TEAM2100

Environment Agency

Environmental Assessment Report

Canvey Island Southern Shoreline

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Technical Check

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Approval

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Introduction

1.1 Project overview

As part of the Thames Estuary Asset Management programme (TEAM2100), repair and replacement of 3.2 km of tidal defence revetment is proposed on the southern and eastern shoreline of Canvey Island, Essex, between Thorney Bay in the west and a point south of the Island Yacht Club and saltmarsh in the east. The existing revetment of primarily concrete blocks and grouted stone is proposed to be overlain with open stone asphalt (OSA). Figure 1-1 shows the location of the project.

Figure 1-1 Canvey Island Southern Shoreline project extent

1.2 Purpose and structure of this report

The project has been screened against the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) and it has been determined that a statutory Environmental Impact Assessment (EIA) is not required. Considering the criteria in Schedules 1, 2 and 3 of the Regulations, and the characteristics of the proposed works on completion, which will be similar to the existing characteristics of the site, no significant effects on the environment are anticipated from the proposed improvement works. Castle Point Borough Council (CPBC) and the Marine Management Organisation (MMO) have provided formal Environmental Impact Assessment (EIA) screening opinions, which confirm that a statutory EIA is not required.

Castlepoint Borough Council have also provided informal advice that the revetment works fall under Permitted Development and do not require planning permission. Only the compounds require planning permission.

The Environment Agency is responsible for the EIA screening determination for permitted development works under the Environmental Impact Assessment (Land Drainage Improvement Works) Regulations 1999 (as amended). The National Environmental Assessment and Sustainability (NEAS) team have screened the project against these regulations and determined that a statutory EIA is not required.

This report is a record of the voluntary environmental assessment work undertaken for the project. It brings together previous assessments and adds to them based on the detailed design and construction methodology.

In the following sections the scope of works is outlined, followed by an assessment of potential impacts on environmental receptors and any mitigation required for these.

1.3 Scope of works

The proposed works involve refurbishing the existing revetment from Thorney Bay (Asset 165844) to south of Island Yacht Club (Asset 165682) by overlaying (and in some locations replacing) the existing material with OSA and tying it in to the existing rock armour at the eastern end (Asset 165681). This will mainly be done from the top of the revetment using a long reach excavator. Some excavation of the foreshore will be required at the toe of the revetment; this will require a small excavator to work on the foreshore. In order for the construction plant to access the works area, the landward earth embankment will be temporarily lowered and widened to create a working platform. This will be done in 500m lengths and the embankment will be reinstated to its original height and width as the works progress along the frontage.

In association with refurbishing the revetment, a number of other works will be required:

- Replacement and widening of one floodgate in the upstand seawall and replacement of two access ramps, to allow maintenance plant to reach the riverward side (this will involve concrete piling for the new access ramp structures);
- Construction of passing places along the maintenance access track on the riverward side of the seawall by widening it at certain locations to allow maintenance plant to travel safely along the entire frontage;
- Replacement of all of the concrete steps that lead down the revetment to the foreshore (many of which are in a state of failure and not currently suitable for public use);
- Removal of the Chapman Sands Jetty;
- Replacement of concrete slabs showing significant differential settlement along the surface of the maintenance track;
- Replacement of the concrete apron around the Concorde Café and the access ramp down to the foreshore; and
- Landscape and amenity improvements and habitat mitigation and improvements (see Sections 2.3 and 2.6 below).

Throughout the construction period there will be a single main compound and a material storage area. Four satellite compounds will be mobilised and demobilised as the work progress along the frontage. The proposed compound locations are shown below in Figure 1-2.

Figure 1-2 Proposed compound locations

Site set up is planned to begin in January 2023, with construction works starting in April 2023. The project is planned to be completed in Summer 2025. The works are proposed to be undertaken in phases, with work teams working in different areas at the same time. The revetment works are anticipated to be done on 500m sections at a time. Works along the eastern frontage are within a designated Special Protection Area (SPA), Site of Special Scientific Interest (SSSI) and Ramsar site and will be undertaken outside of the overwintering bird period which is regarded as September until the end of March. Works in this area are currently planned for April to July 2023. Other timing constraints, such as tidal working windows, weather and holiday seasons will also need to be accounted for.

Environmental Assessment

2.1 Human population

2.1.1 Existing environment

Canvey's southern shoreline is a popular visitor destination. Public access (pedestrian only) is present along both the public footpath on the landward side of the upstand tidal defence wall and the maintenance access track on the riverward side. There is public access onto the foreshore and beach areas using the foreshore steps. On the riverward side of the sea wall, there are two cafes (Labworth Café and Concorde Café) and two amenity tidal pools for public use. On the landward side, there are car parks at Thorney Bay and near to the Labworth Café, and an amusement park and several restaurants near the Labworth Café. There are residential properties all along Western Esplanade and Eastern Esplanade, approximately 30m from the landward embankment on the opposite side of the road.

2.1.2 Assessment

During construction, residents, businesses and visitors may be affected by noise, dust and access restrictions. However, the works will be undertaken in 500m sections at a time and any impacts would be local to this area; no location is anticipated to be affected for the whole construction period. The exception to this would be the main compound and material storage compound locations and residents, businesses and schools along the access routes to the site. A Transport Assessment has been undertaken for the project. It identifies the mitigation measures required to minimise impact on the transport network and disturbance to the local population.

Best practice measures will be in place to minimise noise and dust (such as those referenced in BS 5228: Code of practice for noise and vibration control on construction and open sites, and the Greater London Authority's Supplementary Planning Guidance: Control of dust and emissions during construction and demolition (2014)), and no significant effect is anticipated. A Section 61 noise consent will be obtained from the council, agreeing working hours and other control measures. Access around the works areas will be controlled using temporary path closures, with suitable minor diversions in place. Access to the Labworth Café and Concorde Café during the works at these respective locations will need to be agreed with the café owners; options for maintaining safe access and the desirability of doing so will need to be discussed. Holiday seasons have been considered during the development of the construction programme to reduce disruption along the seafront. With controls in place and mitigation measures tracked through the Environmental Action Plan (EAP) for the project, no significant effects are anticipated.

