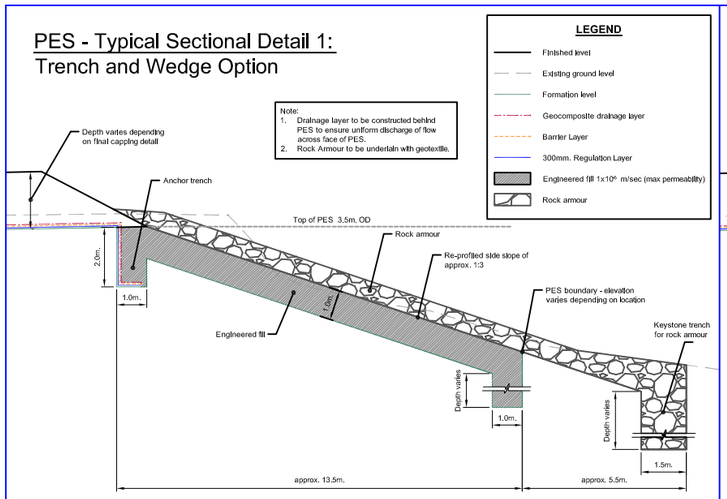
PES - Typical Sectional Detail 1:
Trench and Wedge Option



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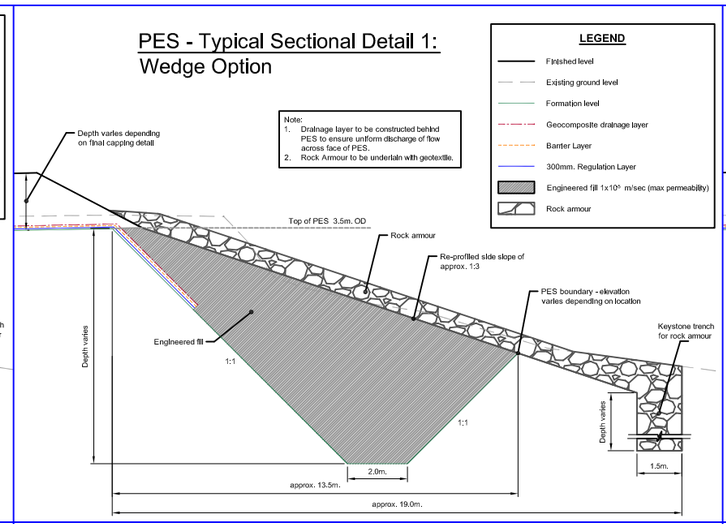
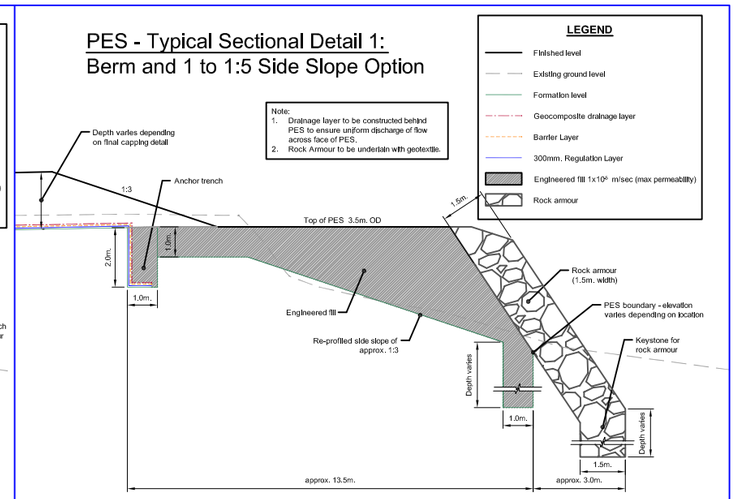
Wedge Option



PES - Typical Sectional Detail 1:
Berm and 1 to 1:5 Side Slope Option



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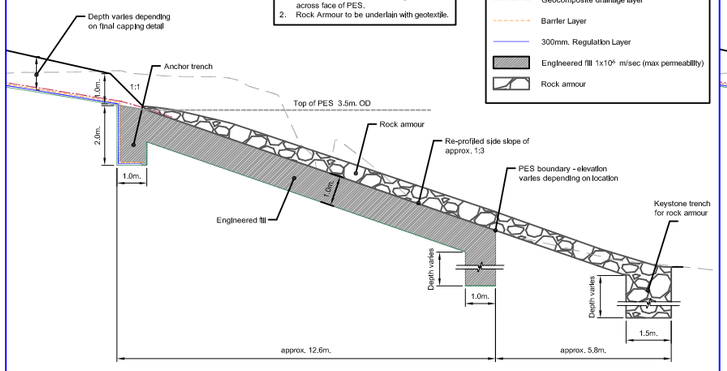

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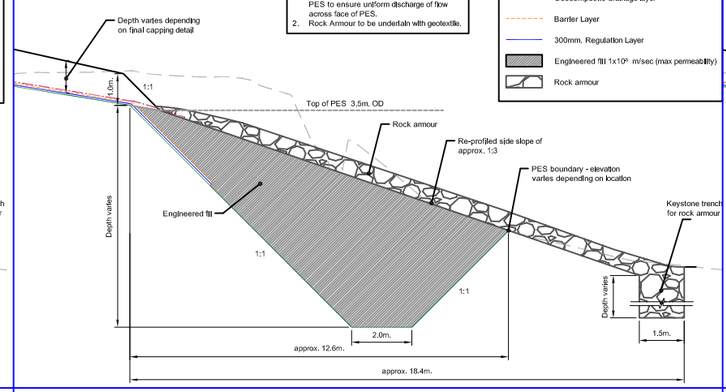
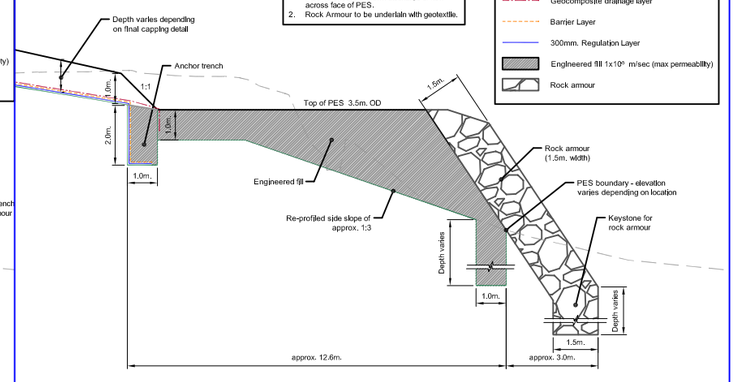


