

APPENDIX 2

SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION

Table A Summary of environmental impacts and mitigation measures associated with the development of Bathside Bay¹

CONSTRUCTION PHASE		OPERATIONAL PHASE					
<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>	<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>
HYDRODYNAMIC AND SEDIMENTARY EFFECTS							
Change in tidal range	Ranges from +2mm (Orwell Bridge) to -20mm (Wrabness and Ballister Creek). Equates to a one-off loss of approximately 3ha of intertidal	None possible	Loss of exposure of approximately 3ha of intertidal	Changes to the hydrodynamic regime – increased local wave activity; Increased tidal currents in Erwarnton Bay, reduced tidal currents at Shotley	Largest increase in wave activity at HIPL, with height increases of up to 23% during large S and SE winds; (occurring <1% of the time); increased wave action in Erwarnton Bay and at Shotley	None possible	Negligible
				Increased sedimentation rates in berths and approaches to Felixstowe and in the new dredged areas to HIPL; Increased rate of erosion of intertidal	2.8ha/annum	Limit offshore disposal to present levels through sediment replacement in estuaries and harbour	None

¹ Where impact predictions are revised from those presented in the tidal works ES they are presented in *italics*

Table A (continued)

CONSTRUCTION PHASE			OPERATIONAL PHASE				
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
BENTHIC INVERTEBRATE COMMUNITIES							
Loss of benthic community due to reclamation	Major adverse affect on the regional site assemblage	None	Major adverse affect on the regional site assemblage	Prevention of benthic community succession due to maintenance dredging	Minor adverse locally	None	Minor adverse locally
Removal of benthic community within the existing channel	Minor adverse locally	None	Minor adverse locally	Enhanced erosion of intertidal area and potential removal of benthic communities	Major adverse	Sediment replacement	None
Removal of benthic community in currently un-dredged subtidal areas	Moderate adverse affect for the Stour and Orwell estuaries	None	Moderate adverse affect for the Stour and Orwell estuaries	Localised erosion of intertidal areas due to predicted increases in wave activity and in tidal currents in the SPA	Minor adverse	Sediment replacement will mitigate for the impact on the estuary wide resource; targeted placement in Erwarton Bay should mitigate for local effects	None

Table A (continued)

CONSTRUCTION PHASE				OPERATIONAL PHASE			
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
Sedimentation of material re-suspended during capital dredging (smothering of benthic communities)	Moderate adverse (locally) to Negligible (beyond the immediate vicinity of the dredging works)	None	Moderate adverse (locally) to Negligible (beyond the immediate vicinity of the dredging works)	Localised acceleration of erosion of intertidal area due to increases in wave action in an already exposed location at Shotley	Minor adverse impact on some foreshore structures	Local beneficial use initiative with clays or gravels	Major benefit locally (without beneficial use, Negligible)
Release of sediment bound contaminants	Negligible	Not required	Negligible				
ORNITHOLOGY							
Loss of 69ha undesignated intertidal feeding habitat in Bathside Bay	Major adverse	None	Major adverse	Enhanced erosion of designated feeding area (equating to 2.8ha annually)	Major adverse	Sediment replacement /recycling	None
Decreased exposure of 3ha of intertidal area within the Stour and Orwell Estuaries SPA	Minor adverse	None	Minor adverse	Potential disturbance to feeding and roosting birds	Negligible	None	Negligible

Table A (continued)

CONSTRUCTION PHASE				OPERATIONAL PHASE			
<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>	<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>
Loss of waterfowl roosting areas at Bathside Bay (i.e. 2.8ha of saltmarsh)	Minor adverse within the estuarine system; Moderate adverse locally	None	Minor adverse within the estuarine system; Moderate adverse locally				
Disturbance to feeding and roosting birds on adjacent intertidal areas	Minor adverse (short term) at Erwarton; No impact elsewhere	Not required	Minor adverse (short term) at Erwarton; No impact elsewhere				
SALT MARSH AND COASTAL VEGETATION							
Direct loss of 2.8ha of saltmarsh within Bathside Bay	Moderate adverse locally; Minor adverse in the context of the SPA	None locally; within the SPA, sediment replacement upstream	Moderate adverse locally; Negligible for the SPA	Indirect loss of saltmarsh within the estuarine system	Moderate adverse	Sediment replacement	Negligible; sediment replacement could be applied (with direct placement) to have a Moderately beneficial impact on the saltmarsh resource
Direct loss of coastal vegetation within Bathside Bay	Minor to moderate locally	None - potential for translocation to be investigated	Minor to moderate locally				