No effects relating to noise, dust or access are anticipated during the operational phase of the project. The maintenance regime is assumed to be the same (in terms of environmental consequences) as the current regime. The new revetment will have a larger footprint than the existing one due to the need for a shallower slope. However, no loss of amenity beach area is anticipated, as the sandy beach material from the disabled access ramp in the west up to and including Concorde Beach in the east will be reprofiled further out onto the foreshore once the revetment works are complete, with no material being taken offsite.

A number of environmental improvements have been identified and included in the design. These all relate to amenity improvements, but some will also have heritage or biodiversity benefits. The opportunities are set out in Table 1 below.

Table 2-1: Environmental opportunities included in the detailed design

Type	Improvement
Amenity/ Heritage	INTERPRETATION BOARDS Implementation of several interpretation boards with information topics such as: Labworth Grade II listed building, Dutch wall, flood risk management on the island, Thames Estuary, SSSI, and the red hills archaeological features. This would increase public awareness of the surrounding area and improve the experience of the users by providing meaningful information to the user. The stands of the existing interpretation boards along the landward embankment are likely to be used, and their content updated with some of the topics covered above.
Amenity	IMPROVEMENTS TO PUBLIC FOOTPATH The footpath that runs along the entire length of the wall landward side is currently only surfaced between Labworth Cafe and Hellendoom Road. The project will surface the footpath from Thorney Bay to Chapman Sands with tarmac, and reinstate hoggin-type material for the remaining length to the east. New surfacing will deliver an improvement to this footpath, which is part of the Thames Estuary Path and the England Coastal Path, as it will be a newer, level and uniform surface.
Art/Amenity	MURALS Murals on the walls of the two new maintenance access ramps on the seaward side. Local community groups or artists would be involved in the design and painting. Maintenance is likely to be minimal and could be done by community groups, along with all the existing murals along the seafront.
Habitat creation/ Amenity	REINSTATE THE LANDWARD SLOPE OF THE EMBANKMENT WITH GREATER BIODIVERSITY The project aims to increase the biodiversity of the reinstated earth embankment by using a seed mix with a combination of low-growing wildflowers and grasses, to benefit pollinators. The seed mix proposed, EL1 – flowering lawn mixture by Emorsgate (or similar approved) contains slow growing grasses (Agrostis capillaris, Cynosurus cristatus, Festuca rubra, Phleum bertoloni) with a selection of wild flowers that respond well to regular short mowing (Trifolium pratense, Ranunculus acris, Prunela vulgaris, Primula veris, Lotus corniculatus, Leucanthemum vulgare, Leontodon hispidus, Galium verum). Only the disturbed part of the embankment will be seeded which will naturally disperse to the rest of the embankment.

2.2 Equality

The Environment Agency, including the TEAM2100 programme, is committed to promoting equality and participation in all its work, with due regard given to the need to eliminate discrimination, advance equality of opportunity, and foster good relations when making decisions and developing policies. To do this, it is necessary to understand the potential impacts on different groups of people.

An equality impact assessment (EqIA) was undertaken to ensure that the refurbishment of the existing revetment at Canvey Island is fair and does not present barriers to participation or disadvantage any protected groups from using the area after the work is completed.

The EqIA helped the project team to ensure that:

- we understand the potential effects of the project by assessing the impacts on different groups
- any adverse impacts are identified, and actions identified to remove or mitigate them

Discrimination is where someone is treated less favourably or put at a disadvantage because of their protected characteristic. The different groups covered by the Equality Act which were used in the EqIA for Canvey Island are referred to as protected characteristics: disability, gender reassignment, marriage or civil partnership status, pregnancy and maternity, race, religion or belief, sexual orientation, gender, and age.

2.2.1 Existing environment

Canvey Island South is a ward in Castle Point of East of England, England and includes areas of Furtherwick, Leigh Beck, Hole Haven, Thames Estuary Industrial Estate, Dutch Village, Charfleets Industrial Estate and Canvey Village.

In the 2011 census the population of Canvey Island South was 6,348 and is made up of approximately 51% females and 49% males. The average age of people in Canvey Island South is 45, while the median age is higher at 47.

99.1% of people living in Canvey Island South speak English. The other top languages spoken are 0.1% Hungarian, 0.1% Thai, 0.1% Portuguese, 0.1% Spanish.

The 2011 census statistics on long-term health problems and disability show that 11% of people living in Canvey Island South say their day-to-day activities are limited a lot, 10% say they are limited a little and 79% say they are not limited by long-term health problems or disability.

The religious make up of Canvey Island South is 65.6% Christian, 25.7% No religion, 0.3% Hindu, 0.2% Buddhist, 0.2% Muslim, 0.1% Jewish. 455 people did not state a religion. 24 people identified as a Jedi Knight and 2 people said they believe in Heavy Metal.

51.2% of people are married, 9.4% cohabit with a member of the opposite sex, 0.6% live with a partner of the same sex, 21.5% are single and have never married or been in a registered same sex partnership, 8.4% are separated or divorced. There are 340 widowed people living in Canvey Island South.

The top occupations listed by people in Canvey Island South are Skilled trades 16.3%, Administrative and secretarial 14.1%, Process, plant and machine operatives 12.0%, Associate professional and technical 10.4%, Administrative 10.4%, Caring, leisure and other service 10.2%, Elementary 10.1%, Sales and customer service 9.8%, Managers, directors and senior officials 9.3%, Elementary administration and service 8.6%.

2.2.2 Assessment

The Access for All Design Guide sets out a balance between our operational needs, the safe management of flood protection assets, rights of way and accessible environments. Components of the project related to access, such as the foreshore steps and access ramps, have elements that do not meet the Environment Agency’s Access for All guide, however they do not have a negative impact on any protected characteristic group compared with the pre-construction phase. Table 2 summarises these elements, the parameters that don’t comply with and the reasons behind this.

