15 ARCHAEOLOGY AND CULTURAL HERITAGE

15.1 INTRODUCTION

Courtney Deery Heritage Consultancy undertook the terrestrial archaeological, architectural and cultural heritage assessment of the proposed development while an assessment of underwater and intertidal archaeology was undertaken by Archaeological Diving Company Ltd (ADCO).

Supplementary information of both the terrestrial and underwater assessments is contained within Appendix P: Archaeology and Cultural Heritage along with a list of references.

The following sections describe the methodology used in the assessments and the existing environment from an archaeological, architectural and cultural heritage perspective. It also examines the potential impacts of the proposed development and recommends mitigation measures to ameliorate these impacts on features of archaeological potential, architectural heritage or cultural heritage.

15.2 METHODOLOGY

The assessment of the terrestrial based archaeological, architectural and cultural heritage of Haulbowline Island and its immediate environs is based on a desk study of published and unpublished documentary and cartographic sources, supported by a site inspection. The area examined for the study includes the East Tip, an entirely reclaimed area of land which is located at the eastern side of Haulbowline Island. It also includes the area of the existing access road to the south of the Naval Docklands where an improved road, parking facilities and the insertion of footpaths are proposed (Figure 5.3 and Figure 5.6.) It is also proposed to provide footpaths along to the existing approach road to the island on the mainland in the Ringaskiddy townland (refer to Figure 5.6 and Chapter 5 ‘Project Description’).

Legislation, Standards and Guidelines

The following legislation and guidelines were considered and consulted for the purposes of the report:-

National Monuments Acts, 1930-2004.
The Planning and Development (Strategic Infrastructure) Act, 2000-2010.
Heritage Act, 1995.
CAAS Environmental Ltd on behalf of the Environmental Protection Agency (EPA) (2002), Guidelines on the information to be contained in Environmental Impact Statements.
CAAS Environmental Ltd on behalf of the Environmental Protection Agency (EPA) (2003), Advice Notes on Current Practice (in preparation of Environmental Impact Statements).
Department of Arts, Heritage, Gaeltacht and Islands (DAHGI), (1999a), Framework and Principles for the Protection of the Archaeological Heritage.
NRA, (2006), Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes.
NRA, (2006), Guidelines for the Assessment of Architectural Heritage Impacts of National Road Schemes.
Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 1999 and the Planning and Development Act 2000 to 2006.
Department of Environment, Heritage and Local Government (2004a) Architectural Heritage Protection, Guidelines for Planning Authorities, Guidance on Part IV of the Planning and Development Act 2000.

15.2.1 Terrestrial Archaeology and Architectural Heritage Methodology

15.2.1.1 Desk Study

The desk study availed of the following sources.

Record of Monuments and Places (RMP) and Sites and Monuments Record (SMR) Files

The primary source of information for the desk study is the Record of Monuments and Places (RMP) of the Department of Arts Heritage and the Gaeltacht (DAHG). The Sites and Monuments Record (SMR), as revised in the light of fieldwork, formed the basis for the establishment of the statutory RMP pursuant to Section 12 of the National Monuments (Amendment) Act, 1994. The RMP records known upstanding archaeological monuments, their original location (in cases of destroyed monuments) and the position of possible sites identified as cropmarks on vertical aerial photographs. It is based on a comprehensive range of published and publicly available documentary and cartographic sources. The information held in the RMP files is read in conjunction with constraint maps (published at reduced six-inch scale). The sites and monuments database of the Archaeological Survey of Ireland which is available online at www.archaeology.ie was also examined.

Development Plan Record of Protected Structures (RPS sites) and National Inventory of Architectural Heritage (NIAH)

The primary source of architectural heritage information are the Cork County Council Development Plan 2009 and the Cobh Town Council Development Plan 2010-2016 which were consulted to identify the Record of Protected Structures (RPS sites) in the study area. Not all architectural heritage of Ireland is known or recorded by NIAH or RPS sites or is protected by legislation. The field survey also carried out as part of this assessment was undertaken in order to identify any previously unknown/unrecorded features of architectural, industrial or cultural heritage merit, and assess if they will be impacted by the proposed development.

Documentary and Cartographic Sources

Documentary and literary sources were consulted in the Trinity Map Library, Cork City Library, Cobh Museum and the National Library of Ireland. A review of historical maps was also undertaken and the following maps were consulted; seventeenth century maps of the Fort of Haulbowline and nineteenth century Ordnance Survey six-inch map editions (1842, 1902 and 1934). Niall Brunicardi's study (1982) of 'Haulbowline, Spike and Rocky Islands in Cork Harbour' provided a tremendous resource for information on the later development of the Island. Other documentary sources used in the report are listed in the references section.

The Topographical files of the National Museum of Ireland

The topographical files of the National Museum of Ireland (NMI) identify recorded stray finds held in the museum's archive. The files, which are donated to the State in accordance with national monuments legislation, are provenanced to townland and sometimes include reports on excavations undertaken by NMI archaeologists earlier in the twentieth century.

Excavations Bulletins and Excavations Database

'Excavations' is an annual bulletin that contains summary accounts of all excavations carried out annually in Ireland. The online database contains summary accounts of excavations carried out from 1985 to 2009. The bulletins and database were consulted to establish the results of excavations which have previously been undertaken at sites or as a consequence of development in the environs of the proposed development.

15.2.1.2 Site Inspection

The proposed development was inspected in September 2012, in dry favourable conditions. The purpose of the site inspection was to identify potential archaeological, historical heritage features and structures/features of architectural, industrial and cultural heritage merit that may be subject to direct or indirect impacts as a result of the proposed remediation project and to produce a photographic record.

15.2.1.3 Assessment Criteria

Archaeological Heritage Assessment

The significance criteria used to evaluate an archaeological site, monument or complex are as follows: existing status (level of protection), condition or preservation, documentation or historical significance, group value, rarity, visibility in the landscape, fragility or vulnerability, and amenity value. In accordance with the EPA guidelines (EPA, 2003, 139) the removal of archaeological remains will result in a negative, direct and significant impact. This impact can, however, be mitigated by excavation for which a detailed record and archive of each site and also the publication of the results are provided, thereby ensuring preservation by record. Archaeological features may, in some situations, be considered as architectural heritage and therefore, may appear on both the RMP and RPS sites. This means that these features are protected by both the National Monuments Act and the Planning and Development Acts.

Architectural Heritage Assessment

'Architectural heritage' is defined as all structures and buildings (together with their settings and attendant grounds, fixtures and fittings, groups of such structures and buildings and sites), which are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. Architectural heritage is generally visible and has a presence in the landscape which requires assessment (Architectural Heritage Guidelines for Local Authorities 2006). The Record of Protected Structures (RPS sites) was set up under the Planning and Development Acts to protect structures determined to be of special interest and its effect is to seek to retain the special character and features that make these structures significant.

The management and protection of architectural heritage in Ireland is achieved through a framework of European and international conventions and national laws and policies (Department of Arts, Heritage, Gaeltacht and the Islands, Framework and principles for the protection of the archaeological heritage 1999, 35). The Convention for the protection of Architectural Heritage in Europe (the Granada Convention, 1985) was ratified by Ireland in 1997. The Convention emphasises the importance of inventories in underpinning conservation policies. The National Inventory of Architectural Heritage (NIAH) was established to fulfil Ireland's obligations under the Granada Convention.

The assessment of the architectural heritage is based on a desk study of published and unpublished documentary and cartographic sources, supported by both site and aerial inspection of the study area. Not all architectural heritage of Ireland, however, is either known or protected by legislation. That is why a field survey is carried out as part of this assessment in order to identify unrecorded features of architectural heritage merit, and assess if they will be impacted by the proposed scheme.

This assessment seeks to identify the properties/structures of architectural heritage merit which will be directly impacted by the proposed development. A direct impact is where a feature or site of architectural heritage merit is physically located in whole or in part within the footprint of a potential development site. Recommendations are based on the architectural heritage merit of a structure or building, and whether this necessitates its preservation, either by avoidance, or by carrying out a record of the past prior to removal or if possible, relocation.

