredged; a wooden hulled minesweeper. Without mitigation, those features that are within the proposed dredge area would be directly disturbed by the dredging. The reclamation and dredging works for Bathside Bay would result in the disturbance to (what are believed to be) the remains of two ex-navy steam drifters (abandoned in the 1940s) and two possible wrecks.

2. Clearly, the significance of the potential impact on features of potential archaeological interest is dependant on the actual nature of the identified anomalies. For this reason, a precautionary approach has been adopted and a worst case potential impact of major adverse significance assumed. This assumption is based on the fact that anomalies, which would be removed by the works, could be of considerable archaeological interest.

3. In order to mitigate this potential impact, a staged approach to further investigation is proposed. The net result of the above process should be that certain anomalies would be dismissed as being of little interest, whereas the nature of others would be recorded. Should the surveys reveal that some anomalies are of considerable interest, discussions would need to take place with English Heritage to determine how best to deal with these features having regard to the nature and importance of the items discovered. In addition, a watching brief should be included on the dredger during certain parts of the dredging works.

4. Assuming that the above mitigation process is followed, there is a minimal potential for loss of features of archaeological interest without their prior evaluation and recording. Therefore, the residual impact of the proposed activities, in-combination and in isolation, would be of **minor adverse significance.**

17.1.3 Potential for removal of submerged prehistoric archaeology

1. The archaeological assessment of vibrocores undertaken for FSR revealed that there is a possible buried soil layer to the west of the existing dredged channel. It is considered that this *may* represent soil of a former saltmarsh and could represent a horizon upon which archaeological evidence might occur. The dredging of the area to

the west of the existing approach channel would, therefore, cause the removal of features of archaeological interest should the horizon represent a former land surface. Given that it is not possible to determine the nature of the feature, it is necessary to assume a worst case potential impact of major adverse significance.

2. At Bathside Bay, although extensive alluvial deposits are present, the lack of formal (settlement) activity in this area minimises the likelihood of any remains being present.

3. In order to provide additional information on the environment and the suitability of landscape for exploitation and settlement (and hence to clarify the range of archaeological evidence that may occur) it is proposed that pollen and foraminifera samples are taken from the vibrocores to establish the character of the buried soil.

4. The implementation of the above mitigation measures would inform the nature of the potential archaeological interest of the proposed dredge area and would minmise the potential for features of archaeolgical interest being lost without evaluation and recording. The residual impact on potential submerged archaeology due to the schemes proposed, therefore, would be of **minor adverse significance.**

17.2 OPERATIONAL PHASE

17.2.1 Effects on Listed Buildings

1. Generally, the two proposed developments have the potential to effect different Listed Buildings. However, the Harwich Conservation Area (and Listed Building therein), would experience an intensification of heavy port activity from all of the estuary elevations of the peninsula town. The effect on Harwich town due to the proposed Bathside Bay development would be of major adverse significance and the effect due to the Felixstowe South Reconfiguration would be of moderate adverse significance. The significance of in-combination effect is considered to be of **moderate to major adverse significance**.

17.2.2 Effect on the setting of Landguard Fort

1. The assessment of the impact of the Bathside Bay proposals on the setting of Harwich included an assessment of the view from the View Point car park. The impact assessment recorded that the cranes on the proposed quayside would be visible on the skyline, but would not extend further north than the church spire of the town, and that the impact of stacked containers would be substantially screened by the topography and built form of the town. This view is similar to that experienced from Landguard Fort. When the Bathside proposal is considered in combination with the Felixstowe South Reconfiguration, therefore, the impact on the Fort is considered to be of **negligible significance**.

17.2.3 Potential for the erosion of archaeological features outside of the development area

1. Archaeological features that are buried in the intertidal and subtidal sediments of the estuarine system could potentially be exposed through an increase in the rate of intertidal erosion.

2. However, during the operational phase it is predicted that the underlying rate of intertidal erosion of the system is expected to decrease as a result of the combined development of Bathside Bay, incorporating its sediment replacement programme, and the reconfiguration of Felixstowe South. In this respect, the proposed schemes could have a beneficial impact on archaeological features that are potentially present within the intertidal sediments, although this is considered to be of **negligible significance.**

18 LOCAL COMMUNITY

1. The in-combination effects on the local community are largely encompassed in other sections of this report. These sections relate to the in-combination effect of the proposed developments on traffic and transportation, noise, air quality and the landscape and visual environment (Sections 13 to 16).