Table 2-2: Assessment of design elements against Access for All standards

Access for all standards	Guide	Proposed	Reason if non-compliant	Any negative impact on a protected characteristic group?
Maintenance track				
Surface	Hard, firm and smooth surface with very few loose stones and none bigger than 5mm	Concrete slab surface. Where slab settlement has resulted in lips of greater than 5mm across joints, then affected slabs will be replaced to take out the lips and potential trip hazard	Compliant	N/A
Width	1200mm (EA recommend 2000mm)	3000mm generally, 2500mm along localised lengths of width encroachment	Compliant	N/A
Maximum distance between passing places	50 metres	None	Not compliant Width of track is already wider than recommended in the guide. Maintenance access reasonably limited to only single maintenance crew who will need to manage traffic management. Very low maintenance traffic and only one entry and exit point. Adding more passing places would result in more undesirable encroachment into the estuary.	No
Ramps at Fisherman's Corner and Chapman Sands				
Gradient	Between 1:20 (5%) and 1:12 (8%)	1:12	Compliant	N/A

Access for all standards	Guide	Proposed	Reason if non-compliant	Any negative impact on a protected characteristic group?
Width	Vehicle ramp width recommended 3500mm (3000mm minimum)	2600mm clear width	Not compliant Only tracked vehicles permitted to access maintenance track and ramps to meet EA's '2m rule'. Selected width allows maneuverability of tracked vehicles and minimises undesirable encroachment into the estuary.	No Still sufficient width for two wheelchairs to pass each other.
Landing length	1800x1800 minimum	2000x2600	Compliant	N/A
Maximum distance between landings	9 metres	One landing, 10m from top of ramp and 9.1m from bottom of ramp	Not compliant Due to the required length and gradient of the ramp it is not possible to meet the standard.	No
Edging	Required to open sides of ramp Minimum 100mm high	200mm high	Compliant	N/A
Handrail	900-1000mm high minimum	1100mm	Compliant The proposed height is standard for handrails that provide edge protection to prevent falls from height and have a lateral structural load as these ones will be.	No
Maintenance ramp onto the foreshore at Concorde Café				
Gradient	Between 1:20 (5%) and 1:12 (8%)	1:12 down the ramp. 1:40 across the ramp.	Compliant	N/A
Width	Vehicle ramp width recommended 3500mm (3000mm minimum)	3150mm edge to edge (-175mm for handrailing = 2975mm clear width for vehicles)	Not compliant. The proposed width of the ramp is necessary to tie in to the adjacent revetment slopes at a stable angle. The intended vehicles types using this ramp will not be impacted by the proposed width. The main purpose of the ramp is for maintenance vehicle access rather than public access, although it is expected that it will be used by the public.	No

Access for all standards	Guide	Proposed	Reason if non-compliant	Any negative impact on a protected characteristic group?
Landing length	1800x1800 minimum	N/A - No landings within the design	Not compliant. The need for the beach access ramp to tie in to the adjacent revetment slopes as well as the need to minimize encroachment makes the provision of rest landings impractical.	No. New ramp will be easier to use than existing one, despite having no landings due to having a more even surface and gradient.
Maximum distance between landings	9 metres	N/A - No landings within the design	Not compliant. The need for the beach access ramp to tie in to the adjacent revetment slopes as well as the need to minimize encroachment makes the provision of rest landings impractical.	No. New ramp will be easier to use than existing one, despite having no landings due to having a more even surface and gradient.
Edging	Required to open sides of ramp Minimum 100mm high	On the landward edge there is a rising OSA revetment slope at 1:3.45. On the riverward edge there is no edging.	Not compliant. The lower end of the ramp (without handrail) will be substantially buried throughout its lifespan. It was deemed that a concrete hard edging would constitute a trip hazard that would be considered a greater risk than not having it.	No
Handrail	900-1000mm high minimum	1150mm high pedestrian parapet guardrail along the extent of the new apron slab area and partially down the length of the new beach access ramp.	Handrail height is compliant with minimum. The handrail will be only supplied on the riverward edge of the beach access ramp where there is a vertical drop of at least 1.1m, which is also within the tidal zone of the river. From a PSRA perspective it was deemed that the hazard from having a submerged structure (the handrailing) and the hazard of a drop from height was balanced at this point.	No
Foreshore steps				

Access for all standards	Guide	Proposed	Reason if non-compliant	Any negative impact on a protected characteristic group?
Width	1200mm minimum	1950	Compliant	
Height	Not exceeding 2000mm without a landing	Height varies	Not compliant The need for the gradient of the steps to tie into the adjacent revetment slope makes the provision of rest landings on the longer steps (greater than 2000mm height) impractical.	No change from existing
Landings	At intervals of minimum 2000mm	None	Not compliant The need for the gradient of the steps to tie into the adjacent revetment slope makes the provision of rest landings on the longer steps (greater than 2000mm height) impractical.	No change from existing
Handrails	As a general rule a handrail should always be provided along steps and ramps	No handrails proposed	The existing steps to the foreshore have no handrails. Handrails in coastal environments can be a hazard.	No change from existing
Hazard warning paving	At the top and bottom of steps, two rows of 400 x 400mm	None proposed.	Not compliant Hazard warning paving at the bottom of the steps would be submerged with the tides and would be likely to collect algae growth over time due to the textured surface. This would create a new hazard as a slippery surface. It would not be suitable to include hazard warning paving at the top of the steps only, as this would lead users to expect matching paving at the bottom.	No change from existing

During construction, it is considered that restriction to the riverside maintenance track and landward side footpath will impact all users in the same way, it is envisaged that once re-open to the public, there is the potential for a positive impact on a few protected characteristic groups defined in the Equality Act 2010, as shown in Table 3 below.