A number of categories of special interest are taken into consideration when assessing the significance of a property/structure. These include architectural, historical, archaeological, artistic, cultural, scientific, technical or social.

Cultural Heritage Assessment

Cultural heritage is a general term used to describe aspects of the environment which are valued for their age, beauty, history or tradition. It encompasses aspects of archaeology, architecture, history, landscape and garden design, folklore and tradition and topography. Cultural heritage is expressed in the physical landscape in numerous often interrelated ways.

Cultural heritage is bound up with the beliefs and oral traditions of local populations, and any items of interest made known by local inhabitants during the course of site work will be duly considered, recorded and assessed.

15.2.2 Underwater Archaeology Methodology

ADCO has reviewed the archaeological research and findings undertaken by Courtney Deery. They have also reviewed Ordnance Survey and related mapping for the area, and the company's own archive, derived from marine archaeological projects conducted in Cork Harbour. Hydrographic survey information was provided by RPS, based on bathymetric and sub-bottom profile data acquired for the project in 2012.[1]

The on-site archaeological fieldwork was carried out following the data review and under licence from the Department of Arts, Heritage and the Gaeltacht (DAHG), licence numbers: 12D034, 12R133. The full extent of the east and southeast inter-tidal foreshore of Haulbowline Island was field-walked when the tides were at Low Water, to maximise the area of foreshore that was exposed above the waterline. The survey extended east of the sea walls on the north shore, and west to the edge of the development footprint on the south shore. Underwater survey was undertaken across the southwest section of the development area, east of the bridge to Rocky Island, where water-depth necessitated diver-based survey (Figure 2). Intertidal survey was conducted along the south, east and north shores. The intertidal survey extended below the Low Water Mark as a waded/ snorkel survey of the sub-tidal zone, where water depth was below 0.50m at Low Water (see Figure 7 for survey extent). A detailed written record, supplemented by photographic record, of the foreshore and the sub-tidal environment was made. A hand-held GPS unit was used to position-fix the survey route and any observations made.

A team of two maritime archaeologists (certified to a minimum of HSE Part III diving certification) and a certified dive supervisor conducted the work, using a mobile surface-supplied diving set-up. Maximum coverage of the underwater inspection area was achieved using a diver-towed survey method. The dive survey was carried out to HSE/HSA standards using Surface Supplied Diving Equipment and all relevant safety equipment.

Magnetometry survey by hand-held metal-detection (Fisher Aquanaut 1280X) was undertaken, but the high level of ambient metal waste from the East Tip constrained practical use of the metal-detector. Underwater visibility was very good, however, providing clear visibility of the seabed in both the intertidal and diver-based survey areas.

[1] Hydrographic Surveys,'Haulbowline Bathymetric and Geophysical Survey Report', 2012.

Limitations

No limitations were encountered during the surveys and the full extent of the intertidal foreshore of the East Tip has been field-walked at Low Water, and the sub-tidal zone has been dive inspected.

15.3 EXISTING ENVIRONMENT

15.3.1 Archaeological and Historical Background

No prehistoric sites or features dating to the early medieval period have been recorded within the areas proposed for remediation or end use (including the access road and footpaths) on Haulbowline Island.

The western or natural side of Haulbowline Island is a recorded archaeological monument (RMP CO087-059) and an Architectural Conservation Area containing several protected structures and features recorded in the National Inventory of Architectural Heritage (NIAH) (Figure. 15. 1 and Figure 15. 2). The island was first fortified by the British army in 1602, and subsequently became a base for the Royal Navy in the 18th and 19th centuries. The naval dockyard was constructed in 1865 on land reclaimed to the east which almost doubled the size of the island. The steel industry was brought to the island in the twentieth century and the deposition of processed material from the steelworks further enlarged the island to the east increasing the island again. There are no recorded features of an archaeological or cultural heritage merit within the areas proposed for development i.e. the East Tip and access road (including areas for footpath improvements).

Further details on the archaeological and historical background to Haulbowline Island from the prehistoric period up to the recent past are provided in Appendix P: Archaeology and Cultural Heritage.

15.3.1.1 Cartographic Sources and Images

The East Tip does not appear as a land mass until the late twentieth century, the following is a description of the early depictions of the development of the natural island.

Seventeenth Century Maps

The earliest consulted map depicting Haulbowline is Candell's 1587 map of Cork Harbour. On this the island is called '*Halbolin*' (Figure 15.3 in Appendix P: Archaeology and Cultural Heritage) no structures are indicated on the island. Subsequent maps relate directly to Haulbowline fort, they include Paul Ivye's plan of the '*Fort of Haulbowlin'* in 1602 which shows the detail of the battery design (Fig.15.4 in Appendix P: Archaeology and Cultural Heritage). Later improvements and developments within the fort are shown in 1608 '*The Forte of Haulboline upon the Haven of Corke'* map and 1610 '*Forte of Halebolin*' map. These maps show the extent of the island at the time and the battery and structures contained within it (Figure 15.5 and 15.6 in Appendix P: Archaeology and Cultural Heritage).

The Down Survey map (not shown) of 1654-1659 for the South Liberties of Cork which shows Cork Harbour names '*Haulbolin Fort'* but does not depict the island or fort.

First Edition Ordnance Survey Map 1842

Cartographic sources from the nineteenth and early twentieth century show the development of Haulbowline into a large naval base. The first edition Ordnance Survey map (1842) shows the natural extent of the Island which has an area of 27 acres, 3 roods and 35 perches (a now obsolete measure of area) (Figure 15.7 in Appendix P: Archaeology and Cultural Heritage). It is an irregular shaped island with a cliff faced rocky western shore and a 'Spit Bank' which is described as being 'muddy sand and gravel' on the eastern shore. The later dockyard and the East Tip are reclaimed from this sand bank. At this time the island is well established as a naval base. The western side of the island is marked 'Ordnance Ground' and the eastern side of the island is marked 'Admiralty Property', they are subdivided by a wall. The Martello tower is located in the 'Ordnance' side while the castle is on the 'Admiralty' side. 'Rat' or 'Coney' island is located to the southeast and is just 2 acres 2 roods and 5 perches in size. Rocky Island to the south is marked as Ordnance Ground; it has two barracks on the east and west side of the island, two powder magazines and quay.

R.L Stopford *'Panoramic View of Cork Harbour', c.1870*

Stopfords 1870 image presents a view of Haulbowline from Cobh (Figure 15.8 in Appendix P: Archaeology and Cultural Heritage). It shows Haulbowline during the construction of the naval docklands site. A canal which separates the natural island from the reclaimed area is depicted. The causeway connecting the reclamation area to Spike Island is shown and this appears as a series of upright poles suggesting a wooden construction (this feature has been identified during the underwater archaeological survey and is described below in section 15.6). In the distance the watch tower on Rocky Island (no longer upstanding) can be seen.

Revised Ordnance Survey Map Editions

The historic 25-inch and the revised 1934 edition map (Figure 15.9 in Appendix P: Archaeology and Cultural Heritage) have no detail of the structures on the island or on Rocky Island; this detail may not have been included because it may have been sensitive military information at the time. The expansion onto the east coast where the Naval Dockyard lies (est. after 1865) is however shown as a large sub rectangular area (over c. 30 acres). The new area of land is connected to the natural island via two small bridges over what has been historically described as a canal. Rat Island has been subsumed into the reclaimed area and may form part of the southeastern corner of the reclaimed area. On the southeastern side of the island there is a causeway across the foreshore which is aligned with another on Spike Island. This was known as the convict's causeway, after the men from the prison on Spike Island who used it to access the island whilst working on the expansion works (discussed previously). Haulbowline remains unconnected to the mainland.

Aerial Photograph of Haulbowline, c. late 1960's

An aerial photograph of the Island viewed from the south shows the recently constructed road bridge from the mainland which dissects Rocky Island. The extent of the former steel works factory, which is now demolished, is located between the naval base to the west and the dockyard to the east. The western magazine fort is seen clearly on Rocky Island, the eastern side however has either been removed/filled in (Figure 15.10 in Appendix P: Archaeology and Cultural Heritage).