PES - Typical Sectional Detail 2:
Berm and 1 to 1:5 Side Slope Option



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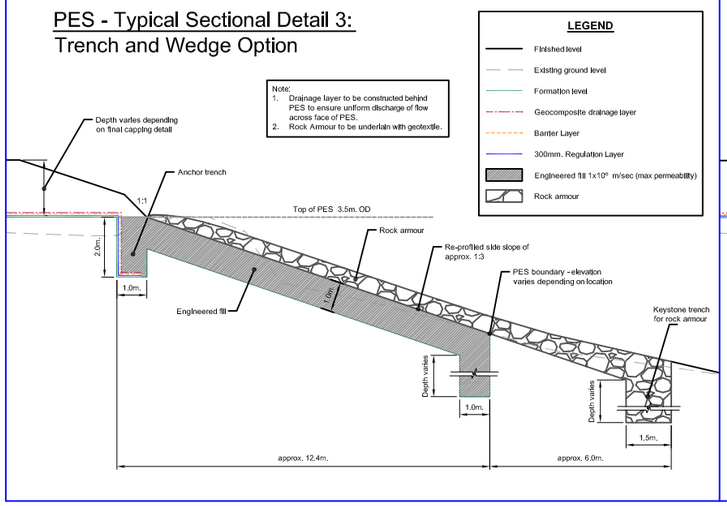

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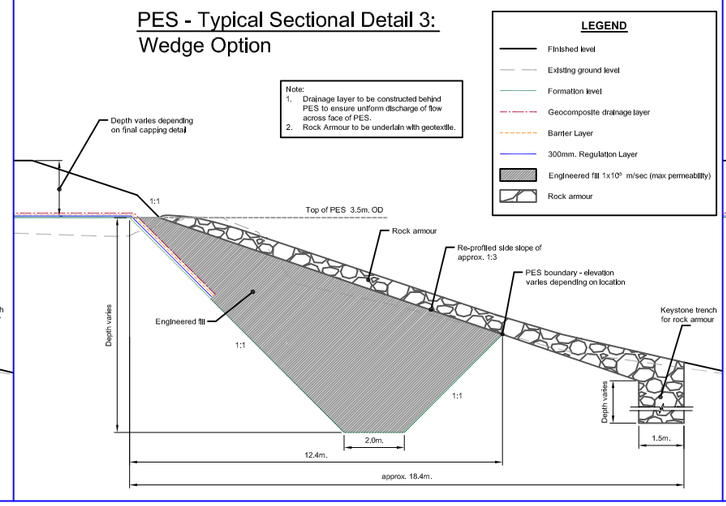
Wedge Option



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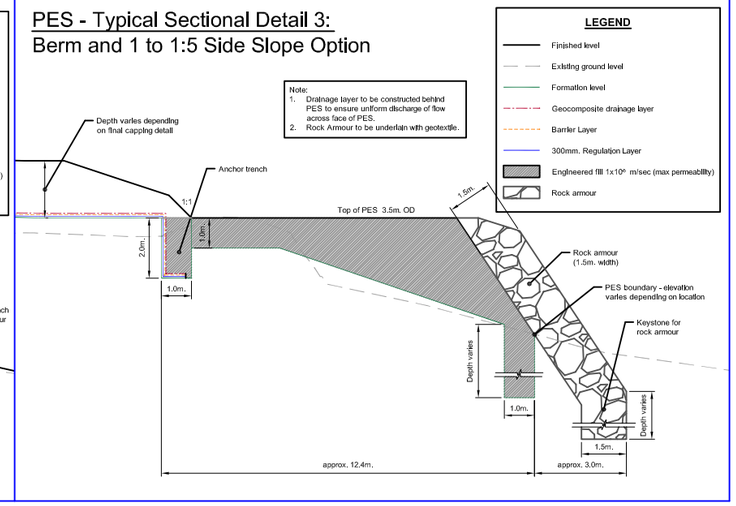

Title
CROSS SECTIONS
OF THE PES

Figure 4

N.T.S.

File Ref : MCE0734 Figure 4
Date : April 2013 Rev : F01

East Tip Remediation Project

EAST TIP
REMEDIATION
PROJECT

RPS

VIEWPOINT 1 LAKE ROAD PROPOSED VIEW

Recommended viewing distance when viewed with both eyes: 45 cm

Title
PHOTOMONTAGE SHOWING PROPOSED END-USE

Figure 5

File Ref : MCE0734 Figure 5
Date : April 2013 Rev : F01

East Tip Remediation Project

EAST TIP REMEDIATION PROJECT

RPS

3 CONSULTATION

An extensive consultation process was carried out in the lead up to and during the preparation of the EIS, planning and waste licence applications. This included both public consultation and consultation with statutory and non-statutory bodies. The aim of the consultation was to engage stakeholders and interested parties as early as possible in the project and to provide an open and transparent process for members of the public to participate in the project. It also gave an opportunity for interested parties to provide baseline information and to keep the public informed of the project as it progressed.