Table 2-3: EqIA assessment summary

Protected Characteristic group	Is there a potential for positive or negative impact?	Please explain and give examples of any evidence/data used	Action to address negative impact (e.g. adjustment to the project)
Disability	Yes	Positive impact: the riverside maintenance track will be widened at 20 passing points to allow maintenance machinery to operate along the full extent. This will also improve the access for people with reduce mobility, especially users of mobility users and wheelchairs. Positive impact: accessibility will be improved along the landward footpath, as it will be surfaced with asphalt from Thorney Bay to Chapman Sands (a longer stretch of asphalt than currently exists) and the remaining stretch will be resurfaced in a hoggin type material (similar to existing but in being resurfaced the path will be relevelled so is likely to have an improved condition).	N/A
Gender reassignment	No	Not affected	N/A
Marriage or civil partnership	No	Not affected	N/A
Pregnancy and maternity	Yes	Positive impact: the riverside maintenance track will be widened at 20 passing points to allow maintenance machinery to operate along the full extent. This will also improve the access for people with prams and pushchairs. Positive impact: accessibility for people with prams and pushchairs would be improved along the landward footpath, as it will be surfaced with asphalt from Thorney Bay to Chapman Sands (a longer stretch of asphalt than currently exists) and the remaining stretch will be resurfaced in a hoggin type material (similar to existing but in being resurfaced the path will be relevelled so is likely to have an improved condition).	N/A
Race	No	Not affected	N/A
Religion or belief	No	Not affected, no places of worship near to the frontage that could be affected by access restrictions or noise.	N/A
Sexual orientation	No	Not affected	N/A
Gender	No	Not affected	N/A
Age	No	Not affected	N/A

2.3 Biodiversity

2.3.1 Existing environment

2.3.1.1 Intertidal

A survey of the intertidal habitat types and associated invertebrate communities was undertaken at selected transects along the entire extent of the project in March 2020, and an overwintering bird survey was carried out on the eastern frontage over the 2019/2020 winter (please see survey reports TEA-3B-00.00-RP-EN-00-000004 and TEA-3B-00.00-RP-EN-00-000002 respectively).

The intertidal zone of the eastern frontage is part of a larger designated SPA, SSSI and Ramsar site named Benfleet and Southend Marshes, which is an internationally important site for waterfowl and wading birds, particularly during the winter months. The overwintering bird survey found that the survey site supports modest numbers of wading birds feeding on the exposed mud, particularly on a high tideline. At low-tide, wading birds are more widely dispersed given the abundance of open mud used by both short and long-billed wading species. Very low numbers of birds were recorded using the rock armour adjacent to the works area for foraging (single counts Curlew and Common Redshank and five counts of Turnstone). The nearest high tide roost was on the shingle beach approximately 200m north of the works area. Figure 2-1 below shows the location of the designated sites.

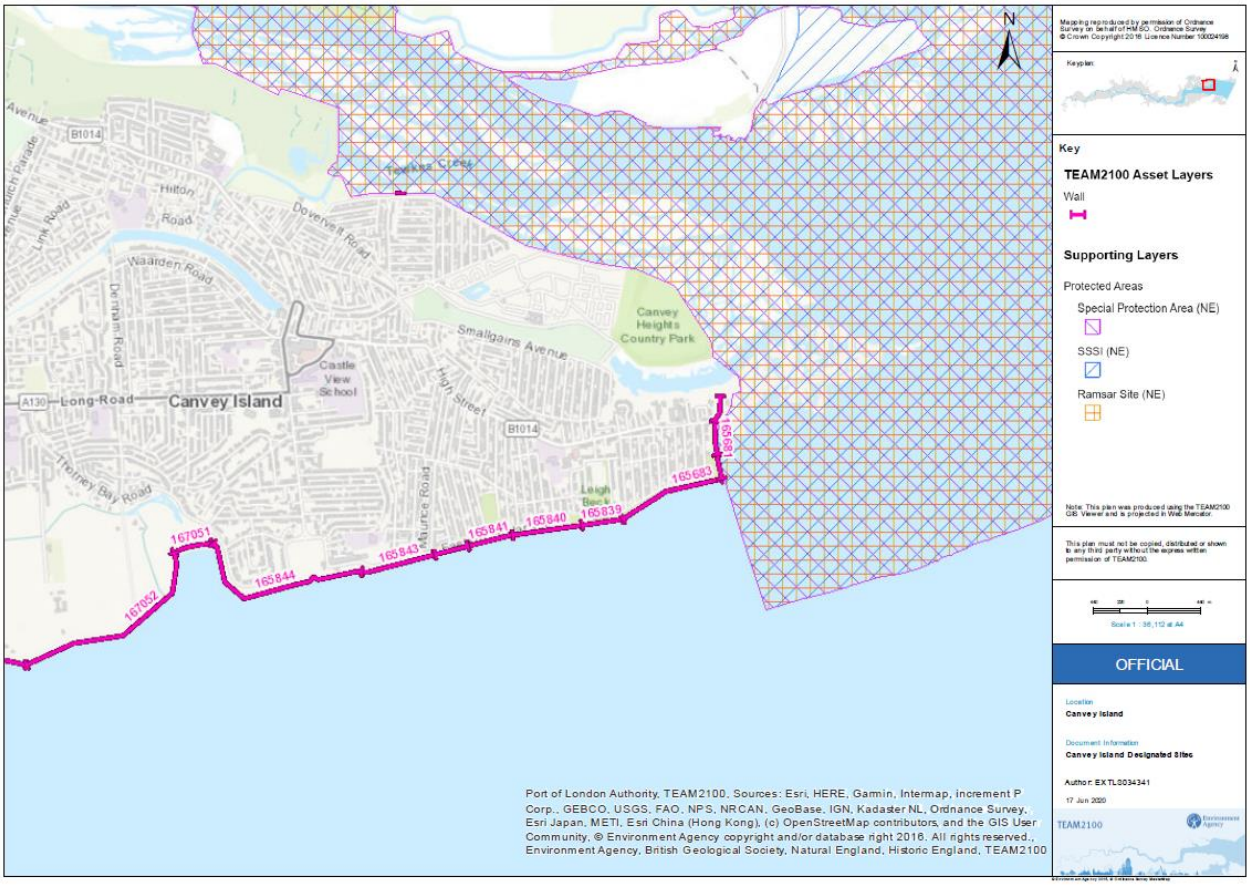

Figure 2-1: Designated Sites

The southern shoreline consists of a mixture of habitat types, including mud, sand, rock and oyster beds. Five of the biotopes recorded during the intertidal survey are listed as Annex I habitats in the EU Habitats Directive (92/43/EEC), and two of these are also Habitats of Principle Importance under Section 41 of the Natural Environment and Rural Communities Act (NERC Act), 2006. The habitats along the southern shoreline have the potential to provide off-site feeding opportunities for SPA bird species, particularly the areas of oyster bed and mudflats.