2. Given the spatial separation of the proposed developments, limited potential for exits for interaction to arise with respect to other aspects of relevance to the local community (i.e. recreation and access). Therefore, there would be **no in-combination effect** in this respect.

3. The potential effects of the proposals on recreational navigation are considered in Section 20.

19 LAND DRAINAGE AND FLOOD AND COASTAL DEFENCE

19.1 CONSTRUCTION AND OPERATIONAL PHASES

19.1.1 Effect on land drainage

1. The proposed development of Bathside Bay and reconfiguration of Felixstowe South do not have the potential to effect the same land drainage system and, therefore, there **no in-combination impact** would arise in this respect.

19.1.2 Effect on coastal defence assets

1. With regard to flood and coastal defence assets, the only area that has the potential to be affected by both proposed developments is the Shotley foreshore. The Felixstowe South Reconfiguration is expected to have an adverse impact on the coastal defences in this location by increasing wave energy (by up to 3%); and, while the predicted effect of the development of Bathside Bay on the Shotley foreshore is to reduce the overall erosion rate (mainly as a result of the predicted reduction of current speeds), there would still be some localised increases in erosion.

2. Proposals have, therefore, been developed to use clay arising from the dredging of the approach channel to Bathside Bay in a beneficial manner. The proposals comprise placing clay against the base of the seawall, extending westwards from the entrance to Shotley Marina. A similar scheme is currently being undertaken over a 260m length of this seawall utilising clay dredged as part of the Trinity III Terminal (Phase 2) Extension.

4. In the event that the proposed Bathside Bay development were to receive consent, the proposed beneficial use described above would be sufficient to offset both the predicted effects of wave activity associated with that development and the proposed Felixstowe South Reconfiguration on the Shotley frontage. However, if either the proposed Bathside Bay development does not progress or it progresses after the Felixstowe South Reconfiguration, it is proposed that clay dredged as part of the Felixstowe South Reconfiguration would be used beneficially along the Shotley frontage (i.e. placed along the base of the seawall in a similar manner as was proposed for the Bathside Bay development).

5. Assuming the implementation of a beneficial use scheme along the Shotley frontage, the in-combination impact of increased wave energy on the standard of coastal protection is predicted to be of **negligible significance.**

20 COMMERCIAL AND RECREATIONAL NAVIGATION

20.1 CONSTRUCTION PHASE

20.1.1 Potential interference with navigation

1. The construction phase for the proposed Bathside Bay development is predicted to have a negligible impact on navigation to Harwich International Port (HIP), with no impact on navigation to other ports within the estuarine system. Given that the construction phase for the proposed Felixstowe South Reconfiguration is also predicted to have a negligible impact on navigation, including vessels travelling to and from HIP the potential exists for a (small) in-combination effect on this traffic to arise. However, this effect would only arise should the dredging component associated with the two schemes overlap; and, in this situation, the in-combination effect is predicted to be of **negligible significance** with all relevant mitigation measures (Notices to Mariners, Harbour Master control etc.) in place.

20.2 OPERATIONAL PHASE

20.2.1 Potential for effect on traffic delay

1. The marine traffic analysis undertaken by MARICO Marine (2003) concluded that there is significant spare capacity in the Haven. It considered that marine traffic could increase without having a negative impact on traffic delay, given the existing management of traffic movements by the Harwich Haven VTS. The Harbour Master has stated that there are **no concerns** regarding the impact of increased traffic levels on existing traffic within the Harbour due to the proposed Bathside Bay development and the Felixstowe South Reconfiguration either alone or in combination (D. Shennan, *pers. comm.*).

21 SOCIO-ECONOMICS

21.1 CONSTRUCTION PHASE

21.1.1 Jobs generated during the construction phase

1. It is estimated that the development of Bathside Bay would generate 140 (full time equivalent) construction jobs, while the Felixstowe South Reconfiguration would generate 190.