15.3.1.2 Recorded Archaeological Monuments (Record of Monuments and Places, RMP sites) and Stray Finds

There are no recorded archaeological monuments within the proposed East Tip remediation area or areas proposed for road widening and footpath improvements (Figure. 15.1 in Appendix P: Archaeology and Cultural Heritage). The western side of Haulbowline Island (c. 220m west) is a recorded monument (RMP Ref: CO087-059 (001-003)), comprising a barracks (001), Martello Tower (002) and bastioned fort (003). The proposed development will not impact on the recorded monuments and these sites cannot be seen from the proposed development area.

Recorded Monuments on Haulbowline Island

RMP Ref:	CO087-059001---	**Townland:**	Haulbowline Island
National Grid Ref:	179003/ 65407	**Site Type:**	Barracks
RMP Description: Built in 1602 year under the direction of Paul Ivy, the construction of the Bastion (003) commenced on the northern side of the island, at its highest point. Between the years 1608–11, a keep, gatehouse, etc. were added.			

RMP Ref:	CO087-059002	**Townland:**	Haulbowline Island
National Grid Ref:	178868/65478	**Site Type:**	Martello Tower
RMP Description: Located on high ground at northern edge of Haulbowline island, the tower overlooks the entrance to the Upper harbour; formerly part of the 'Ordnance Ground' (CO087-05902-), now occupied by Naval Service. Constructed in 1813-15 at cost of £3,000 (Kerrigan 1978, 148). It is built of coursed limestone blocks with an entrance at first floor level approached by a wooden stairs. It is oval in plan (14.6m x 9.1m; H c. 13.4m) (Enoch 1975, 28); and a large water tank is installed in the roof area. Restored wooden floor; tower is being converted into museum by Naval Service.			

RMP Ref:	CO087-059003	**Townland:**	Haulbowline Island
National Grid Ref:	178927/ 65516	**Site Type:**	Bastioned Fort
RMP Description: On Rocky Island of Haulbowline between Great Island and Ringaskiddy, in Cork Harbour. Possible Viking occupation of island (Jefferies 1985, 16) maybe reflected in the name (O Murchadha 1982, 142). Earliest known fortification here is the fort constructed in the summer of 1602 to a design of Paul Ive (Ives/Ivye)(Brunicardi 1982, 8-12); though garrisoned in October it was still unfinished by March 1603 (Hayes-McCoy 1604, 32). Contemporary plans show 'an irregular work based on a quadrangle with demi-bastions on the north, or cliff edge, and two bastions on the southern corners' (Gowen 1978, 246). Slightly later (1608-11), a keep, gatehouse, etc. were added (ibid, 249). Brunicardi (1965-6, 21) describes the remains of some of these features, including the keep 'now only about 15 feet in height', but Gowen (1979, 251) found 'the whole area has been subject to much disturbance' and concludes 'it is unlikely that any diagnostic features remain'. By 1624 the fort was abandoned and remained in disrepair throughout rest of 17th and 18th centuries (Brunicardi 1982,11-15). In 1806 the island divided between Ordnance (W) and Navy (E), the line marked by high stone wall. Ordnance built Martello Tower (CO087-05903-) on high ground to the north in the area of the old fort; also a barracks with storehouses, workshops, etc. The Navy built a supply depot or victualling yard, the most prominent feature of which was six large warehouses, still surviving, as do many other early 19th century buildings shown on 1842 OS 6-inch map. Later dockyard (1865-1887) built on reclaimed ground to the east of the island (Brunicardi, 1965-6, 28-32).The island is now jointly shared by Irish Naval Service and Irish Steel.			

A powder magazine (CO087-105) is recorded on Rocky Island, c. 304m from the East Tip (see Figure 15. 1) and was associated with the nineteenth century naval base at Haulbowline.

RMP Ref:	CO087-105	**Townland:**	Rocky Island
National Grid Ref:	179248/64981	**Site Type:**	Powder Magazine
RMP Description: Occupying central part of Rocky Island (area c. 2.5 acres) in Cork Harbour; island now crossed by bridge linking Ringaskiddy to Haulbowline. Magazine built 1808-18 to store gunpowder for naval base at Haulbowline. Consists of two identical structures facing each other across open forecourt; each section consists of three inter-connecting vaulted brick-built caverns with flanking corridor; common entrance through archway with classical surround in limestone ashlar, on the northern side of the forecourt. Eastern section filled in during the construction of the bridge in 1966; western section still open. Ancillary building on island demolished and fittings for magazines missing. Island unoccupied from 1920s until purchased by Irish Steel in 1964; later used as storage for industrial waste. (pers. comm. W.J. Williams). The magazine has been recently conserved and developed as a crematorium.			

Spike Island c. 440 m southeast of the East Tip (see Figure 15.1) is also a recorded RMP Ref:CO087-065 (001-003), it is the site of an early ecclesiastical foundation (002), a military cemetery (001) and a star shaped fortification (003).

RMP Ref:	CO087-065001-	**Townland:**	Spike Island
National Grid Ref:	180091/64368	**Site Type:**	Burial Ground
RMP Description: No file available			

RMP Ref:	CO087-065002-	**Townland:**	Spike Island
National Grid Ref:	180339/64599	**Site Type:**	Ecclesiastical site
RMP Description: According to Hurley (1980, 63), Spike island is 'identifiable with the early ecclesiastical site of I*nispicht*' (see also Coleman 1893, 1-8; Lynch 1912,162-4; J.C.Q. 1936, 47-8; Bolster 1972, XLI), of which there are no visible surface traces; map of 1625 appears to show ruined church on island (Hayes-McCoy 1964, plate 21) but none shown on Vallancey's map (MacCarthy ibid), nor does the latter show any remains of castle/tower house shown on 1587 map (Hayes-McCoy ibid., 25, plate 15).			

RMP Ref:	CO087-065003-	**Townland:**	Spike Island Fort
National Grid Ref:	180091/64368	**Site Type:**	Fortification
RMP Description: Large star-shaped artillery fortification with glacis, occupying over half of Spike island, in Cork Harbour. Fort replaced a battery erected 1779 but abandoned by 1783 (Brunicardi 1982, 39). Work on new fortifications designed by Charles Vallancey began 1791; original plan for small irregular fort (MacCarthy 1970, 161-2), but structure built described as 'extensive artillery barracks' (Lewis 1837, vol. 2, 572). Barracks erected 1806 (Windele 1844, 193) and by 1811 ordnance depot established. Though Windele (ibid.) says 'these works are incomplete. It is at present garrisoned by a small military force', the fort had largely taken its present form by 1842 (compare plan on 1842 OS 6-inch map and photo in Kerrigan 1978, 145 & Brunicardi ibid, 45); however work continued at least to 1860. From 1847-1883 fort used as convict prison. Described by Kerrigan (1978, 147) as of 'irregular outline consisting of six bastions connected by ramparts and surrounded by a broad dry ditch'; inside are ranges of barrack buildings arranged around a large parade ground. Fort now used as civilian prison. To the west are remains of 'a large and handsome military hospital' (Lewis ibid.); various buildings erected for 'persons connected with the establishment' (ibid.) along shoreline to the north.			

No stray finds were recorded in the Topographical Files of the National Museum of Ireland ascribed to Haulbowline Island.

Previous Excavations

No licensed archaeological excavations have occurred on Haulbowline Island. Several underwater archaeological assessments however have taken place in the offshore areas of the Island. Underwater monitoring of dredging at Rat Island, the Naval Basin and the approach to the basin was carried out, and no archaeological features or artefacts were identified within the area of dredging (Gleeson 2004). An intertidal and metal-detector survey were carried out on the north-western foreshore area of Rocky Island in Cork Harbour in advance of the proposed construction of an outfall pipe associated with the redevelopment of the magazine as a crematorium. No features or finds of archaeological significance were revealed. (Purcell 2006). The underwater archaeological potential is described in Section 15.6 of this report.