Table A (continued)

CONSTRUCTION PHASE			OPERATIONAL PHASE				
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
Direct loss of coastal invertebrates in Bathside Bay	Moderate regionally	None - potential for translocation to be investigated	Moderate regionally				
FISHERIES RESOURCE							
Deterioration in quality of feeding resource for estuarine fish within the footprint of the deepened and widened channel	Moderate adverse locally	None	Moderate adverse locally	Prevention of benthic invertebrate community succession in the dredged area due to maintenance dredging	Minor adverse	None	Minor adverse
Loss of potential feeding habitat for estuarine fish	Moderate adverse locally	None	Moderate adverse locally	Effect of ongoing sediment replacement on fisheries (i.e. elevated suspended sediment)	Moderate adverse if undertaken during a sensitive period or at a sensitive location	Managed placements to avoid sensitive periods and locations	Negligible to Minor in the short term; No impact on commercial fishing activity
Effect of dredging-induced suspended sediment on fish physiology	Minor adverse (short term)	Careful silt stripping; optimisation of dredging speeds	Minor adverse (short term)				

Table A (continued)

CONSTRUCTION PHASE				OPERATIONAL PHASE			
<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>	<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>
Effect of dredging-induced suspended sediment on zooplankton	Moderate adverse (if dredging occurs when population level is at peak) to Minor adverse (when populations are at lower levels)	Careful silt stripping; optimisation of dredging speeds	Moderate adverse (if dredging occurs when population level is at peak) to Minor adverse (when populations are at lower levels)	Effect of sediment replacement on the native oyster	Negligible	Managed placements to avoid sensitive periods and locations	Negligible
Direct uptake of fish during dredging	Minor adverse (short term)	None	Minor adverse (short term)				
COMMERCIAL FISHING ACTIVITY							
Limited access to fishing areas during dredging works	Minor adverse (short term)	None	Minor adverse (short term)	Restriction of access to fishing areas 100m to the north of the existing channel and between the channel and the proposed quay face	Moderate adverse locally	None	Moderate adverse locally

Table A (continued)

CONSTRUCTION PHASE			OPERATIONAL PHASE				
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
WATER AND SEDIMENT QUALITY							
Generation of sediment plume during dredging and from the reclamation	Minor adverse in the estuary (short term); no impact on bathing beaches	Silt should be transferred directly to disposal vessels rather than being double-handled	Minor (short term) adverse affect locally	Alterations to the hydrodynamic regime affecting bacterial dispersion	No impact on designated bathing beaches	Not required	No impact
Reduced die-off rate of bacteria due to sediment plumes	Negligible	None	Negligible	Enhanced turbidity in the water column during maintenance dredging	Minor increases in suspended sediment concentrations above background levels	Not required	Negligible
Release of contaminants into the water column	Negligible	Not required	Negligible	Run-off of contaminated surface water from the reclaimed area into Stour estuary	Negligible - drainage system designed to avoid run-off of contaminants	Not required	Negligible
Disturbance of potentially contaminated ground	No impact	Not required	No impact	Accidental pollution	The potential for accidental pollution to occur is Minimal	Implementation of pollution contingency plan, as currently in place at the Port of Felixstowe	The potential for accidental pollution is Minimal; the significance of an impact will depend on the nature of the incident

Table A (continued)

CONSTRUCTION PHASE			OPERATIONAL PHASE				
<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>	<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>
Risk of gas accumulation due to the disruption of gas migration routes	Potentially Major adverse	Implementation of mitigation measures as recommended (WSA, 1991b), e.g. installation of a gas migration barrier	Negligible				
Accidental pollution	The potential for accidental pollution to occur in an uncontrolled manner is Minimal	No mitigation is required in addition to good site practice	The potential for accidental pollution is Minimal				
LANDSCAPE AND VISUAL SETTING							
Visual effects of construction; plant on land and on the river, pumping ashore, haul roads, building erection, landscaping and site lighting	Minor (all views), although the magnitude of the effect will be slight to substantial depending on location	Site management to ensure a tidy and ordered site, and controlled lighting; early construction of the small boat harbour quayside mound to screen views from Harwich	Minor	Loss of existing (limited) vegetation cover; alteration (raising) of the site topography	Minor consequence; Major change	Planting (trees, shrubs and grassland), screen mounding and the establishment of a wetland corridor; affecting views from Parkeston and Harwich	Minor in terms of land cover and drainage; Major with respect to topography