2. The demand for construction workers for each project would in some areas 'overlap' and create additional pressure in terms of sourcing labour (this would also be true of demand in the operational phases). However, the mobility of construction workers is likely to assist in over-coming this, as evidenced by the experience of other large-scale construction and engineering schemes. The availability of (relatively) long term employment in the local area may also encourage new entrants into the industry from within the existing workforce, particularly if this is supported by targeted training and job-brokerage programmes. There is, therefore, the potential for a **beneficial in-combination effect** to arise.

21.1.2 Indirect effects on the local and national economy

1. As a result of the reconfiguration of Felixstowe South, there could be an indirect and induced benefit in the Haven Gateway region of £40.1 million, with an overall regional benefit in the region of £95.6 million due to the construction phase of the development. These figures would have a moderate beneficial impact on the Haven Gateway economy. Equally, it was predicted that the development of Bathside Bay would provide an indirect benefit of up to £32.6 million locally, £81.6 million regionally and £48.9 million nationally. In-combination, this represents a contribution of £72.7 million and £177.2 million to the local and regional economy.

2. Impacts of **moderate beneficial significance** (indirect economic benefit) and **minor beneficial significance** (indirect jobs generated) would arise.

21.2 OPERATIONAL PHASE

21.2.1 Direct and indirect job creation

1. The creation of around 620 jobs as a direct result of the reconfiguration of Felixstowe South and 772 as a result of Bathside Bay, 1392 in all, constitutes an impact of **moderate beneficial significance.**

1. The numbers of direct jobs created by each proposal would not be affected by the completion and operation of both new facilities, as the jobs data provided by HPUK relate solely to personnel required to operate that facility alone. No direct jobs could be substituted or addressed by jobs located at the other facility. Therefore, there would be no (adverse) in-combination effect.

2. By 2015, when the facilities are expected to be fully operational, and the multiplier effects have worked through to the local economy, the effect would be to raise Gross Value Added (GVA), or output, in the Haven Gateway economy by just under

£91m (at 1995 prices). The multiplier effects of the proposed developments are expected to result in an additional 2,250 jobs in the Haven Gateway economy. Of these, 1393 are the direct jobs required, whilst the remaining 857 jobs are generated by the multiplier effects and would be created across the Haven Gateway economy as a whole.

3. Indirectly, therefore, the proposed schemes would have an impact of **moderate beneficial significance** on the local economy through the increased GVA output and the creation of additional jobs.

4. The jobs created by the multiplier effect would similarly not be affected by the construction of both facilities, as these are derived from the expenditure of the workers filling the direct jobs. There may be scope for a reduction in the number of associated jobs created to support the operation of these facilities, as the potential would exist for companies to be able serve the needs of both the ports from a central location, thus requiring fewer staff to do so. However, even if this was the case and in an extreme scenario the number of associated jobs were halved (i.e. a single job could provide the associated functions required to support the activities at both facilities), this would only reduce total jobs created by some 465, or 15%. Therefore, there is the potential for an in-combination effect of **minor adverse significance**.

21.2.2 Effect on tourism

1. The impact on the local environment translates into the potential for an impact on tourism. Therefore, the in-combination effects on air quality, noise, traffic and transportation and the landscape and visual environment are of relevance to the effect on tourism. Given that the in-combination assessment for these parameters does not indicate any substantive change from the situation that would apply to each individual project, where an impact of minor beneficial significance is predicted to arise, the potential for an **in-combination effect** to arise on tourism in the area is **minimal**.

21.2.3 Effect on investment

1. The development of the facilities proposed for Bathside Bay and Felixstowe South would emphasise and secure the Haven Gateway's position as a primary deep-sea port serving the UK and northern Europe into the future. The scale of capacity available would raise the area's profile even further, improving its competitiveness in the global marketplace and supporting investment in other related sectors as well as in businesses not directly reliant on the port. Therefore, there would be a **beneficial in-combination effect of moderate significance** as a result.