The consultation process included the establishment in 2011 by the Minister for Agriculture, Food and the Marine, Mr. Simon Coveney of a Project Steering Group including the representatives of Cork County Council, the EPA, Department of the Environment Community and Local Government (DECLG), Office of Public Works (OPW), Department of Defence, Department of Jobs, Innovation and Enterprise, Naval Service, Port of Cork, National Maritime College and Cork Harbour for a Safe Environment and local public representatives. A website was also established (http://www.corkcoco.ie/haulbowline).

Consultation letters were issued in September 2012 and again in January 2013 to identified stakeholders and interested groups informing them of the project and inviting feedback. A series of public meetings were held between October 2012 and January 2013 in Cobh and Ringaskiddy.

As part of the EIS Scoping process RPS also consulted with statutory and non-statutory consultees through written correspondence and also through discussions and meetings. Feedback was used to inform the EIS and the mitigation measures proposed therein.

A wide range of issues were raised during the consultation process relevant to traffic, impacts on the marine environment, health issues, flooding, dust and noise impacts during construction, impacts to groundwater and end-use options. Issues raised have, to the maximum extent possible, been addressed in the EIS.

A separate technical dialogue process was also carried out with contractors specialising in working in the marine environment and in remediation of contaminated sites to help inform the development of the design solution and the construction methodologies.

4 ASSESSMENT OF ALTERNATIVES

An assessment was carried out of various alternatives for the design and construction solutions for the remediation of the site and also in relation to possible alternative end-uses for the site once remediated.

4.1 ALTERNATIVE DESIGN SOLUTIONS

When assessing alternatives, consideration was given to the technical aspects and likely environmental impacts associated with the various options, to ensure that design options and construction methods proposed for the remediation of the East Tip result in the least environmental impact and comply with 'Best Available Techniques' (BAT).

The DQRA recommended a preferred approach involving the use of a capping or cover system across the top of the site and installation of a perimeter engineered structure (PES) around the whole of the site. Treatment of the waste off site was not considered further due to the environmental and technical difficulties and also the significant costs that would be associated with such works. Furthermore, in-situ treatment of waste was not considered further due to the risks associated with such methods which could include potential impacts from noise and dust and potential impacts to surface, ground and marine waters.

Similarly, use of very low permeability or reactive barriers as part of the PES were not considered further due to the requirements for on-going pollution control and maintenance systems and the additional costs associated with the installation and management of these systems when the risk posed by the East Tip, as outlined in the DQRA, does not warrant this level of remediation.

Based on the assessment in the DQRA the installation of a cover system together with construction of a PES with a proposed maximum permeability of $1x10^{-5}$ m/s meets the requirements for protection of the environment and minimises the maintenance and aftercare requirements. This option therefore represented a more environmentally sustainable and cost effective solution than a low permeability perimeter system.

The potential for the re-use of processed slag as part of the PES presents an opportunity to minimise the impact from the importation of fill. If the re-use of slag to form the perimeter system is approved, by the EPA, this will further support the environmentally sustainable nature of the proposed PES.

A small percentage of waste will remain permanently outside the final remediation works, located between the PES and the western site boundary (Old Sea Wall) and between the PES and the Low Water Mark Spring Tides on the north, east and southern site boundaries. An assessment was carried out of the potential impacts and associated possible benefits of removing this waste however its removal would require extensive works in the foreshore and in the sub-tidal area of the East Tip which could present a significant impact to the environment. This is unnecessary given that the DQRA has shown that leaving the waste in-situ does not present a risk to the aquatic environment.

4.2 ALTERNATIVE CONSTRUCTION METHODS

Because of the nature of the Haulbowline East Tip and the issues associated with the construction of the PES, particularly along the boundary with Cork Harbour, a technical dialogue was held during the development of the outline design. This involved engaging with a number of contractors who specialise in the areas of marine works, contaminated land remediation and general earthworks. The dialogue demonstrated that there are a range of alternative and proven construction methods that can be used to construct the PES and to manage the potential environmental and technical challenges associated with its construction. The option selected by the Contractor at the construction stage will take cognisance of all mitigation measures set out in the EIS which have been proposed based on worst case scenarios in relation to potential impacts.

4.3 ALTERNATIVE END USES

A number of possible end-uses have been considered for the East Tip / Haulbowline Island in various plans and policy documents in the past decade. In earlier years, these have included high density mixed use residential and commercial development. Later plans have recognised the full re-use difficulties associated with the remediation of a waste site, and the potential for residential or commercial development was acknowledged as limited. The potential of the island for heritage / cultural development was identified, given both its naval history and wider policies of Cork County Council for maritime heritage and cultural projects based around Spike Island and Fort Camden amongst others. The most recent plans for Cork Harbours suggest that the site could have a 'passive amenity function'.

In terms of this particular project, the option of simply shaping the land and leaving it with no active use was also considered.

The preferred option of laying out the site for use as a public park and playing pitch for the Naval Service will deliver an important amenity for the local community and enhance the landscape and visual context of the harbour (refer to Section 2 for overview of this preferred end-use).

5 CONSTRUCTION

5.1 GENERAL CONSTRUCTION METHODOLOGIES

Construction can generally be separated into those works on the main body of the site and those within the foreshore area, the latter being subject to tidal constraints. These tidal influences will dictate the methodologies and working times for the construction of the PES in particular together with any excavation works that have to take place in the foreshore.

Prior to commencement of the works the public will be notified by Cork County Council through updates on the project website and a key liaison officer will be appointed for public enquiries etc.

It will be necessary to carry out some further investigations on the foreshore in advance of the works commencing on site to verify the ground conditions.

The works will commence with establishment of site compounds and processing and stockpiling areas, particularly if the slag is to be processed and re-used in the works. Removal of scrap and systematic demolition of the structures on the site will then be carried out. Following demolition it is anticipated that reprofiling of the site will then commence, which will respect the existing site profile but will involve some excavation of raised areas and the infilling of low areas in order to achieve a smoother profile for capping and landscaping. Excavation might require the use of rock-breakers to break out areas of waste slag that have become fused over time. There is the potential for noise and dust generation during the works which will require appropriate management and mitigation on site.