Table A (continued)

CONSTRUCTION PHASE		OPERATIONAL PHASE					
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
				Effects on landscape character	Minor to Major, depending on location of view; intensifying the industrial character of the Felixstowe and Harwich headlands and harbour	Scheme mitigated through design - limits on stacking heights/lighting and location of buildings/lights away from the quayside; in landside views, the creation of the Ramsey Creek corridor and earthworks	Minor to Major, depending on location of view; typically more significant in views towards the site from and across the water
				Effect of lighting on 'skyglow'	In views from the north and south, Major due to coalescence with Felixstowe; from the east, Moderate; and elevated views from the west, Moderate	Scheme mitigated through design - e.g. full cut off lanterns with low aiming angles to reduce light spill and masts set back from the water's edge	Minor to Major, where the effect in distant views will be reduced

Table A (continued)

CONSTRUCTION PHASE		OPERATIONAL PHASE				
Potential impact	Significance	Mitigation	Potential impact	Significance	Mitigation	Residual impact
			Effects on urban settings	Harwich - Major; Dovercourt - Moderate to Major (in upstairs and high views); Bathside - Moderate; Shotley - Moderate to Major due to the intensification of port activities; Parkeston - Moderate to Minor; Mistle and Manningtree - Minor to Moderate (rail movements)	Harwich - creation of a new setting for the approach to the town and planting; Dovercourt - establishment of the wetland buffer and good site layout; Bathside - boulevard planting; Parkeston - screen planting	Harwich - Major; Dovercourt and Shotley - Moderate to Major; Bathside - Moderate; Parkeston, Mistle and Manningtree - Minor to Moderate
			Effects on designated landscapes	Moderate locally, intensifying existing adverse effects of port facilities on the AONB and SLA ¹	Mitigation through design - control of stacking heights and good design of lighting	Moderate locally, however, the integrity of the sites will not be affected

¹ Area of Outstanding Natural Beauty and Special Landscape Area

Table A (continued)

CONSTRUCTION PHASE		OPERATIONAL PHASE					
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
				Effect on setting of Listed Buildings and Scheduled Ancient Monuments	Victoria Hotel - Moderate to Major; Train Ferry Berth - <i>Moderate</i> ; Pier and Great Eastern Hotels - Minor to Moderate (views will not be impacted); Church and West Streets - Moderate; Bathside Battery - Minor	Victoria Hotel - improvements to the open space; Church and West Streets - small boat harbour screens views	Victoria Hotel - Moderate; Train Ferry Berth and Church/West Streets - Moderate; Pier and Great Eastern Hotels - Minor to Moderate; Bathside Battery - Minor
				Effect on views	Moderate in the local and immediate study area; Moderate to Major in the urban and Conservation Areas	Scheme mitigated through design	Moderate to Major depending on viewpoint
				In-combination effect of development on Shotley	Major	None	Major

Table A (continued)

CONSTRUCTION PHASE		OPERATIONAL PHASE					
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
NOISE							
Increased noise during the daytime	Minor to Moderate adverse during combi-wall piling	Piling confined to 07:00 to 19:00 Monday to Saturday; potential for use of shrouded piling rig to be trialed and, if practical, adopted; use of acoustic screens adjacent to the old town; vibratory systems to be used where possible and shrouded systems on land; noise monitoring; mechanical plant to be fitted with silencers and comply with EC noise limits; maintain good public relations	Minor to Moderate adverse, where the lower impact level will be achieved if a the trial use of the shrouded piling rig proves to be successful	Increased night-time noise due to the operational port	Harwich and Dovercourt (key receptors) - Moderate to Minor adverse; Parkeston - Minor adverse; Shotley Gate - Minor to Moderate adverse (the latter at the nearest locations to Bathside Bay)	Ensuring that noise is an integrated design consideration (incorporating landscaping features); noise limit specifications are prepared for all major noise radiating plant; all tractor units are fitted with the latest noise control technology; Quayside cranes are designed with minimisation of noise radiation; RTG engine pods and exhausts are high quality; and reassessment of driver skills takes place regularly	Minor to Moderate adverse depending on receptor location, diminishing to Minor adverse if full noise control measures are achieved