PART III:

IN-COMBINATION EFFECTS AT THE INNER GABBARD AND INNER GABBARD (EAST)

This Part comprises the following:

22 HYDRODYNAMIC AND SEDIMENTARY REGIME

22.1 DISPOSAL PHASE

1. The potential hydrodynamic effects of the disposal of dredged material take effect on completion of the disposal phase and, therefore, are addressed bellow (post-disposal).

22.2 POST-DISPOSAL PHASE

22.2.1 Potential impact on hydrodynamics and local sediment transport

1. The potential effect of the disposal of dredged material on hydrodynamics and local sediment transport in the offshore area around the Inner Gabbard included modelling of a scenario whereby the disposal of 40Mm^3 of dredged material was undertaken. This is a conservative (worst case) approach and was intended to determine the potential effect associated with the disposal of dredged material arising from other future projects. Given that the proposed quantity of dredged material to be disposed offshore of as a result of the proposed Bathside Bay development and Felixstowe South Reconfiguration is significantly less than this quantity (approximately 1.5Mm^3 and 2.5Mm^3 respectively), the findings of the modelling of this scenario represent an assessment of the in-combination effect of disposal. Given the close proximity of this site to the Inner Gabbard (East) and the similarity in hydrodynamic and sedimentary regime between the two areas, these findings are applicable to the Inner Gabbard (East).

2. The studies found that the impact of the placement of 40Mm^3 on tidal currents would be **negligible** outside of the proposed capital placement area. As the placement arising from the dredging for the proposed developments would be about 10 times smaller than that modelled, it can be assumed that this would be true for the in-combination effect of these placements.

3. The studies found that the water depths at the Inner Gabbard, of the order of 30m, were too deep to produce any changes in the way waves are refracted in the vicinity of the site or to produce changes in the dissipation of wave energy through friction in the vicinity of the site. As this is true of the water depths at Inner Gabbard, it would apply even more to the greater water depths (approximately 50m) of Inner Gabbard (East). Consequently, **no in-combination effects** would arise.

4. The studies concluded that the placement of clay would effectively block the net movement of any local bedload transport, but that there is little bedload sediment transport through the area of the Inner Gabbard site. Therefore, any resulting local accretion is expected to be **minimal**, along with any change to sand transport in the streamline of the placement. This conclusion also applies to the Inner Gabbard (East) site.

23 SUBTIDAL MARINE COMMUNITIES

23.1 DISPOSAL PHASE

23.1.1 Potential smothering of benthic communities due to the deposition of clay at the Inner Gabbard (East)

1. Associated with the reconfiguration of Felixstowe South, 2.5Mm^3 of clay are expected to arise, which would require disposal. Similarly, 1.5Mm^3 of clay are expected to arise due to the development of Bathside Bay. It is proposed that this material would be deposited at the Inner Gabbard (East). In each case, the impact on sub-tidal marine communities is expected to be of moderate adverse significance, with the greatest impact occurring within the footprint of the disposal. Mitigation measures include targeting the disposal operations to minimise the area affected and constructing containment bunds.

2. Although following the disposal phase the benthic community would adapt to the altered nature of the seabed and colonisation of the clay (and gravel associated with FSR) could be expected, in combination, the placement of 4Mm^3 of clay on the seabed is expected to have a **moderate adverse** impact on the subtidal benthic resource**.**

23.1.2 Potential smothering of benthic communities due to the dispersion of fine material

1. The settlement of fine material (arising from the clay) associated with the disposal phase has previously been predicted for the proposed Bathside Bay development by HR Wallingford. The studies concluded that the tidal currents in the vicinity of the Inner Gabbard are too great for any permanent deposition to occur, with the exception of localised areas of irregular seabed topography where deposition may presently occur. Temporary deposition of a fraction of a millimetre would occur on slack water and over time this deposition would diminish as material is resuspended and dispersed. Although the total quantity of clay to be deposited would be higher than for the proposed Bathside Bay development (approximately 2.5Mm^3 as opposed to 1.5Mm^3), temporary deposition associated with the Felixstowe South Reconfiguration would be of the same order of magnitude as that predicted for Bathside Bay.

2. The impact of the deposition described above, for each scheme in isolation, would be of negligible significance for benthic communities. Should the disposal phase for the two developments coincide (although this is unlikely), the in-combination effect would also be of **negligible significance**.