Construction activities on the East Tip are proposed to take place between 07.00hrs and 19.00hrs Monday to Friday and between 09.00hrs and 16.00hrs on Saturdays. It is proposed however that construction of the PES and other works on the foreshore can take place over extended working hours to take advantage of the tidal cycle.

Contractors may opt to carry out the construction of the PES using the principle of working with the tides which could result in an extension to the programme. Other contractors may prefer to construct temporary containment measures such as sheet piles, geotubes or impermeable control berms and then work behind these structures in the dry, therefore providing more flexibility in relation to the times that they can construct the works.As construction of the PES will require works in the foreshore, these activities will be monitored by a marine archaeologist.

Overall it is anticipated that construction works will take up to 18 months from mobilisation to site assuming that all required materials such as subsoil are readily available at the time.

It is anticipated that approximately 15-20 workers will be employed at the site at any one time.

The sensitivity of the marine environment to impacts from sediment release and other construction impacts is recognised and all works will have to be undertaken with the mitigation measures outlined in the EIS in place. In addition they will be overseen by an Environmental Clerk of Works to be appointed by Cork County Council and or/its site agent.

5.2 ENVIRONMENTAL MANAGEMENT

A Construction and Environmental Management Plan (CEMP) will be prepared by the Contractor prior to the works commencing setting out how the measures will be put in place as identified in the EIS. There are a range of potential impacts during the works including noise, dust, contamination of surface waters, sediment release to the marine waters etc and the CEMP will have to identify how these will be monitored, mitigated and managed in accordance with the EIS, Waste Licence, Planning Permission and any foreshore consents.

6 THE HUMAN ENVIRONMENT

6.1 COMMUNITY & SOCIO-ECONOMIC

Human beings comprise one of the most important elements of the 'environment' and therefore any potential impacts on human beings that may arise either during the remediation works or when the site is functioning as a recreational amenity must be properly assessed. The studies carried out have demonstrated that the risk from the existing site to the wider environment is low. However whilst the remediation of the East Tip for use as an amenity will be of ultimate benefit to the local community, the works required to achieve that may have a potential impact on human beings.

The communities that could potentially be affected from the site during or after works include the Navy recruits accommodated on Haulbowline Island during their training, Navy personnel working at the base, the resident populations in Cobh, Ringaskiddy and Shanbally and the sizeable working community in the surrounding area in the various industries such as the pharmaceutical companies, ferry terminal and commercial fishing industry. There is also a significant leisure and tourism industry in the local area which includes various sailing clubs, rowing clubs, ferry and tour operators and fishing.

There is potential impact on these communities from:

- Increased vehicular traffic importing construction materials;
- Increased dust emissions to air during the works;
- Increased sediment and contaminant emissions to the surface waters in the Harbour;
- Increased noise generation from the works;
- Visual impact of the works; and
- Increased disturbance locally.

The remediation of the site and its development into a recreational area will bring benefits to the local community and local working population. These benefits will take the form of a reduction in the level of existing risk from the site and a significant positive addition to the amenity potential of the area. The remediation of the site also offers the potential for enhanced tourism by complementing the plans of Cork County Council to develop other tourism initiatives in the Harbour area such as the development of Spike Island and the development of cycle and walking routes.

Whilst a slight short-term negative impact on residents and the working community is predicted to occur during the construction phase, particularly from construction traffic, noise and visual impacts, there will be a long-term positive impact on amenity for residents, workers and visitors to the area.

6.2 TRAFFIC

A Traffic Impact Assessment (TIA) has been carried out to assess the impact of the development on the local road network. The main traffic impact will be during the construction stage which is anticipated to take up to 18 months and during which significant volumes of

construction materials in the form of engineered fill, subsoil and topsoil will have to be imported. At the moment it is not possible to identify where these materials will originate from and therefore what the exact route for transport of the materials will be. However it is likely that the route will include part of the N40 Cork South Ring Road and along the full length of the N28 through Shanbally and Ringaskiddy villages.

In a worst-case scenario assuming all materials have to be imported it is estimated that 24,000 movements of loaded HGVs will be generated during an 8 month period within the overall 18 month construction programme. A further 5,000 truck movements in each direction will also be generated after this 8 month period for associated works such as upgrade works to the access road and footpaths and completion of topsoil importation.

Taking these worse case figures an assessment was carried out on the congestion impact and traffic nuisance impact arising from this level of traffic. It was determined that, by limiting the hours during which deliveries will take place to the site to 09.30hrs to 18.00hrs (Monday to Friday) and 09.00hrs to 15.00hrs (Saturday), there will be no significant impact on junction delays along the anticipated route. In addition whilst the increase in morning interpeak traffic (09.00-12.00hrs) will be perceptible in the villages of Shanbally and Ringaskiddy, the increased traffic will be well within the range of conditions experienced at other times of the day and therefore acceptable.

Options to reduce the levels of traffic including the potential to transport materials by sea and also reusing materials on site to construct the PES will be explored further prior to construction.

Notwithstanding the above there are a number of specific mitigation measures required in the approach route to the site that have been identified as necessary. These include remedial works to parts of the access road from the southern side of the South Channel Bridge to the public car park, and also on the access road from the northern end of the North Channel Bridge to the entrance to the East Tip. This part of the access road will also be widened to accommodate two roads, one to the Naval dockyard and one to the East Tip (see Project Description Section 2.2 above). Footpaths will also be provided from the public car park to the East Tip. It is also proposed to provide a pedestrian crossing on the N28 in Ringaskiddy in advance of the construction works.

A Traffic Management Plan (TMP) will be prepared in advance of the proposed works to minimise any impacts on other road users and to maximise road safety along the haulage route. It is proposed that the TMP will be included in the Contract Documents for the appointed Contractor to develop and implement as part of their role.