Table A (continued)

CONSTRUCTION PHASE			OPERATIONAL PHASE				
<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>	<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>
Increased noise during the night time (dredging operations)	Moderate adverse during the works for the small boats harbour (and, to a lesser degree, plant attending to the end of the pipeline discharging gravel)	Use low noise dredgers in the boat harbour; use of screens near to the old town of Harwich; use of noise sensitive reversing alarms or rear mounted sensors	Minor to Moderate, where the latter only applies to those locations close to the small boat harbour	Elevated noise levels due to increased shipping	Negligible due to large container ships; Minor adverse due to pilot boats	Reduced speed of pilot boats	Negligible and Minor adverse
Noise due to the movement of construction traffic	No impact on the A120; Minor adverse on the B1414 and B1352	The haul road to the B1414 to be kept in a good condition	Minor adverse (B1414 and B1352 only)	Elevated noise due to road traffic	Minor adverse	None	Minor adverse
VIBRATION				Elevated railway noise	Minor adverse	Use of newer locomotives	Minor adverse
Damage to buildings and disturbance to local community from vibration generated during the piling activities	Moderate adverse community perception in the NW corner of old Harwich; <i>Minor</i> adverse in other locations (e.g. Shotley Gate); No impact on structures	Limit piling to 07:00 to 19:00 Monday to Saturday; monitor vibration levels at sensitive structures and reduce the energy of blows where necessary	Moderate to <i>Minor</i> adverse in terms of the perceived impact; no impact on structures	Vibration resulting from movement and stacking of containers	Negligible	Not required	Negligible

Table A (continued)

CONSTRUCTION PHASE			OPERATIONAL PHASE				
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
				Vibration due to road traffic	Negligible	Good maintenance of the A120	Negligible
				Vibration due to rail movements	Negligible	Good maintenance of the track	Negligible
AIR QUALITY							
Increased particulate and gaseous emissions	Minor adverse due to general site activities; Moderate adverse due to fugitive releases of dust	Application of an EMP and good site practice (e.g. wheel washing, speed restrictions and covers)	Minor adverse	Emissions during operation (shipping, terminal activities, HGV traffic etc.)	Nitrogen dioxide - Minor adverse; Sulphur dioxide - Negligible; Carbon monoxide - Negligible; Particulates - Minor adverse; Benzene - Negligible	Policy changes (local and national government) and employee travel plans	Minor adverse
Increased emissions from HGV traffic	Minor adverse	Implementation of a Traffic Management Plan	Negligible	Emissions of PAHs from shipping	Negligible	Not required	Negligible
				Container fumigation	Negligible	Operators obliged to phase-out use	Negligible
				Residual emissions of CO ₂	Negligible	Not required	Negligible

Table A (continued)

CONSTRUCTION PHASE		OPERATIONAL PHASE					
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
COMMERCIAL AND RECREATIONAL NAVIGATION							
Potential disruption to commercial navigation at Harwich International Port	Minor adverse	Vessels must have appropriate signals as required by International Regulations; construction works should be appropriately marked; one-way passage for larger commercial vessels to be coordinated by Harbour Master; Notices to Mariners and broadcasts	Negligible	Disruption to navigational activities due to predicted increases in wave activity	Minor adverse for recreational navigation in certain weather conditions; Negligible for commercial navigation	None	Minor adverse for recreational navigation in certain weather conditions; Negligible for commercial navigation
Interference with navigational aids in the lower Stour estuary	Major adverse (worst case)	As above	Negligible	Potential for navigational difficulties at Trinity Pier due to changes in current speeds	No impact	Not required	No impact

Table A (continued)