3. As part of the disposal of dredged material for both proposed developments, it is also proposed to disperse capital silts at the Inner Gabbard. The total volume of material arising from the two schemes is expected to be small (less than 250,000m^3) compared with the annual input of maintenance dredged silt at this site (approximately 2Mm^3); no adverse impact on benthic communities has been detected in relation to this (latter) disposal to date.

4. The rate of input of material to this site would be unchanged from the existing situation and the disposal of capital silts would not be undertaken at the same time as

the disposal of maintenance dredgings. Therefore, although there is the potential for an in-combination impact due to the disposal of capital silts from the two proposed developments (as disposal could occur within the same time frame), the impact could be expected to be of **negligible significance**.

5. As part of the Trinity III Terminal Extension, the disposal of capital silts was undertaken at the Inner Gabbard. On initial analysis of the bathymetric monitoring data available following this disposal, it appears that some material may have accumulated at the site. During the dredging, it was noted that a significant quantity of shell was dredged and it may be that this material has accumulated. However, the nature of this potential effect cannot be determined until the monitoring data has been reviewed and reported.

6. If it is determined, on analysis of the monitoring data for the Trinity III Terminal Extension disposal, that capital silt has accumulated at the site (and assuming that the same methodology is adopted to its disaggregation for the proposed developments), it is possible that this material could also accumulate. Therefore, there is the potential for an in-combination impact on the benthic community to arise. The significance of the in-combination effect depends on the extent to which the footprints of the depositions combine. Assuming (as a worst case) that the footprints of deposition from both proposed developments, as well as the Trinity III deposition, do not overlap, an in-combination effect of **moderate adverse significance** could arise. If the footprints do combine, then the effect would be more limited.

7. This impact could be mitigated by the placement of the capital muds at the Inner Gabbard (East).

23.2 POST-DISPOSAL PHASE

23.2.1 Potential effect on benthic communities due to changes in the flow regime and sedimentary patterns

1. The potential in-combination effect of the disposal of dredged material on hydrodynamics and local sediment transport is described in Section 22.2.1. Given that any effect on the hydrodynamics would be negligible and localised to the development, the consequent impact on the benthic community would be of **negligible significance.**

24 WATER AND SEDIMENT QUALITY

24.1 DISPOSAL PHASE

24.1.1 Disposal of capital silts at Inner Gabbard disposal site

1. The disposal of silt at the Inner Gabbard disposal site has been studied previously by HR Wallingford and is currently undertaken by the HHA for the disposal of maintenance dredged silt on 4 or 5 campaigns annually. The annual disposal of silts currently amounts to roughly 2Mm^3 and no adverse impacts have been reported arising from this practice.

2. The disposal of additional silts arising from the capital dredging for the proposed Bathside Bay development and Felixstowe South Reconfiguration (assuming, as a worst case, that the dredging for both projects was to be undertaken at the same time) at the Inner Gabbard dispersive site over a single year would, therefore, have a **negligible impact**. That is, the rate of input of silt to this site would be unchanged and the disposal of capital material would not coincide with the disposal of maintenance material

24.1.2 Dispersion of placed sand from Inner Gabbard (East)

1. It is estimated that along with clay and rock about 170,000m^3 of sand would be deposited at the Inner Gabbard (East) as a consequence of the dredging work for the Felixstowe South Reconfiguration. HR Wallingford has assessed the potential dispersion of this sand following disposal and the findings are reported in the FSR ES. As part of the proposed Bathside Bay development, it is not expected that a significant quantity of sand would be deposited at the offshore disposal site as this material would be pumped ashore for reclamation (the material is clay and capital silts). Given this, there would be **no in-combination effect** arising from the two schemes.

24.1.3 Dispersion of fine material at Inner Gabbard (East)

1. The dispersion of fine material (other than sand, described above) as part of the disposal of dredged clay arising from the proposed Bathside Bay development has previously been investigated by HR Wallingford. The dispersion studies were undertaken on the basis that repeated placements of up to 6000m^3 of clay would take place by bottom dumping on a cycle time of approximately 5.5 hours. It was assumed that 5% of the deposited sediment would be released into the water column, with the remaining sediment impacting and depositing on the seabed.