Pavements will need to be assessed on a continuing basis during the construction phase and some additional remedial works may be required.

Specific structural repairs will be required to the access bridges to the island based on an inspection of their structural integrity which was carried out in 2012 on behalf of Cork County Council. A 25 tonne load restriction has since been imposed on the bridge therefore any works at the East Tip that require individual gross vehicle loads greater than 25 tonnes will not be permitted until the structural integrity remedial works to the bridge have been completed. The use of the bridge for delivery vehicles with gross vehicle loads less than 25 tonnes will be undertaken in agreement with the Bridge Engineer to ensure the integrity of the existing bridge is maintained. It is expected that works to remediate the bridge will commence in latter half of 2014.

The Traffic Impact Assessment has shown that with the various mitigation measures proposed the impact from traffic is expected to be slight and short term. Impacts during the end-use and aftercare stage when the site is an amenity are expected to be negligible and temporary and greatly outweighed by the benefits to the local community in terms of the additional amenity value of the remediated site.

6.3 AIR QUALITY & CLIMATE

An assessment of the potential impacts to air quality and climate during construction and also during the end-use, aftercare and maintenance phase was carried out, paying particular attention to sensitive receptors adjacent to the project and to the potential exposure of these receptors to airborne pollutants from the proposed development.

The main potential impacts arise from the following:

- Dispersion of construction dust/pollutants during the proposed works from excavation, reprofiling, crushing, soil importation, demolition etc;
- Potential risk from asbestos during the works;
- Greenhouse gas emissions from construction operations; and
- Potential odours during construction stage.

In addition to the above there is also the potential impact of emissions to the atmosphere from construction traffic on the haul routes through Ringaskiddy and Shanbally.

The East Tip, in its current derelict condition, poses a slight adversepotential impact to air quality over the long term (greater than 15 years). Once construction commences it is predicted that there will be a temporary (9 month duration) moderate adverse impact on air quality from dust emissions during site clearance, materials handling and whilst processing of materials takes place on site. This potential impact will continue during the installation of the capping (months 11-18). However the Contractor will be required to mitigate this impact by implementing a range of mitigation measures during construction in line with a Construction and Environment Management Plan and Dust Minimisation Plan for the works. The residual impact during the construction phase is considered to be negligible provided these mitigation measures are implemented (Refer to Section 9.5.1.2 of the EIS: Volume 2).

Once remediation is complete the long term net impact of the remediationwill be a long-term positive moderate impact to air quality.

Asbestos is known to be present in the material on the East Tip albeit in very low quantities. With the implementation of a specified series of mitigation measures and ongoing monitoring, the asbestos risk to human health on site (and therefore off-site) will be minimised. The impact is considered to be slight adverse over the temporary nature of the excavation works, however construction workers on site will be protected through use of appropriate PPE and ongoing monitoring.

There is a low potential for odour generation and nuisance to occur during the site preparation works as the material on site typically includes solid materials with low capacity to generate odours. As such, odour impacts during this phase are considered negligible. The importation of topsoil for the capping works has the potential to generate odours depending on the nature and quality of the topsoil and the prevailing weather conditions. A series of mitigation measures for the control of odours during this temporary capping phase are specified.

Construction traffic can impact on local air quality and the proposed haul routes used for deliveries and any sensitive receptors that line these routes may experience impacts to local air quality. The proposed haul route is along the N28 through the villages of Ringaskiddy and Shanbally from the greater Cork City area and air quality impacts to local receptors along the N28 from construction traffic will be negligibleduring the short term remediation stage.

Emissions with the potential to cause climate change will arise from embodied carbon dioxide in site materials as well as vehicles delivering this material to the East Tip site. A series of mitigation measures to offset the predicted greenhouse gas emissions are proposed. These include the implementation of a Traffic Management Plan to minimise congestion, reducing idle times on site, ensuring regular maintenance of plant and equipment, re-use of materials available on-site and, where possible, incorporating materials with a reduced environmental impact into the works. The Contractor will also be required to implement an Energy Management System for the duration of the works.

There are no predicted impacts to atmosphere through the end-use, aftercare and maintenance stages of the proposed development. While a small car park (circa 50 spaces) is proposed for the end-use option, the impact to air quality associated with such a car park is considered negligible.

There will be no residual impact on air quality resulting from the proposed development. The long term net impact of the remediation will be quantified as positive and moderate.

6.4 NOISE & VIBRATION

There is the potential for noise and vibration impacts on the surrounding environment from the proposed construction activities at the site during the works and also from construction traffic to and from the site. An assessment was carried out of the potential impact from these activities during the construction and post-construction phases of the project. The assessment included baseline monitoring at a number of locations in the vicinity of the proposed site in order to characterise the general noise environment in the area. The locations were selected to be representative of the noise environment in the Naval Base, at the National Maritime College, and at the nearest residential properties to the south of the site and at White Point and Cobh.

An assessment was then carried out of the anticipated noise and vibration impacts associated with the construction activities on site and also relating to traffic to the site. These were compared to national and international standards.

The assessment determined that there will be a small number of properties adjacent to the L2545 to Haulbowline that will experience a minor noise level increase as a result of traffic movements to and from the site. However this will still be low in the context of the higher noise levels currently experienced along other parts of the route.

The assessment also found that there is potential for elevated noise levels at the nearest noise sensitive receptors based on worst case noise level predictions from the proposed construction works. There is also the potential for significant noise impact at the dockyard workshops in the Naval Base during the works although the impact will be significantly mitigated by the fact that Naval Base personnel will be working within the buildings and therefore availing of the noise attenuation offered by the buildings.