The revetment and maintenance access track have several plant species growing on them which are characteristic of saltmarsh habitats, including golden samphire. Golden samphire is in greatest abundance on the revetment on the eastern shoreline (Frontage E).

2.3.1.2 Terrestrial

A Preliminary Ecological Appraisal (PEA) walkover survey was undertaken in August 2021 of the proposed compound locations and the landward side of the embankment that require planning permission (TEA-3B-00.00-RP-EN-00-000006).

Each of the proposed temporary compound locations assessed were dominated by modified grassland of low nature conservation value. The survey identified that the grassland is kept relatively short by regular mowing and is regularly used for recreational activities.

Priority Habitats listed in Section 41 of the NERC Act were identified within and adjacent to the site boundary that included reedbed directly adjacent to the north of the proposed location of the Materials Storage Compound, coastal saltmarsh along the eastern and southern foreshore of the seawall, and two small narrow areas of deciduous woodland 700 m to the east of the survey area.

Golden samphire, a saltmarsh type plant, has been found to be growing on the top half of the revetment and in the maintenance access track at some areas along the frontage, mainly at the eastern end.

2.3.2 Assessment

2.3.2.1 Designated sites and intertidal habitat

A Habitats Regulations Assessment to assess potential effects on the SPA and Ramsar sites has been undertaken (both Stage 1 Likely Significant Effects Screening TEA-3B-00.00-TN-EN-00-000001 and Stage 2 Appropriate Assessment TEA-3B-00.00-TN-EN-00-000006). The outcomes of this assessment are summarised below.

2.3.2.2 Coastal waterbirds

Works on the Eastern frontage are timed for spring 2023 (with works focused in April - July) which is outside of the overwintering season for waterbirds and also avoids the main period during which migratory birds are returning. Owing to the planned timing of the works, existing levels of human disturbance and low habitat utilisation as recorded by surveys, a Likely Significance Effect (LSE) has been discounted for physical disturbance of waterbirds during construction.

2.3.2.3 Habitat loss

Loss of intertidal habitat along the entire project extent (both designated and non-designated) has been estimated by biotope using the 3D model of the project. These losses are shown in Table 2-4 below and the biotopes are mapped alongside the existing and proposed revetment footprints in the drawings in the appendix to the HRA (TEA-3B-00.00-DR-EN-00-000001 to -000006).

Table 2-4: Estimated loss of each biotope

Biotope code	Biotope full name	Estimated loss
LR.FLR.Eph.EntPor	*Porphyra purpurea* and *Enteromorpha* spp. On sand-scoured mid or lower eulittoral rock	2125m^2
LR.LLR.F.Fves.X	*Fucus vesiculosus* on mid eulittoral mixed substrata	2130m^2

Biotope code	Biotope full name	Estimated loss
LR.LLR.FVS.AscVS	*Ascophyllum nodosum* and *Fucus vesiculosus* on variable salinity mid eulittoral rock	4,200m^2*
LS.Lsa	Littoral sand	2051m^2
LS.LSa.MoSa.AmSco.Sco	*Scolelepis spp.* in littoral mobile sand	4778m^2
LS.LSa.MuSa.Lan	*Lanice conchilega* in littoral sand	11m^2
LS.LSA.MoSa.OI.FS	Oligochaetes in full salinity littoral mobile sands	1864m^2
LS.LMx	Littoral mixed sediment	2324m^2
LS.Lmu.Mest.HedMacScr	*Hediste diversicolor, Macoma balthica* and *Scrobicularia plana* in littoral sandy mud	169m^2
N/A	Oyster bed (not a biotope)	1403m^2*
Total loss		21055m^2 = 2.1055ha
Note: *includes small loss from designated site (combined loss of designated LR.LLR.FVS.AscVS and oyster bed habitat is 660m^2).		

Designated habitat loss

There will be a loss of approximately 660m^2 of designated habitat due to the shallower slope of the new revetment, which represents 0.0029% of the SPA. The designated habitat lost will be oyster beds and the biotope LR.LLR.FVS.AscVS - *Ascophyllum nodosum* and *Fucus vesiculosus* on variable salinity mid eulittoral rock, which is present on the lower half of the revetment and is also listed as an Annex I habitat. This habitat has been recorded to be poorly utilised and low quality to qualifying interests, and at risk from disturbance from the adjacent urban area. The HRA concludes that the loss of designated intertidal habitat (as a proportion of the total designated site) is therefore considered to have no adverse effect on the site integrity of the SPA or Ramsar site.

Undesignated habitat loss

Table 2-4 and the figures in the appendix of the HRA show that the biotopes with the largest area of loss along the entire frontage are:

- LS.LSa.MoSa.AmSco.Sco - Scolelepis spp. in littoral mobile sand, which is present to the west of the amenity tidal pools on the southern frontage; and
- LR.LLR.FVS.AscVS - *Ascophyllum nodosum* (knotted wrack) and *Fucus vesiculosus* on variable salinity mid eulittoral rock, which is present on the lower half of the revetment on the eastern and western facing frontages as well as sections of the southern shoreline.

Both of these are listed as Annex I habitats.