15.3.2 Architectural and Cultural Heritage

15.3.2.1 Architectural Conservation Area

The western side of Haulbowline Island is designated as an Architectural Conservation Area (ACA) (Figure 15. 2 in Appendix P: Archaeology and Cultural Heritage) in the Cork County Development Plan 2009. This part of the island contains a number of buildings and features of architectural heritage importance associated with the naval base and the earlier fortification of the Island, which, when considered collectively, have an overall architectural quality and significance. The island also dominates the view of the Harbour from the mainland and particularly from Cobh (Plate 15.13 in Appendix P: Archaeology and Cultural Heritage). The East Tip as it exists, visually detracts from the architectural heritage quality of the island and of the aesthetic of the harbour area.

In the 2009 Plan, the key objective for ACAs, is stated as follows:

> *It is an objective to conserve and enhance the special character of the Architectural Conservation Areas included in this plan. The special character of an area includes its traditional building stock and material finishes, spaces, streetscape, landscape and setting* (ENV 4-6)

15.3.2.2 Record of Protected Structures

Haulbowline Island has been in military use since 1609 and the array of structures on the island contributes much to Ireland's maritime heritage, military and naval history. In addition to its ACA status there are protected structures (RPS sites) on Haulbowline Island, again these are on the western side namely the Martello tower (RPS site Ref. 00578) and the range of limestone warehouses and offices which all come under the RPS site reference number 00670 (Figure 15.2). The most prominent buildings of the base are the six great storehouses built in c. 1822. Collectively they form an impressive coherent group of buildings and can be viewed from Cobh. Three storehouses are aligned north-south and face east towards the East Tip. The other three form a crescent shape to the northwest of the former group. They present as detached thirteen-bay three-storey with attic accommodation buildings (Plate 15.7). Until recently these structures were used by the ISPAT steelworks and large factory structures stood between these structures and the naval docklands.

National Inventory of Architectural Heritage (NIAH) sites

The closest NIAH site to the East Tip is on the eastern side of the naval dockyard area, a double height workshop (NIAH Ref: 20908776) which lies immediately west (described below, Plate 15.8). The remaining sites, which are listed below in Table 15.1 are located within the ACA area (Figure 15.2).

Table 15.1: National Inventory of Architectural Heritage (NIAH) sites on Haulbowline

NIAH Ref.	Location	Site	Date
20908776	Haulbowline Island	Workshop	1865–1890
20908745	Haulbowline Island	Block 4, Store/Warehouse	1820/1825
20908746	Haulbowline Island	Block 6	1820-1825
20908747	Haulbowline Island	Block 8	1820-1825
20908748	Haulbowline Island	Block 9, Store/ Warehouse	1820-1825
20908749	Haulbowline Island	Irish Ispat, Store/ Warehouse	1820-1825
20908750	Haulbowline Island	Irish Ispat, Store/ Warehouse	1820-1825
20908751	Haulbowline Island	Naval Boat Transport	
20908752	Haulbowline Island	Church	1920-1940
20908753	Haulbowline Island	Tank Building, Building Miscellaneous	1820-1825
20908754	Haulbowline Island	Store/Warehouse	188-1900
20908755	Church Avenue, Haulbowline Island	Officer's House	1880-1900
20908756	Haulbowline Island	Officer's House	1880-1900
20908758	Seamanship Bay Haulbowline Island	Boathouse	1820-1825
20908759	Haulbowline Island	Boathouse	1820-1825
20908760	Haulbowline Island	Albacore Cottages	1880-1900
20908761	Haulbowline Island	Letterbox (Edward VII)	1905
20908762	Haulbowline Island	Terrace of Officers Houses	1820-1825
20908763	Haulbowline Island	Naval Head Quarters	1880-1900
20908764	Haulbowline Island	Logistics Unit, Former RIC Barracks	1820-1825
20908765	Haulbowline Island	Naval College	1820-1825
20908766	Haulbowline Island	Base Headquarters	1820-1825
20908767	Haulbowline Island	Tower	1700-1740
20908768	Haulbowline Island	Store Warehouse	1820-1825
20908769	Haulbowline Island	Martello Tower	1820-1825
20908770	Haulbowline Island	PMS	1820-1825
2090877	Royal Alexandra Yard Haulbowline Island	Harbour/Dock/Port	1820-1825
20908744	Rocky Island	Magazine, Now Crematorium	1805-1810

15.3.3 Site Inspection

The East Tip forms the easternmost side of Haulbowline Island; it is an area that was gradually reclaimed from a sand bank from the late 1940's where the processed waste from the Ispat steel works was dumped (Plate 15.1 and 15.2). The East Tip measures approximately 9 hectares in area, the reclamation material slopes on the north, east and south into the foreshore. With the exception of a football playing pitch, the East Tip comprises stockpiles of various grades of processed materials and the ground surface as a result is very uneven. The reclaimed area and stockpiled materials slope down to the shore, there are no retaining structures present. Vestiges of the modern steel works are still present including cranes, steel frames, machinery and a modern office building (Plate 15.3). No features of an archaeological, architectural or cultural heritage merit were identified within the East Tip area.

Access to the East Tip is provided by a road that runs south of the Naval Dockyard area into the southwestern side of the East Tip site. It is likely that this access road was upgraded in the late 1960's during improvement works at the steelworks site when the road bridge from the mainland was constructed enabling vehicular access to the island for the first time.

The mid-nineteenth century (1865) eastward expansion of the island for the development of the dockyard area was contained by a sea wall. The majority of this sea wall (west of the dockyard) was covered by the reclamation material that forms the East Tip, however the northeastern and southeastern curving sea walls can be seen (Plates 15.4 and 15.5). They comprise sloping walls of stone blocks and date sometime between 1865 and 1887. Sections of the sea walls have been repaired with concrete or are concrete rendered. At the southeastern corner there is a line of up to seven protruding blocks from the walls which form rudimentary steps (Plate 15.6). These may be the steps that Brunicardi (1982, 24) describes as the 'Priests Stairs', which were used by the Chaplain of Spike Island to access Haulbowline after the prisoner causeway between the islands was dismantled (Haulbowline could not be accessed by road until 1966). The East Tip is bound to the west by the Naval Dockyard (est. 1865) and is separated from it by a chain-link fence (Plate 15.7). Immediately adjacent to this is a two storey naval workshop (NIAH Ref: 20908776) (Plate 15.8). It is a detached gable-fronted double-height building with a ten-bay east and west elevation which was constructed sometime between the years 1869-1887. There is a pitched artificial slate roof and coursed rubble limestone walls with red brick quoins. It has square-headed openings with cut stone sills, rendered lintels and red brick block-and-start surrounds. There is a detached gable-fronted double-height warehouse to the south with a pitched artificial slate roof. It is also constructed of coursed rubble limestone walls with red brick quoins. Both these structures will not be physically impacted by the remedial works.

Further to the west is the Naval basin and dock (Plate 15.9 and 15.10). As they are lowlying they cannot be seen from the East Tip. West of the dockyard is the site of the steelworks factory, and there are excellent views of the the imposing buildings associated with the early nineteenth century Naval base, this view has been recently opened out after the dismantling of the steel works.

The factory reused earlier 19th century structures associated with the naval base, these structures remain upstanding and the three storehouses and the pump-house for the docks (Plates 15.11, 15.12 and 15.13) can be seen from the East Tip they are among some of the smaller red-brick hospital structures that lie out of view. None of these features will be impacted by the proposed remediation works. The demolition of the steelworks site has opened up a view of the naval buildings (and the ACA) from the east and the remediation of the East Tip area will serve to enhance the ACA.

There are excellent views from Haulbowline to Cobh from the East Tip, particularly of Saint Colman's Cathedral and the colourful building facades facing the sea (Plate 15.14).There are also excellent views towards Spike Island (Plate 15.15). From Cobh the present view of the Island is dominated by the large spoil heaps which detracts from the western part of the natural island and the ACA. From an architectural heritage perspective any remediation works in this area would considerably enhance the views from Cobh (Plate 15.16).

No features of an archaeological, architectural or cultural heritage merit were identified in the area of the proposed remediation or road widening works.