Whilst the noise assessment was based on an unlikely worst case prediction of all plant operating at the same time at the nearest point of the site boundary to the respective noise sensitive receptor, a number of mitigation measures have been recommended. These include limiting construction operations generally to 07.00 hrs to 19.00hrs (Monday to Friday) and 09.00hrs to 16.00hrs (Saturday) and haul road activities to 09.30hrs to 18.00hrs (Monday to Friday) and 09.00hrs to 15.00hrs (Saturday). However some works outside these hours including limited night-time working may be required on the foreshore to avail of optimum tidal conditions. In this case all activities will be carried out in collaboration with the relevant authorities and residents and there will be strict noise control measures in place.

Other mitigation measures include a noise barrier to be placed along the western boundary of the site during the works and temporary noise bunds are also to be created as required. Temporary barriers will also be placed between the access road and the Naval Dockyard workshops and also adjacent to the National Maritime College during the upgrade of the roads and footpaths.

A detailed Noise Management Plan will be prepared and included as part of the Construction Environmental Management Plan.

It is not anticipated that there will be any significant vibration impacts during the construction phase.

There will be no significant noise generating activities once the site is being used as an amenity area.

6.5 LANDSCAPE & VISUAL IMPACT

The site, which is currently derelict with unsightly stockpiles of waste materials, is located in an area with two distinct landscape character areas, these being an ‘Estuarine Harbour-Based Industrial and Maritime Landscape’ and a ‘Harbour Edge Town Centre and Undulating Residential Townscape’. The former is concentrated mainly on the low-lying parts of the landscape at the edge of Cork Harbour where many of the industrial sites are located and is mainly economic in nature with a low sensitivity to change although some parts also have heritage and cultural value such as the cranes of Cork Dockyard and structures on Spike Island. The latter landscape includes a number of town centres such as Ringaskiddy, Monkstown and Cobh which have scenic and recreational value. Monkstown and Cobh in particular have high scenic value from walking trails, parks, woodlands and also, in the case of Cobh, protected structures. Cobh also has a history which gives it a high recreational value with an important tourist industry. This landscape character area has a medium sensitivity to change.

A Landscape and Visual Impact Assessment (LVIA) of the proposed development was carried out for the construction and also end-use, aftercare and maintenance stages taking account of the landscape character of the surrounding environment. This also included an assessment of the impact of the proposed development on relevant designations within the Cork County Development Plan and also a specific assessment of the impact of the development on a number of representative viewpoints from locations throughout the study area.

The assessment considered that the option proposed in the Landscape Masterplan was the optimum option noting that;

- It maximises the existing location of stockpiles reducing the volumes that require double handling around the site;
- It locates the higher profiles on the north, east and south of the site therefore offering the greatest shelter from the harshest winds to future site users;
- The path network has been designed to maximise visitors stay at the site by offering points of interest and panoramic viewpoints of the Harbour;
- The path network takes account of wildlife sensitivities in the area and will encourage observation of wildlife by visitors, minimising potential for disturbance by use of screen planting and fences;
- The proposed development will significantly increase biodiversity at the site through the use of extensive native woodland and scrub with wildflower meadows and a wetland habitat; and
- Measures for bird enhancement have been considered including a bird roosting ledge at the eastern side of the island.

Mitigation measures during the construction phase include locating temporary site compounds and fencing carefully to avoid unnecessary impacts. Key mitigation measures during the end-use phase will include ensuring the landscape planting and grassed areas are properly established and maintained to achieve the desired effect of an attractive parkland.

Overall the assessment concluded that construction impacts will be low and of short duration whilst, after development, the proposal will result in beneficial landscape and visual impacts.

6.6 MATERIAL ASSETS

Material Assets can be described as resources that are valued and that are intrinsic to specific places. They can be of either human or natural origin and the value can arise from either economic or cultural reasons.

An assessment was carried out of the impact of the proposed development on the property and infrastructure of the site, on its cultural and social associations, on its interactions and associations within Cork Harbour and also in relation to the utilities servicing the site. The links with the Irish Naval Service (INS) in particular are significant given the location of the Naval Base directly adjacent to the site and also the long historical and social linkages that the INS has with Haulbowline Island and with the areas of Ringaskiddy and Cobh and their local communities.

Although there are no proposed land take or severance of third party lands associated with the works, there are potential impacts on the INS operations because of temporary access arrangements, and also the requirement for some works on Navy property (access road and football pitch). There is also the potential for impacts on INS operations through inconvenience, dust, noise and traffic. Whilst the development of the site will have little impact on the tourism or leisure sectors during construction, there is the potential for temporary negative impacts to harbour users during works to the foreshore.

Notwithstanding the above a letter of consent has been provided by the INS and has been included with the planning application and, in addition to the various mitigation measures proposed elsewhere in the EIS, every effort will also be made to liaise with the INS to avoid or minimise impacts during the construction phase. In addition it is proposed to liaise with utility providers in advance of commencement of work in order to avoid conflict with existing services.

Similarly whilst the majority of works will occur in the dry and from the landward side, there will be work within the foreshore and therefore the contractor will liaise with the INS and other harbour users to ensure that any conflicts in boat movements are avoided and normal seafaring rules will be applied.

No residual impacts are expected during the end-use, aftercare and maintenance stage. In fact, the remediation of the site to a recreational facility open to the public at such a strategic coastal location will result in a significant increase in the asset value of this site for the State, Cork County Council and residents of Ringaskiddy and Cork generally.

7 THE NATURAL ENVIRONMENT

7.1 ECOLOGY

The proposed works at the East Tip are located in close proximity to a number of designated sites including Cork Harbour Special Protection Area (SPA), which at its closest point at Lough Beg is 1.4km to the south of the East Tip and 600m south from the road works in Ringaskiddy. Great Island Channel candidate Special Area of Conservation (cSAC) is located 4.2km to the north of the East Tip.

Terrestrial, intertidal, benthic, bird and bat surveys have been undertaken at the site to establish the baseline environment. There are no species or habitats of conservational interest recorded at the site or in the adjacent marine environment. Consultation has also been undertaken with key stakeholders including the NPWS, IFI and EPA.