2. Increases in the depth averaged suspended sediment concentrations of up to 15mg/l and 25mg/l were predicted for spring tides and neap tides respectively. Increases above 10mg/l persist for less than one hour on every tide. Given this, it is predicted that there would be no measurable cumulative increase in suspended sediment concentrations as a result of repeated disposal operations. Furthermore, given that there would only be a single disposal operation taking place at a particular time, and that the individual disposal operations associated with the Felixstowe South Reconfiguration would be of a lower volume than for Bathside Bay, there would be **no in-combination effect** associated with the two developments.

24.2 POST-DISPOSAL PHASE

24.2.1 Erosion of deposited material at the Inner Gabbard (East)

1. During the post-disposal phase, the deposited material would erode; the rate of erosion is difficult to predict but an assumption of 0.2m/year has been made. Assuming that the dredged material deposited as part of the proposed Bathside Bay development and Felixstowe South Reconfiguration eroded at a similar rate, the consequent in-combination effect on water quality would be of **negligible significance.**

2. The gravel that would be deposited at the Inner Gabbard (East) would be relatively immobile and would not erode. It would be retained within the disposal site and trapped within crevices within the clay.

24.2.2 Dispersion of maintenance dredged material at the Inner Gabbard

1. No maintenance dredgings would be deposited at the Inner Gabbard in association with the reconfiguration of Felixstowe South; the scheme results in a reduction in the quantity of sediment expected to accumulate the in approaches and berths at Felixstowe. Therefore, **no in-combination effect** would arise.

25 COMMERCIAL NAVIGATION

25.1 DISPOSAL PHASE

25.1.2 Movements of disposal barges interfering with commercial navigation

1. Given that disposal vessels would have to cross a shipping route, there is the potential for the disposal operations associated with both the proposed Bathside Bay development and Felixstowe South Reconfiguration to have an impact, in isolation, of minor adverse significance. In the unlikely event that the disposal of dredged material associated with both developments takes place at the same time, the number of vessels at the disposal ground at any one time would not increase, but the total number of movements would increase. However, given the low number of movements involved, the in-combination effect is considered to be of **minor adverse significance.**

25.2 POST-DISPOSAL PHASE

25.1.2 Potential interference with navigation due to the presence of material on the seabed

1. Given that the disposal ground is located in water depths in excess of 50m, there would be **no impact** on navigation associated with the disposal of dredged material from either development in isolation or in-combination.

26 FISHERIES RESOURCE AND COMMERCIAL FISHING ACTIVITY

26.1 DISPOSAL PHASE

26.1.1 Interference with fishing activity due to the disposal of dredged material

1. There is the potential for an in-combination effect on fishing activity in the vicinity of the disposal ground to arise due to the presence and movement of vessels associated with the disposal operations. However, given the relatively low fishing intensity in the area and the short duration of the disposal activity, the in-combination effect would be of **negligible significance.**

26.1.2 Migration of clay balls outside of the disposal area with potential for effect on fishing gear

1. There is the potential for the migration of clay balls from the disposal ground to occur as a result of the disposal of clay arising from both developments. In-combination there is the potential for a greater volume of clay to disperse from the site in this form, although the overall footprint of the impacted area would not be different from that associated with either scheme in isolation. Therefore, the in-combination effect (like the effects in isolation) is considered to be of **minor adverse significance.**

26.2 POST-DISPOSAL PHASE

26.2.1 Reduction in potential fishing grounds

1. Although the area of the seabed that would be directly impacted by the disposal of dredged material would be greater for both schemes in-combination compared with the impact of each scheme in isolation, the fact that that the area is not heavily fished would only give rise to an in-combination effect of **negligible significance** on fishing activity.

27 MINERAL RESOURCES

1. In isolation, the proposed disposal of dredged material associated with either the proposed Bathside Bay development or the Felixstowe South Reconfiguration would have no impact on mineral resources. Similarly, there is **no potential for in-combination effect** as no hydrodynamic mechanism exists that could cause an impact on existing mineral resources to arise.

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