15.3.4 Underwater Archaeology

Haulbowline Island has a busy history of development from a fortification into a naval dockyard, and much of the present development area lies against land that has been reclaimed from the natural sandbar of Spit Bank. The vestigial remains of the former causeway to Spike Island are clearly mapped, while the sub-bottom profile data recovered for the present project indicates a deep and extensive sequence of sedimentary deposits that could readily retain buried remnants of archaeological interest.

15.3.4.1 Intertidal Zone

Foreshore Topography

The intertidal zone at Low Water extends to include much of the proposed works area along the north and east shores of the island. The natural foreshore consists of silty sand and/or mixed pebble cover that slopes imperceptibly seaward, where it is quickly replaced with a light fluid sand/silt surface that remains shallow for an extended distance seaward. A series of geo-referenced shots of the intertidal zone along the northern side of the survey area serve to illustrate the foreshore topography present (Plates 1-17 in Appendix P: Archaeology and Cultural Heritage). This topography is the natural sandbar of Spit Bank. Overlying it on the landward side there is considerable addition of spoil that is dumped from the steelworks along the eastern side of the island (Plates 18-19 of Appendix P: Archaeology and Cultural Heritage). The waste is very dark/black in colour. It can form low cliffs against the shore, and retains striking layering that reveals the process of dumping. Debris and discarded objects are included in this material, and some of this material has fallen onto the foreshore (Plate 20, Appendix P: Archaeology and Cultural Heritage).

A small indentation on the northeast edge suggests a small cove is developing on the shoreline, perhaps anticipating an indentation on the natural layering below, but also resulting from water run-off from the reclaimed portion of the island.

The shorelines on the north and south sides are more abrupt, where the 'made-ground' from the waste meets the Low Water line directly, and runs into the sub-tidal zone. The deeper shore results from the limits of the Spit Bank, imposed by the river channels that drain into the harbour.

Features

The remains of stone-built sea walls survive at both the north and the south ends of the survey area, where existing structures on Haulbowline merge with the recently reclaimed portion of the island (Plates 21-23, Appendix P: Archaeology and Cultural Heritage). The sea walls are steeply-pitched and are faced with granite rectangular blocks set with their long axis facing the ground. The stone is set in concrete. Along the south shore, newer additions of sea wall are built against the stone walls and are rendered in concrete.

The remains of the causeway feature that extended southeast from Haulbowline Island survives as a linear stone mound that runs from the foreshore to a point that is recorded at 179862E 65170N, where it ends as a rounded feature that may dip below the surrounding sands (Plates 24-25 Appendix P: Archaeology and Cultural Heritage). The feature is made up of small stones forming a compact cairn, with a low rounded profile some c. 20m wide and up to 1m in height. A metal pipe is inserted into the stone mass at its outward end (Plate 26 Appendix P: Archaeology and Cultural Heritage). There was no indication of timber piles or related features that might have supported a timber walkway, but such elements could easily have been eroded, and foundation stumps would be buried by the stone cairn.

The only object observed in the intertidal survey was a large steel cylinder with a domed surface and a steel bolt on its crown (Plate 27 Appendix P: Archaeology and Cultural Heritage). It lay alone on the silty-sand, and may represent part of an abandoned buoy.

15.3.4.2 Sub-Tidal Zone

To facilitate dive work, marker buoys were placed at two points, 179776E 65527N and 179516E 65082N respectively. The two points defined the seaward extent of the dive work, which was completed by a series of towed dive surveys completed inside the buoyed area. The diver was towed East and West in a grid pattern which was repeated at right angles, moving in and away from shore, to provide maximum coverage. Underwater visibility was good at 3m, ensuring 6m-wide sweeps at a time.

Seabed Topography

The underwater inspection confirmed the bathymetric survey, identifying a sloping seabed that rises gradually to the south, in keeping with the shallowing nature of the seabed as it approaches the east end of Rocky Island. Water velocity increased where the water depths were greatest, and reflect the active flow of the tide as it races along this channel.

The seabed is for the most part covered in a silty-sand that is featureless (refer to Plates 28-29 Appendix P: Archaeology and Cultural Heritage). Some cobbling was evident in the deeper sections, as may be expected from constantly high water velocities, but within the sheltered areas inshore, soft sand was only punctuated by a line of modern rock armour associated with the sea walls, and also some modern metal debris.

No material was recovered and no material of archaeological significance was identified.

15.4 POTENTIAL IMPACTS

15.4.1 Construction Phase

15.4.1.1 Archaeological Heritage (Terrestrial)

East Tip Remediation Works

The East Tip is a man made area which was reclaimed from a natural sand bank in the twentieth century by the dumping of waste from the processing waste from the Ispat steelworks site. The nearest recorded archaeological sites lie on the western side of the island and relate to the seventeenth and eighteenth century defence of Cork Harbour. The proposed remediation works i.e. engineered capping system and perimeter engineered structure, recreation enduse and improved vehicular and pedestrian access and road widening will have no direct or indirect impact on any recorded archaeological monuments (RMP sites) on the island.

Proposed Footpath Improvement Works on Approach to the Island

The proposed footpath works on the existing mainland approach to the island in Ringaskiddy will have no impact on any recorded archaeological remains or cultural heritage sites. The footpath will be inserted along the existing road edge and the archaeological potential is considered to be low. No mitigation measures are considered necessary for these works.

15.4.1.2 Architectural and Cultural Heritage

East Tip Remediation Works

No protected structures (RPS sites), Architectural Conservation Areas (ACA's), or National Inventory of Architectural Heritage (NIAH) sites on Haulbowline Island will be directly or indirectly impacted by the proposed East Tip Remediation works.

The proposed access road and footpath improvement works will have a direct impact on the southeastern most corner of the former steel and naval dockyard lands (to the west of the East Tip). It is likely that this narrow area has previously been disturbed during the expansion and improvement works associated with the steel plant in the 1960's. This area is bound by a retaining sea wall which may define the original 1865 expansion of the docklands area (Plates 15.4 and 15.6 in Appendix P: Archaeology and Cultural Heritage). The existing seawall will be retained to the south of the docklands area along the present access road.

The site work identified projecting blocks inserted into the sea walls which form rudimentary steps at the point where it meets the East Tip, it is possible that these are the 'Priests Stairs' (Plate Plate 15.6) used by the Chaplain of Spike Island to access Haulbowline after the prisoner causeway between the islands was dismantled (dating to c.1865, Brunicardi 1982, 24). The steps are of local cultural heritage merit. The keying in of the perimeter engineered structure with the old sea wall in the vicinity of the 'Priests Stairs' is likely to have a direct physical impact on all or part of the steps and the short stretch of the sea wall in this area. Once the perimeter structure has been inserted any steps that remain will be dismantled if they provide unconstrained access to the water's edge and are considered to pose a threat to public health and safety.

Proposed Footpath Improvement Works on Approach to the Island

The proposed footpath works on the existing mainland approach to the island in Ringaskiddy will have no impact on any cultural heritage sites. No mitigation measures are considered necessary for these works.

15.4.1.3 Underwater Archaeology

The remains of stone-built sea walls survive at both the north and the south ends of the survey area, where existing structures on Haulbowline merge with the recently reclaimed portion of the island. The development works adjacent to and on the foreshore will anticipate some impact with the merging of new structures and the stone-built sea walls.

The development works therefore represent a potentially significant impact on the existing environment in this area where works are proposed within the foreshore (i.e where the bottom of the rock armour layer will be keyed into the existing foreshore to provide a suitable foundation).

The presence of the stone-built causeway confirms the existence of works associated with the reclamation of the Island in the late 1800s as part of the construction of the dockyard. The presence of stone-built sea walls help to further define the edges of the visible historical remains. The depth of sedimentary deposit over bedrock close inshore as revealed in the marine geophysical survey report highlights the potential holding capacity for previously unrecorded features associated with the presence of the Spit Bank as a navigation hazard.

15.4.2 End-Use, Aftercare and Maintenance Stage

15.4.2.1 Archaeological Heritage (Terrestrial)

There is no potential for impacts to archaeological heritage during the end-use, aftercare and maintenance stage.