Due to the distance of the East Tip to designated sites, no direct impacts are anticipated. However, indirect impacts could result in a release of sediments during the construction stage. Specialist coastal modelling studies have been undertaken to inform the design and construction proposals. As a result of the modelling the determination was made that the removal of waste from the lower foreshore and shallow subtidal presented a potential risk to adjacent sites of conservational interest. This foreshore material is consolidated and forms part of the intertidal habitat of the East Tip site. Such a release could potentially result in adverse effects on the designated sites in either of the following ways:

a) By contamination of food chains in the immediate vicinity of the East Tip (for example at the Common Tern feeding area of Spit Bank); and/or
b) By transport of contaminants via oceanic currents to habitats within the boundary of Natura 2000 sites or into areas of high conservational value.

The study showed that for the preferred remediation solution (the subject of this EIS) a maximum deposition of approximately 50mm in the immediate vicinity of the proposed perimeter area is predicted and increased suspended sediments are likely to be restricted to the area around the East Tip (with maximum predicted increases of 500mg/l extending 0.1km and 0.17km to the north and east of the area respectively). Therefore re-suspended sediment effects will be localised and would not result in the potential of sediment to be transported to Natura 2000 site. These estimates do not include additional sediment abatement mitigation measures which are expected to further restrict any sediment to the site environs. Such measures include use of sheet piling, geotextile tubes, sediment screens or other sediment abatement measures in order to prevent the redistribution of any re-suspended or exposed sediments during tidal exposure. As a result the risks of material re-suspension and distribution will be minimised. The construction also includes a perimeter engineered structure to contain the waste material which will have outer rock armour. This will result in a minor residual change in foreshore habitats from mixed sediments to rocky shore. This is the only residual change identified from the ecological assessment. All other identified impacts are temporary in nature.

Specific mitigation measures have been proposed for the prevention of impacts to all species. Likewise, precautions will be taken in relation to non-native invasive species during the construction phase.

The mitigation measures will form the backbone of the detailed construction method statements. Exact implementation details in the Construction Method Statements will be agreed with the relevant state body and NPWS representatives.

Other potential impacts from construction include physical presence and noise on marine species and birds. Specific mitigation has been implemented for the minimisation of any potential impacts.

Due to the proximity to Natura 2000 sites, an Appropriate Assessment Stage 2 Natura Impact Statement (NIS) has been prepared and is included with the EIS (Volume 4). The NIS concludes that there will be no potential for cumulative impacts arising in combination with any other plans or proposals, with the implementation of best practice and the recommended mitigation measures.

At the recommendation of the NPWS, an Environmental Clerk of Works will be appointed during the construction phase with responsibility to ensure that the construction, mitigation and monitoring is conducted according to the EIS recommendations.

7.2 SOILS, GEOLOGY, HYDROGEOLOGY & HYDROLOGY

The distribution, chemical composition and hydraulic properties of the wastes on the East Tip and that of the underlying and surrounding natural geological formations have been extensively characterised through a comprehensive site investigation and risk assessment (DQRA), which has built on the previous site investigations conducted on Haulbowline Island. In addition, monitoring has been carried out to assess the water chemistry of the groundwater within and below the East Tip and the degree of tidal interaction with the surrounding marine water.

The results of this comprehensive assessment show that the waste material is of a variable thickness with some heavy metal concentrations above levels acceptable if the site was to be opened to the public in its current condition (no remediation) as a recreational park. The risk assessment has also predicted that there is currently a theoretical impact to marine waters for only two metals in groundwater discharging from the site in the near shore marine water body up to and including 25m from the shore of the East Tip. It should be noted however, that this risk assessment is conservative and that no impacts from the metals have been observed in marine water quality sampling of the area.

The assessment also demonstrates that all groundwater present within the East Tip waste body and underlying natural geological formations is essentially sea water and is influenced by the tidal rise and fall of water in Cork Harbour.

In order to make the site suitable for future use as park land, a capping system will be constructed across the surface of the East Tip which will break existing contaminant linkages with future land users of the site. This capping system will also reduce rainfall infiltration into the waste body and therefore reduce groundwater flow and contaminant transport from the site into the surrounding marine waters in Cork Harbour.

In addition, a Perimeter Engineered Structure (PES) will be constructed around the perimeter of the waste body along the shoreline in order to reduce the quantity of groundwater exiting the site. Potential impacts to soils, geology and hydrogeology during the construction stage of the project will be mitigated through construction sequencing, management and monitoring, which includes:

- Construction of the PES prior to re-profiling and infilling of the central low area of waste, which will reduce potential impacts from remobilisation of contaminants within groundwater in the waste;
- Collection of intercepted groundwater seepage at the PES construction site and recirculation into the waste body to prevent potential marine water impacts;
- Use of dust suppression management to prevent windblown contamination;
- Implementation of a CEMP to reduce potential accidental spillages of fuels and chemicals present on site during the construction stage; and
- An environmental monitoring programme for groundwater and marine water quality during the construction stage.

There will be only negligible impacts on soils, geology and hydrogeology once these mitigation measures are adhered to.Predicted impacts at theend-use stage will be positive for the following reasons:

- The capping system will have severed potential human health risk pathways with contaminants present in the waste;
- The site will be suitable for use as park land; and
- The PES will have reduced groundwater discharge to marine waters in Cork Harbour.

During the end-use, aftercare and maintenance stage impacts to deeper saline groundwater in the limestone bedrock below the site will be imperceptible. A monitoring programme is also recommended to demonstrate the effectiveness of the overall remedial solution (refer to Section 10 of this NTS).

8 ARCHAEOLOGY & CULTURAL HERITAGE

The archaeological assessment included terrestrial archaeology, architectural and cultural heritage and, given the nature of the site, underwater and intertidal archaeology.