It has been confirmed by research into OSA applications on other coastal sites in Essex that the standard aggregate mix used by the supplier supports growth of the knotted wrack habitat. This mix has a range of stone sizes and appears to create appropriate conditions for algae to attach and grow on the substrate. Therefore, the lost LR.LLR.FVS.AscVS habitat is expected to regrow on the new revetment at Canvey over a number of years and no permanent loss is anticipated. To encourage colonisation of the new revetment surface, the loose rubble at the toe of the revetment which already has algae growing on it will be repositioned at the toe once the revetment works are completed.

Rock pools are proposed to be installed at the tie in of the revetment with the existing rock armour on Frontage E to provide additional habitat diversity on site.

TEAM2100 maintains a balance sheet of intertidal habitat loss and gain across the estuary and aims to ensure no net loss across the estuary as a whole (this includes both designated and non-designated habitat). However, other than the knotted wrack habitat, the habitat loss described above cannot be replaced on site or elsewhere in the estuary. Therefore, agreement within the Environment Agency Area Teams has been obtained to provide replacement habitat for the designated and non-designated habitat offsite elsewhere in Essex.

2.3.2.4 Terrestrial habitats

Some of the modified grassland on the landside embankment will be lost during construction as the embankment will be temporarily lowered and widened and used as a work platform for machinery. The compound areas will result in a loss of modified grassland as hard standing will be laid. However, the areas of modified grassland and embankment that are used as a worksite and for the compounds will be reseeded after construction with a flowering lawn mixture, which will increase biodiversity compared to the existing grassland. The reinstatement of these areas is shown on the Landscape Masterplans (drawing references TEA-3B-00.00-DR-LA-00-000016, -000017, -000018, -000019 and -000020).

Priority Habitats listed in Section 41 of the NERC Act were identified within and adjacent to the site boundary that included reedbed directly adjacent to the north of the proposed location of the Materials Storage Compound, coastal saltmarsh along the eastern and southern foreshore of the seawall, and two small narrow areas of deciduous woodland 700 m to the east of the survey area. None of these priority habitats are likely to be impacted by the refurbishment works. A drainage strategy for the compounds includes proposals for drainage of the Materials Storage Compound; this includes an infiltration system which will help prevent silt and pollution entering the reedbed area at Thorney Creek Fleet (document reference TEA-3B-00.00-RP-CI-Y0-000001).

Any saltmarsh-type plants growing on the revetment, including golden samphire, will be lost when the revetment is refurbished. However, as described in the previous section, the proposed standard aggregate mix of OSA has been shown to support plant growth, and this includes samphire, so this lost habitat is expected to regrow on the new revetment surface. The project will speed up this process at the eastern end of the project (where most of the samphire was identified) by collecting seeds from the existing samphire before revetment works begin, supplementing this with additional seed if necessary, and sowing the seeds on the new revetment surface once installed by brushing them into the top half of the revetment with topsoil.

2.3.2.5 Protected species

The Preliminary Ecological Appraisal contains the full details of the assessment of potential impacts on protected species. In summary, no significant effects are anticipated due to the low likelihood of protected species being present. Precautionary measures have been included in the Environmental Action Plan, such as keeping working areas mown short prior to construction to deter reptiles, and clearing vegetation outside nesting bird season where possible.

2.4 Heritage and archaeology

2.4.1 Existing environment

An Archaeological Desk-Based Assessment has been carried out (TEA-3B-00.00-TN-HE-00-000002). The foreshore has high potential for archaeological remains to be present, although some of the area affected by the project will have been disturbed by previous works to the defence. The area in front of and behind the southern shoreline defence contains remains of substantial Roman salt production sites. There is evidence that settlement or occupation at these sites may have prehistoric origins and continued during subsequent periods (Anglo-Saxon to Post-medieval). Archaeological remains of this activity are found on both sides of the coastal defence, and the foreshore has yielded some large assemblages of historic artefacts (mainly pottery). The coastline has also been the route of 17th century flood defences, and site of modern military installations.

Labworth Café, which is directly at the top of the revetment and on the riverward side of the sea wall, is a Grade II listed building. There are no other designated assets in the 500m study area. The Concorde Café and tidal pools are of some heritage significance (as well as their social value) because they are surviving elements of the 20th century recreational landscape along the shoreline.

2.4.2 Assessment

2.4.2.1 Buried archaeological remains

The proposed works have potential to result in physical disturbance of any archaeological remains present along the coastal defence, including affected foreshore areas, and in construction, welfare and storage areas. Further archaeological fieldwork is planned in the form of a field walkover survey, a trial of a geophysical survey and, depending on the findings of this first phase and discussions with archaeological stakeholders, targeted test pitting and auger surveys. This fieldwork will inform mitigation required during construction.

2.4.2.2 Structures and setting

No physical impact is anticipated on modern structures along the seafront, including the Grade II Labworth Café and non-designated Concorde Café. The foreshore steps that will be removed and replaced are not considered to be of heritage significance. Neither are the timber stakes at several locations at the toe of the revetment, which may be removed.

During construction, the works would change the setting of the seafront area, by introducing movement of plant, noise and other disturbances. This would affect the settings of heritage assets including Grade II Labworth Café; however, these changes would be limited in duration and reversible upon cessation of the construction phase of the proposed development. Castle Point Borough Council has confirmed that listed building consent is not required.

The proposed development would alter the appearance of the seafront in numerous areas; however, these alterations would be minor in scale and neutral or positive in their effect on the setting of heritage assets and on public amenity. There would therefore be no harm to heritage assets are a result of alteration to their settings.

2.5 Geology and contaminated land

No effect on geology is anticipated. The piles for the maintenance access ramps will pass through embankment fill and be embedded into tidal flat deposits.

Ground investigations have revealed the presence of asbestos within the grout in the revetment. The removal of this grout will be minimised as much as possible as explained in the Basis for Material Management and Re-use Technical Note (TEA-3B-00.00-TN-GT-00-000001). Contaminated material that is removed will be disposed of appropriately at a licensed facility.