15.4.2.2 Architectural and Cultural Heritage

The Haulbowline ACA, protected structures (RPS sites) or NIAH sites will not be negatively impacted by the proposed development. The proposed remediation works and enduse will conserve and enhance the special character of the Haulbowline ACA and will therefore have a positive impact on the architectural heritage of the area. In addition the views towards the East Tip from Cobh will be significantly improved.

15.4.2.3 Underwater Archaeology

There will be no impact on archaeological or cultural heritage during the end-use, aftercare and maintenance stage of the project as it is anticipated that all archaeological features and sites will be resolved in the construction stage of the proposed development.

15.4.2.4 'Do Nothing' Scenario

In the 'do nothing' scenario, the East Tip will continue to diminish and detract from the views of the Haulbowline ACA from Cobh and from the Harbour area and surrounding landscape.

15.4.2.5 'Worst Case' Scenario

From a terrestrial archaeological and cultural heritage perspective there is no worst case scenario envisioned.

15.5 MITIGATION MEASURES

15.5.1 Construction Stage

15.5.1.1 Archaeological Heritage (Terrestrial)

The terrestrial archaeological potential of the proposed works is considered to be negligible and no mitigation measures are therefore required as it is unlikely that any unknown archaeological materials are present on the site.

15.5.1.2 Architectural and Cultural Heritage

There is likely to be a direct impact to all or part of the 'Priests Stairs'. It is therefore recommended that a measured, photographic and written survey of the steps and sea wall in this area be carried out prior to the site construction works. This will provide a record of the past.

The majority of the features associated with the steelworks have already been removed from the site, it is recommend that prior to site clearance works that a photographic survey of any vestiges of the twentieth century steel works that remain on site e.g. machinery, tracks, cranes etc (e.g. Plates 15.13) is carried out in order to provide a record of the past. If appropriate, consideration for the new-life reuse/recycle or reconstitution of some of the steel features might also be given and used for features/sculptures associated with the landscaping of the site.

As the remediation area is being considered for public use it is recommended that the archaeological, architectural and the military/ defence/ naval and industrial (steelworks) history of Haulbowline is communicated and presented to the public. This could take the form of a guide book, information panels and/or smart phone media. A narrative could explore cultural heritage themes such as the development and phased expansion of Haulbowline including the incorporation of Rat Island, the convict's causeway, the 'Priests Stairs', the sea walls and later access bridge. The opportunity to present these 19th and 20th century heritage stories as well as the earlier history of the island and statutory designations could tie in with other heritage interpretation events and displays in Cobh, Spike Island and surrounding areas.

The above recommendations are subject to discussions with and approval from the National Monuments Service, DAHG and Cork County Council who may seek additional information or consider alternative strategies.

15.5.1.3 Underwater Archaeology

The following mitigation measures are recommended during the construction works in the foreshore area as described in Chapter 5 'Project Description' and Chapter 6 'Project Construction':-

- Archaeological survey of sea-wall locations to be disturbed should be carried out prior to disturbance works. Such survey would usually be a detailed photographic record supported by measured description.
- It is recommended that archaeological monitoring licensed by the Department of Arts, Heritage and the Gaeltacht is conducted during all seabed and inter-tidal/foreshore disturbances associated with the development.
- An archaeologist experienced in maritime archaeology will be retained on site for the duration of the relevant works required (i.e. tying in of the rock armour) in the foreshore.
- In the event of archaeologically significant features or material being uncovered during the construction phase, machine work should cease in the immediate area to allow the archaeologist/s to inspect any such material.
- If the presence of archaeologically significant material is established, full archaeological recording of such material is recommended. If it is not possible for the construction works to avoid the material, full excavation would be recommended. The extent and duration of excavation would be a matter for discussion between the client and the licensing authorities.
- It is recommended that the core of a suitable archaeological team be on standby to deal with any such rescue excavation. This would be complimented in the event of a full excavation. The archaeological team should be experienced in maritime archaeology.

- It is recommended that an archaeological dive team is retained for the duration of any inwater disturbance works on the basis of a twenty-four or forty-eight hour call-out response schedule, to deal with any archaeologically significant/potential material that is identified in the course of the ground disturbance activities. The permits necessary for this aspect of the site work are additional to the excavation licence required by the archaeological monitor, and are generally held by the dive-team leader. The archaeological dive licence takes a minimum of 3-5 weeks to process. It is necessary to ensure that all permits are in place before site works commence.

- A secure wet tank should be provided on site for the storage of materials which may be recovered in the course of archaeological work.

- Bouying/fencing of any such areas would be necessary if discovered during excavation.

- Spoil will not be dumped on any of the selected sites discovered during archaeological monitoring or their environs.

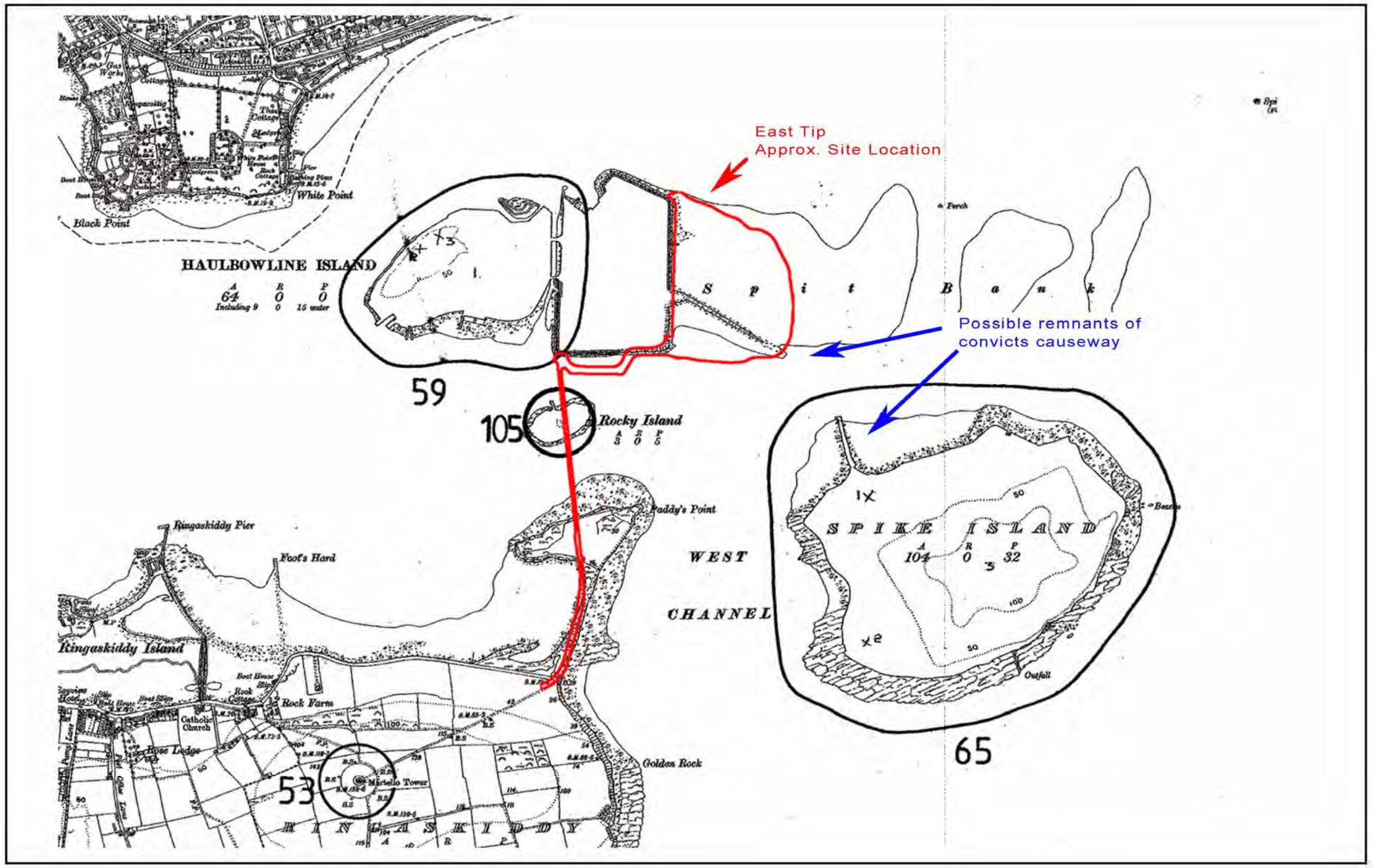
15.5.2 End-Use, Aftercare and Maintenance Stage

There will be no impact on archaeological, architecture, cultural heritage or underwater archaeology during the end-use, aftercare and maintenance stage of the project and, therefore, no mitigation measures are proposed.