8.1 TERRESTRIAL ARCHAEOLOGY AND ARCHITECTURAL HERITAGE

Whilst the western or natural side of Haulbowline Island contains a recorded archaeological monument (RMP), there are no recorded monuments within the proposed East Tip remediation area or areas for proposed road widening and footpath improvements.

The western side of the Island is designated as an Architectural Conservation Area (ACA) containing several protected structures and features (listed on the National Inventory of Architectural Heritage), reflecting the long maritime and military history of the site. The closest Architectural Heritage site to the East Tip is a double height workshop on the eastern side of the naval dockyard, immediately to the west to the site. A site inspection confirmed that no features of an archaeological, architectural merit were evident in the area of the proposed remediation or road widening works.

However a series of projecting blocks inserted into the sea walls where it meets the East Tip are possibly the 'Priests Stairs', used by the Chaplain of Spike Island and have a potential local cultural heritage merit. These steps will have to be removed during the works and it is recommended that a measured, photographic and surveyed survey of the steps and sea wall is carried out prior to the works commencing. A similar photographic record will also be carried out of features associated with the steel works in order to provide a record of the past.

There is no potential for impacts on the archaeological, architectural or cultural heritage of the site during the end-use and aftercare stage and, in fact, the proposed remediation works and end-use will conserve and enhance the special character of the Haulbowline ACA and will therefore have a positive impact on the heritage of the area.

8.2 UNDERWATER ARCHAEOLOGY

The underwater archaeological assessment considered both the intertidal and sub-tidal zones and included dive surveys. Whilst no material of archaeological significance was found during the survey, there will be some impact with the merging of the PES with the stone-built sea walls. Also the depths of sedimentary deposits overlying bedrock close inshore shows there is a potential for previously unrecorded features to be revealed during construction of the PES.

Therefore a number of mitigation measures are recommended including an archaeological survey of sea-wall locations prior to the works and archaeological monitoring by an experienced maritime archaeologist of all seabed and inter-tidal/foreshore disturbances. In the event of archaeologically significant material being encountered, various measures are recommended including standby teams being available, wet tanks for storage of materials and buoying and fencing of such areas for further investigations.

Subject to there being no significant finds during the works there is no potential for impacts on the underwater archaeology of the site during the end-use and aftercare stage.

9 INDIRECT & CUMULATIVE IMPACTS & IMPACT INTERACTIONS

Indirect and cumulative impacts can result from individually minor but collectively significant actions taking place over the same period of time and/or within the same geographical area. These could relate to cumulative impacts from the same development or from past, present or reasonably foreseeable future projects.

In the case of this project indirect impacts are those which are considered to be caused by associated developments, i.e. not directly part of the project but associated with the project.

Indirect (or Secondary) Impacts

A number of positive indirect or secondary impacts were identified which include direct and indirect employment opportunities that may arise for construction workers and local economic benefits from the purchase of services and materials.

Whilst not directly part of this project, structural improvement works will need to be undertaken on the bridge to the Island which will result in an overall indirect positive impact to users of the bridge including Navy personnel.

There will however also be some potential indirect negative impacts associated with the development such as the extraction of material from commercial quarries if suitable material from construction sites or from the site itself cannot be sourced.

Interaction of Impacts

The inter-relationships of impacts were also addressed and the following interactions were considered to be relevant to this EIS:

- Human Beings and Traffic, Noise, Landscape, Ecology, Soils, Geology and Hydrogeology and Archaeology;
- Traffic and Noise;
- Noise and Ecology;
- Landscape and Material Assets;
- Landscape and Ecology; and
- Soils, Geology and Hydrogeology and Ecology.

Cumulative Impacts

In addition to the above the potential for cumulative impacts was assessed taking account of the possibility of other developments arising in the area including:

- Possible Future Remediation of Neighbouring Steelworks Site;
- Irish Maritime and Energy Resource Centre (IMERC);
- Possible Waste Management Facility by Indaver Ireland;
- Port of Cork (POC) - possible development of a new port at Ringaskiddy and maintenance dredging; and
- Spike Island Masterplan.

The majority of these developments have not received planning consent with planning approvals in place for only the Beaufort Building at the IMERC site. It is unlikely that most of these potential developments will coincide with the works at the East Tip. Liaison will be undertaken with the POC with regards to the timing of any excavation works in the context of their maintenance dredging programme.

In the event that construction of one or more of these possible developments coincides with construction at the East Tip it could have cumulative impacts in terms of traffic, noise and air quality.In the longer term if a number of these developments are implemented and become operational they could have cumulative impacts on the visual setting of the area, tourism implications and heritage impacts.

Any such cumulative impacts for the above projects will be quantified as part of the EIA, AA (Appropriate Assessment), SEA (Strategic Environmental Assessment) and or planning processes for those projects and will take the findings of this EIS into account.

10 SUMMARY OF MITIGATION AND MONITORING

The Environmental Impact Statement has examined the proposal for the remediation of the East Tip at Haulbowline and its development as an amenity area.

Where environmental impacts have been identified, appropriate mitigation measures have been proposed for the construction, end-use, aftercare and maintenance phases of the project.

Recommendations for monitoring have also been included to assess the effectiveness of the mitigation measures proposed.

A summary of the mitigation measures proposed throughout the EIS is provided in Tables 17.2 (construction phase) and 17.3 (end-use, aftercare and maintenance phase) of the EIS whilst proposed monitoring activities are set out in Tables 17.4 (construction phase) and 17.5 (end-use, aftercare and maintenance phase) of the EIS.

Cork County Council is committed to ensuring that the mitigation and monitoring measures proposed are implemented to ensure the actual impact of the project does not exceed that predicted in the EIS. The mitigation measures will also deliver a level of environmental management and performance consistent with national and international standards and legislation.

In summary, having conducted a detailed study of the effects of the proposed works on the environment, it has been concluded that the proposed development will have no significant residual impact on the human, natural or cultural heritage of the area and will in fact result in a positive impact relative to the current situation at the site.