Removal of material will be undertaken within the low tide working window, which will minimise risk of contamination of the watercourse. The contractors will adhere to best practice pollution prevention guidance for demolition and construction activities adjacent to water.

2.6 Landscape and visual amenity

2.6.1 Existing environment

A Landscape Appraisal Report was produced at the Appraisal stage of the project to help choose the preferred solution for the site (TEA-3B-00.00-RP-LA-00-000001). The assessment of potential impacts has been updated for the design stage below.

The site is within the Greater Thames Estuary National Character Area (NCA) which is predominantly a remote and tranquil landscape of shallow creeks, drowned estuaries, low lying islands, mudflats and broad tracts of tidal salt marsh and reclaimed grazing marsh that lies

between the North Sea and the rising ground inland. It forms the eastern edge of the London Basin and encompasses the coastlines of South Essex and North Kent, along with a narrow strip of land following the path of the Thames into East London. There is a marked contrast between the wild and remote coastal marshes and the industrial and urban developments which are highly visible in the low-lying landscape.

With regard to Local Landscape Character, the coastal area of Essex has a longstanding use for holidays and leisure, because of its proximity to London. It has also been used for industry and military purposes because of the remoteness of some of its creeks and headlands. Seaward of the flood defences, local landscape consists of intertidal areas, including beach areas which are used for recreation and mudflats and saltmarshes which are valuable for wildlife.

The site's landscape is dominated by the presence of the flood defence, which is a long linear element that can create a feeling of being trapped on one side or another of it. Riverward, there are open views across the Thames to the North Kent Marshes, with the Isle of Grain visible in the distance. There is a strong community on the island and local groups have painted murals on the riverward side of the flood wall and installed planters along the maintenance access track at Thorney Bay. The tidal defences on the eastern end of Canvey Island form the landward boundary of Benfleet and Southend Marshes SPA, Ramsar site and SSSI or (designated for intertidal habitat and birds).

On the landward side of the flood defence, there is an amenity area on a linear strip of land between the embankment and the housing developments of different width along the whole length of the defence (approximately 2 km). The amenity area has no ecological designation and is mainly short mown grass and a few small trees and shrubs. There are a few places to which the local community is attached, such as memorial gardens, WWII airplane crash locations and a fun park.

Other features along the frontage include the Labworth Café, which is a Grade II listed building that sits adjacent to the flood defence, overlooking the Thames Estuary. There is also a designated Public Right of Way (PROW CANV_5) running along the whole flood defence on the landward side, on top of the embankment with views over the wall and into the centre of the island.

The Chapman Sands Jetty is towards the eastern end of the frontage and sits well within the landscape, however the presence of additional fencing, chains and gates at the higher end of the jetty (which are closer to the visual receptors) is considered to detract from the visual amenity of the structure and outweighs the benefits the lower seaward side has (which is further to the visual receptors). Study of the historic records in the vicinity of the project site to date has not found that the jetty has any historic importance.

2.6.2 Assessment

The construction effects of the project (caused by vehicle movements, temporary hoarding and site compounds and other temporary features) on the landscape areas of the site of low value and sensitivity are minor adverse and are short term and temporary effects. The significance of this is slight.

The OSA is a type of intervention that is likely to have a minor adverse impact on landscape and visuals during operation as it resembles materials that are frequently used in this environment, such as bituminous grout.

Using OSA will not have a significant impact on the regional landscape character area, as the current Essex block revetment is of a similar man-made system to OSA. Also, the areas of the revetment that were repaired, were done so with bitumen, which has a similar appearance to OSA. There will be a minor impact on the local landscape, as the surface will look different to the current Essex blocks however, OSA is still man-made and so the change in appearance will be minor. The OSA will provide a more uniform finish than the current mix of blockwork and bitumen repairs, which could be considered beneficial (less messy) or adverse (more man-made).

Removing the Chapman Sands Jetty will lose a feature in the landscape, which people may use as a meeting place or reference point. However, it would also declutter the area and the adjacent maintenance access track by removing the fencing, chains and gates.

The new passing place in front of the Labworth Café (Grade II listed building) has been designed to avoid impacts on the setting of the listed building by extending it enough on either side of the centre of the building to ensure that the view of the Café from the estuary is not perceived as asymmetrical.

Overall, it is considered that the magnitude of negative landscape and visual effects will be minor. In the longer term, any negative landscape effects will be reduced by the weathering effect of used materials which will result in a lightening of the colour of the OSA, and the colonisation of the lower part of the OSA by seaweed species which will soften its appearance.

The project will provide some benefits to local access and amenity. For example, all sets of concrete steps that provide access to the beach and foreshore will be replaced. This will improve access as some sets of steps are currently in unusable condition. Some of the steps will also be repositioned slightly so that they line up with access points or passing places along the frontage. The ramp down to the beach at Concorde Café will also be replaced, with a shallower gradient and more even surface, improving access at this location.

As part of the reinstatement, the footpath at the top of the embankment on the landward side of the seawall will be surfaced from Thorney Bay to Chapman Sands, which is the most frequently used section of path. This will improve the accessibility of the path by providing a new, consistent surface.

Landscape Masterplans have been produced and show all improvements incorporated into the project (TEA-3B-00.00-DR-LA-00-000016, -000017, -000018, -000019 and -000020).

2.7 Materials and resource efficiency

The main new materials that will be brought to site will be OSA, lean sand asphalt, concrete and steel. None of these are deemed to be in short supply and so the project is not anticipated to have a significant effect on the availability of these materials. Topsoil stripped from the temporary working areas will be stored on site and reused during reinstatement where possible. Temporary fill for use in making the temporary working platform and haul roads/ramps on the landward side will be reused where possible as works progress along the frontage. A Materials Management Strategy and Materials Management Plan will be developed for the project and will cover requirements of the CL:AIRE Definition of Waste Code of Practice where relevant.