15.6 RESIDUAL IMPACT

No residual impacts are envisaged from an archaeological and cultural heritage perspective to the terrestrial environment.

Provided monitoring and mitigation proposals are implemented during the construction stage in the foreshore area as outlined above impacts to the marine environment can be avoided.



Legend

Study Area Boundary / Extent of works

Title

HAULBOWLINE ISLAND
STUDY AREA
RMP SITE LOCATION MAP

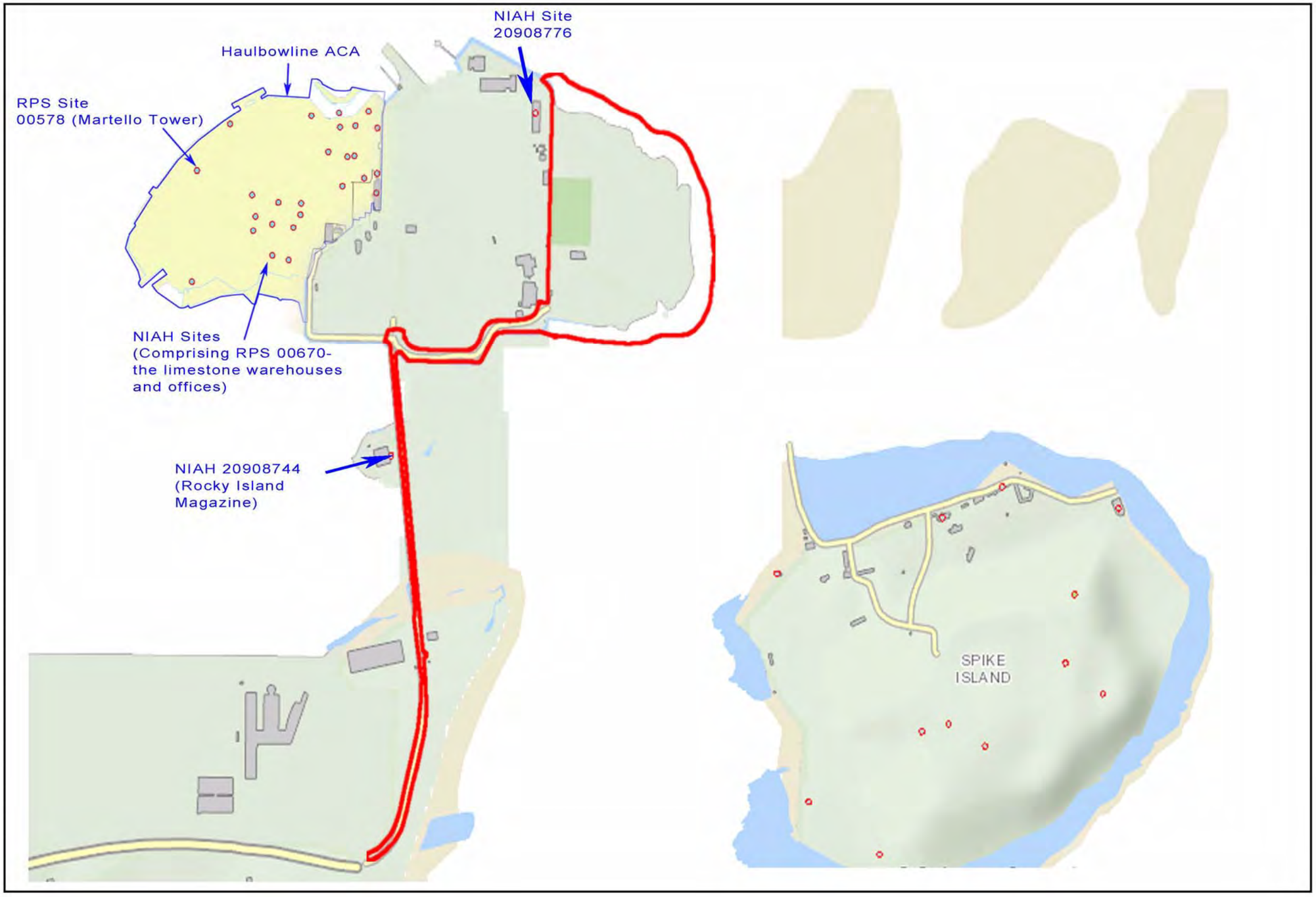
Figure 15.1

File Ref: MCE0734MI0021F01
Date: April 2013
Rev : F01

East Tip Remediation Project

EAST TIP REMEDIATION PROJECT

RPS



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Legend

Study Area Boundary / Extent of works

Title

HAULBOWLINE ISLAND
STUDY AREA
HAULBOWLINE ACA, RPS & NIAH SITES

Figure 15.2

File Ref: MCE0734MI0022F01
Date: April 2013
Rev : F01

East Tip Remediation Project

EAST TIP REMEDIATION PROJECT

RPS

16 INDIRECT & CUMULATIVE IMPACTS & IMPACT INTERACTIONS

Although indirect impacts as they relate to particular issues (e.g. air and noise, landscape, etc.) have generally been discussed within the relevant chapters of this EIS, the purpose of this chapter is to assess the 'indirect' (or secondary) and 'cumulative impacts' of the overall proposed development.

In addition, while each individual chapter established the full extent of the 'direct' impacts associated with the proposed development, this section provides a discussion on the inter-relationship of these impacts during the construction phase of the proposed development which entails the remediation and capping of the existing waste disposal site. The assessment has indicated that there will not be any significant environmental impacts during the recreational end use stage, other than the positive impact arising from the provision of a public amenity parkland in place of a waste tip.

Section 16.1 below describes the 'indirect' (secondary) impacts of the proposed development while the impact inter-relationships are discussed in Section 16.2. Some overlap exists in the discussion between these impacts. Cumulative impacts relate to the potential for incremental changes to environmental parameters due to the combined effect of this project added to changes which have been, or which may yet be, brought about by past, present or reasonably foreseeable future projects or actions.

The assessment of these impacts has been undertaken with regard to EU (Environmental Impact Assessment) (Waste) Regulations 2012, the EPA documents 'Guidelines on the Information to be contained in Environmental Impact Statements 2002' and 'Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)' 2003. It has also been prepared with consideration to the EU 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions', prepared for the European Commission (1999).

16.1 INDIRECT (OR SECONDARY) IMPACTS

The EPA Guidelines for EIS describe indirect impacts as:-

> *'impacts which are caused by the interaction of effects, or by associated or off site developments'.*

In the case of this development, indirect impacts are those which are considered to be caused by consequential associated development, i.e. not directly part of the project, but associated with the project e.g. aggregate extraction. In addition to associated developments, some mitigation measures can also cause indirect impacts, e.g. the requirement for removal of hazardous waste from the site has potential to contaminate an alternative disposal site.

Under Section 172 (1D) of the Planning and Development Act, 2000 (as amended by the European Union (Environmental Impact Assessment) (Planning and Development Act, 2000) Regulations 2012), a Planning Authority or An Bord Pleanala, such as in this particular case, must consider *"whether an environmental impact statement submitted under this section identifies and describes adequately the direct and indirect effects on the environment of the proposed development and, where it considers that the environmental impact statement does not identify or adequately describe such effects, the planning authority or the Board shall require the applicant for consent to furnish, within a specified period, such further information as the planning authority or the Board considers necessary to remedy such defect".*

16.1.1 Improvement Works to Bridge

Delivery access to the site will be via the existing Haulbowline Bridge. The bridge is in need of remedial works and a weight restriction of 25 tonnes is currently in place. At the time of writing this EIS a post-tensioning special inspection, concrete testing and scour assessment has been undertaken, which will determine the works necessary to remediate 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.