CONSTRUCTION PHASE		OPERATIONAL PHASE					
<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>	<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>
Disruption to recreational boat moorings within Bathside Bay	Major adverse	Proposals for a small boat harbour in Gass House Creek have been developed to accommodate displaced boats	No impact	Wave effects on vessels in the small boat harbour Potential for increased sedimentation at Trinity Pier	No impact No impact	Not required Not required	No impact No impact
				Interference with navigation	No impact (commercial and recreational users are segregated)	Not required	No impact
				Disturbance to small vessels due to passing ships	Negligible to Minor adverse	Not required	Negligible overall
RECREATION							
No impact	-	-	-	No impact	-	-	-
ARCHAEOLOGY AND HERITAGE							
Potential effect on designated sites and buildings - demolition of part of the Train Ferry Berth's long berthing arm	Negligible in the context of the special interest of the Train Ferry Berth	A programme of repairs is proposed; preparing/painting; making good the truncated arm; and maintenance	No impact	Potential effect on designated sites and buildings	No impact	Not required	No impact

Table A (continued)

CONSTRUCTION PHASE		OPERATIONAL PHASE					
<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>	<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>
Potential effect on known archaeological sites	Potentially Moderate adverse	Digital data from geotechnical and magnetometry surveys is to be reviewed by a specialist. The findings will be discussed with English Heritage and Essex CC in order to agree suitable mitigation (as appropriate). If the wrecks present are considered to be 'rare' or well preserved, recording should be undertaken. No vehicles are to track over known sites within the bay until 1.5m of cover is achieved	Negligible	Potential effect on designated sites and buildings	No impact (no intrusion); for 'setting' see landscape	Not required	No impact
				Known and potential sites and landscapes	No impact	Not required	No impact

Table A (continued)

CONSTRUCTION PHASE			OPERATIONAL PHASE				
<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>	<i>Potential impact</i>	<i>Significance</i>	<i>Mitigation</i>	<i>Residual impact</i>
Potential sites and landsurfaces	Minor to Moderate adverse	As for the known archaeological resource. A watching brief should be maintained throughout the silt removal and dredging process	Negligible				
LAND DRAINAGE AND FLOOD DEFENCE							
Disruption of pattern of land drainage	No impact on the pattern of land drainage or the risk of flooding	Not required (relies on sound design)	No impact	Increased flood risk due to changes in water levels	No impact	Not required	No impact
Implications of the proposed development on the existing standard of flood defence	<i>No impact</i> (includes consideration of the effects of vibration)	Not required	<i>No impact</i>	Increased flood risk due to changes in the wave climate	Minor adverse	None	Minor adverse
				Siltation at outfalls and barrages due to changes in erosion/accretion patterns or sediment replacement	No impact	Not required	No impact

Table A (continued)

CONSTRUCTION PHASE			OPERATIONAL PHASE				
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
TRAFFIC AND TRANSPORTATION							
Potential for increased traffic levels on the road network	Minor adverse on the A120; Minor to Moderate adverse on the B1414 and B1352	Movement of major items by sea; preparation of a Traffic Management Plan to include wheel washing, designated routes, marked vehicles and trip sharing	No impact on the A120 or wider network; a Minor adverse impact on the B1414 and B1352 for a six month period	Potential for increased traffic generation on the road network	Capacity exceedance at 3 roundabouts and 1 intersection (out of 12)	Highway improvements (e.g. widening the running surface, single lane dualling etc.) to be discussed with the Highways Agency; and a scheme and a Travel Plan	No impact
INFRASTRUCTURE							
Unlikely that any impact will arise	The appointed Contractor should verify the location of any utilities	Depends on findings	Unlikely that any impact will arise	No impact	Negligible	Not required	Negligible
SOCIO-ECONOMICS (also see Statement of Need, Section 1.2)							
Increased construction employment	Minor benefit locally	Not required	Minor benefit locally	Increased direct employment	Moderate benefit	Not required	Moderate benefit
Indirect effects on the local and national economy	Moderate benefit locally; Minor benefit elsewhere	Not required	Moderate benefit locally; Minor benefit elsewhere	Multiplier effects	Moderate benefit	Not required	Moderate benefit

Table A (continued)

CONSTRUCTION PHASE		OPERATIONAL PHASE					
Potential impact	Significance	Mitigation	Residual impact	Potential impact	Significance	Mitigation	Residual impact
				Increases in associated port activities	Minor benefit	Not required	Minor benefit
				Increased visitor expenditure	Minor benefit	Not required	Minor benefit
				Effect on the labour market	Moderate benefit	Not required	Moderate benefit
				Improved competitive advantage	Further enhancement	Not required	Further enhancement