Waste that will be produced by the project includes old revetment material (including any contaminated/asbestos containing material as mentioned in Section 2.5), waste concrete relating to any in-situ pouring, and timbers that currently line the toe of the defence at some locations. The existing revetment material will be retained as much as possible to minimise waste; currently it is expected that 65% can remain and 35% will be removed due to presence of voids. Many of the concrete components will use pre-cast concrete, which will reduce waste compared to forming structures onsite. The Site Waste Management Plan for the project also identifies another method of reducing waste, by building structures such as the ramps over existing concrete rather than removing the concrete first (TEA-3B-00.00-HS-ZZ-00-000001). The project is not expected to significantly affect capacity of local or regional waste facilities.

2.8 Traffic and transport

A transport assessment has been undertaken (TEA-3B-00.00-RP-TM-00-000001) to assess the potential impacts on the transport network and users due to the construction of the project and identify any mitigation required. The assessment concludes that the impacts of the construction traffic will not be significant. Although there will be an increase in the percentage of construction Heavy Goods Vehicles (HGVs) using local roads, the increase in actual HGV numbers will not be significant particularly since the HGV demand will be managed through the implementation of a Construction Traffic Management Plan (CTMP) to spread the demand across the working hours both for tidal and non-tidal works. The Framework CTMP (TEA-3B-00.00-RP-TM-00-

000002) sets out how construction traffic will be managed including access routes, temporary closures and vehicle monitoring. A Detailed CTMP will be developed before construction starts and will be implemented on site.

2.9 Water environment

The works will be partially within the Thames Lower water body (as classified in the EU Water Framework Directive 2000, which is transposed into UK law through the Water Environment Regulations). A Water Environment Regulations compliance assessment has been carried out (refer to Appendix A) and has concluded that there will be no deterioration of the water body as a result of the works. Any risks to hydromorphological elements, biological quality elements and water quality elements will be controlled by measures in the Environmental Action Plan.

No impacts on groundwater are anticipated. A screening assessment was undertaken to assess potential risk to groundwater from the piling activity, based on the pile design and ground investigation reports; this concluded that risk to groundwater is low and no further assessment or mitigation is required (see the Basis of Design Environmental Appendix: TEA-3B-00.00-BD-EN-00-000001).

2.10 Climate change

The design of the project takes into account climate change-related sea-level rise to ensure that flood protection can be maintained and therefore the project itself is not anticipated to be vulnerable to climate change within its design life.

Opportunities to reduce the carbon demand of the project and therefore reduce its contribution to climate change have been identified during appraisal and design stages. Actions or decisions taken so far that have reduced the carbon demand include:

- OSA as the preferred option: this had thelowest carbon demand of the short-listed options
- Reduction of waste and material requirements through the overlay of the existing revetment where possible rather than full replacement
- Low carbon concrete to be used for various elements of the project
- Optimisation of the slope of the new revetment which reduces waste and material requirements

Further measures to be considered as the project continues include reduction of carbon from construction-related travel and use of plant. A trial of a ‘warm-mix’ OSA may be carried out on a small section of revetment to inform future projects; this requires less heating than the standard methodology and would therefore reduce the carbon demand.

The Carbon Optimisation Report for the project provides further detail on the carbon accounting results and carbon reduction measures (refer to document TEA-3B-00.00-RP-EN-00-000001).

2.11 Major accidents and disasters

The project is not anticipated to cause or be vulnerable to any major accidents. Natural disasters include flooding and the purpose of the project is to provide continued protection to Canvey Island from flooding and so it will not increase flood risk. Repairing the defence will extend its life and reduce the potential for future catastrophic failure.

Conclusion

During the construction of the Canvey Island Southern Shoreline project, there is potential for impacts on the human population, biodiversity (qualifying bird species of the designated sites and intertidal habitat), unknown buried archaeology and the setting of heritage assets, traffic and transport and water quality. However, these effects can be mitigated and controlled through the EAP and other management plans.

The operation of the project is anticipated to have positive impacts on access and amenity due to incorporation of elements such as new surfacing along the landward footpath (see Table 1 for more information). There will be some benefit to terrestrial biodiversity due to the inclusion of a floral seed mix on the reinstated area of the landward embankment, which will attract pollinators. There is likely to be a net loss of intertidal habitat at the site due to the new revetment having a flatter slope and thus a larger footprint than the existing one. However, this will be replaced by habitat creation offsite, elsewhere in Essex.

Overall, with mitigation in place, no significant adverse effects are anticipated to occur during construction or operation.

Glossary

Acronyms and Abbreviations

Acronym / Abbreviation	Detail
CPBC	Castle Point Borough Council
CTMP	Construction Traffic Management Plan
EA	Environment Agency
EAP	Environmental Action Plan
EIA	Environmental Impact Assessment
EqIA	Equality Impact Assessment
HGV	Heavy Goods Vehicle
HRA	Habitat Regulations Assessment
LSE	Likely Significant Effect
NEAS	National Environmental Assessment and Sustainability
OSA	Open Stone Asphalt
PEA	Preliminary Ecological Appraisal
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TEAM2100	Thames Estuary Asset Management 2100

Definitions

Descriptor	Detail
Environment Agency	The Environment Agency protects and improves the environment and make it better place for people and wildlife. Operates at the place where environmental change has its greatest impact on people's lives. Reducing the risks to people and properties from flooding; make sure there is enough water for people and wildlife; protect and improve air, land and water and apply the environmental standards within which industry can operate. Acting to reduce climate change and helping people and wildlife adapt to its consequences are at the heart of all that we do. The Environment Agency cannot do this alone. They work closely with a wide range of partners including government, business, local authorities, other agencies, civil society groups and the communities they serve.
TEAM2100	Thames Estuary Asset Management 2100, is one of the UK Government's top 40 national infrastructure projects and once underway will be one of the world's largest flood risk management programmes. This involves the planning, programming, optimisation and delivery of investigation, design, capital maintenance, refurbishment and replacement works on the existing tidal flood defence assets along the entire 170km length of the Thames estuary.

Appendix A: Water Environment Regulations Compliance Assessment