16.1.2 Economic

In addition to the direct employment opportunities for construction workers carrying out the remediation and construction works, indirect employment opportunities are expected to be created during the construction phase for a range of goods and services. These may include local purchase of construction materials and increased use of services such as shops and cafes in the local Ringaskiddy and Cobh areas by construction workers. This will have temporary indirect positive socio-economic benefits for local residents, retailers and other commercial operators e.g. accommodation services and transport companies, including increased workforce participation and income levels.

16.1.3 Sourcing Materials from Other Sites for Use in Capping

There is insufficient material on site to cater for the PES and capping system, reclamation works and landscaping proposed on site. Given the large quantum of material required for these works material will be required to be sourced from outside the site to cater for this development. As outlined in Chapter 1 'Introduction' it is proposed to source material from other construction sites where possible. If such a site is not available or does not have sufficient quantities of material available at the time it is required at Haulbowline, it may be necessary to source fill material from a licenced quarry site with sufficient available capacity. The use of fill material from other construction sites can have an overall positive balancing impact and possible cost saving implications. The extraction of material from commercial quarries however has potential to have a minor indirect negative impact as it depletes locally available natural resources. Material will only be extracted however within licenced volume limits.

In any case, materials sourced on site (i.e. processed slag see Appendix C: *East Tip Remediation Classification of Slag Waste (RPS, 2013*)) will be used where possible and rock armour will also be sourced locally. The sourcing and purchasing of materials could have a positive local economic impact.

16.1.4 Delivery Routes / Options

While it is most likely that material will be delivered to the East Tip by road, it is possible that some materials may come via sea directly to the former Irish Steel dockyard. Depending on the place of departure, and the volume of material involved, this could result in an increase of construction traffic in some other coastal location in the area unspecified in the impact assessments contained in this EIS. However, in the event that importation of materials by barge is an option, then details of such an activitywill be explored in consultation with the Port of Cork, local boat groups and subject to the requirements for Marine Vessel Notice and all other statutory requirements. The CEMP and TMP will

be updated to ensure that the Contractor manages the activity in a manner that any potential impacts are not likely to be significant.

16.1.5 Possible Public Events

While the development proposals for the East Tip remediation do not incorporate proposals for organised events to be held at the recreation area, it is possible that the area could become an attractive location for same in the future, given in particular its coastal location. Such events could have potential impacts in terms of traffic, noise and parking with the level of potential impact, however being dependent on the nature and size of the event. Any such events would require to be managed in accordance with any necessary licensing requirements.

16.2 INTER-RELATIONSHIPS / INTERACTION IMPACT

In addition to the requirements of the EU EIA Directive No. 2011/92/EU and the EU EIA (Waste) Regulations 2012 (S.I. No. 283 of 2012), to describe the likely significant effects of a proposed development on particular aspects of the environment, it is also required to consider the interaction of those effects.

Table 16.1 identifies the interaction of predicted likely impacts in a matrix format. In this matrix each aspect of the environment which is considered in detail in the appropriate sections of the EIS is cross tabulated against all of the other aspects that have also been considered. Where an interaction is considered likely it is given a reference number in the matrix and detail of the interaction is recorded below. The interactions are listed in numerical sequence, purely for referencing purposes.

1. Human Beings and Traffic

The potential for construction traffic to cause congestion and impact on the living, working and visiting community of the area will be minimal only. However there will be a slight impact in terms of increased noise and related traffic safety/ inconvenience in the villages along the N28 which is likely to occur during the hours of 09:00 to 12:00 on weekdays, the period of the working day when the baseline traffic levels are lowest.

This construction traffic must access the site via the N28 and L2545 through Shanbally and Ringaskiddy. Depending on the sources of the topsoil/subsoil some of the traffic may also be required to pass through Carrigaline. As the supply of soil is unlikely to be steady throughout the eighteen month construction phase, the rate of truck movements is likely to fluctuate to higher and lower rates.

Construction work involving additional road construction on the island in addition to the import and export of soil and waste to and from the site could give rise to conflict with naval related traffic and have security implications.

2. Human Beings and Noise and Traffic & Transport

The traffic levels associated with delivery of materials will give rise to increase noise levels close to the East Tip site itself where existing background noise levels are lowest along the delivery route. This slight increase in noise levels will have potential to cause slight annoyance to workers within the Naval Dockyard workshops in particular. It also has potential to impact slightly on the peaceful environment of the crematorium at Rocky Island. However, the increase in noise will be just perceptible and is for a temporary period. It will be a slight negative impact only therefore.

Due to the mitigation measures proposed there is only slight potential remaining for construction related noise to impact on nearby sensitive receivers at the Naval Base, and beyond.

3. Human Beings and Landscape

The improvements to views of the island from Cobh and from the sea in particular when the remediation work is complete and the site is laid out as a park, will benefit in particular residents and tourists visiting Cobh, and water sports participants using this area of the Harbour.

4. Human Beings and Ecology

The provision of new habitats and enhanced number of floral and faunal species at the new amenity area will be a more enjoyable experience for visitors to the island and residents in the general area.

5. Human Beings and Soils, Geology and Hydrogeology

Improvements in marine water quality due to the remediation solution will have potential associated positive impacts to the local fishing industry.

6. Human Beings and Archaeology

Cultural information displays proposed to be provided within the proposed recreation area in respect of the history of Haulbowline and Spike Islands will be a positive addition to the area for visitors and local residents.

7. Noise and Ecology

Submarine acoustic noise in particular during any piling activity if deemed necessary can potentially give rise to disturbance to marine mammals. However, due to the nature of the noise levels associated with the construction operations (i.e. not likely to cause physical or auditory injury and not likely to result in behavioural effects over a wide area), the low number of marine mammals in the vicinity of the construction site and the proposed mitigation measures outlined in Chapter 14 'Ecology', impacts on marine mammals due to construction related submarine acoustic noise is predicted to be of negligible magnitude and negligible significance to marine mammal populations in the area.

8. Landscape and Material Assets

The laying out of the remediated site as a public park is a significant positive addition to the material assets of the area.

9. Landscape and Ecology

The landscaping proposed at the subject site will create new habitats which in turn will increase the species diversity at the site compared with the current situation.

10. Soils, Geology and Hydrogeology and Ecology

Potential impacts to marine water quality in terms of siltation water flow or turbidity in areas around the site either as a result of construction or as a result in hydrological changes of the completed works, can indirectly impact on marine ecology for example by giving rise to changes in food sources for benthic invertebrates. This in turn can lead to changes in community composition. However the proposed works will remediate the site thus only improving the ecology around the site.

Table 16.1: Interaction of Impacts

Initial Impact Identified in EIS on having an Interaction/ Cumulative Effect on Receptors	Human Beings & Socio Economic	Traffic and Transport	Air and Climate	Noise and Vibration	Landscape and Visual	Material Assets	Ecology (Flora and Fauna)	Soils, Geology, Hydrology and Hydrogeology	Archaeology & Cultural Heritage
Human Beings & Socio Economic									
Traffic and Transport	**1**								
Air and Climate									
Noise and Vibration	**2**	**2**							
Landscape and Visual	**3**								
Material Assets					**8**				
Ecology (Flora and Fauna)	**4**		**7**						
Soils, Geology, Hydrology & Hydrogeology	**5**				**9**		**10**		
Archaeology & Cultural Heritage	**6**								

16.3 CUMULATIVE IMPACTS

For the purposes of considering potential cumulative impacts in the area it was necessary to firstly identify possible other developments which may come on stream in the short to medium term. These are described in Section 16.3.1 and the associated cumulative impacts in Section 16.3.2.below.

16.3.1 Possible Future Development

Possible Future Remediation of Neighbouring Steelworks Site

Cork County Council is currently in the process of appointing consultants to undertake a Tier 1 assessment of the neighbouring Steelworks site at Haulbowline. Depending on the outcome of the Tier 1 assessment and rate of progression of possible future remediation proposals, achievement of licences and approvals for same etc., it is possible that remediation works at the Steelworks site could commence prior to completion of the majority of the works at the East Tip. However, the remediation solution for the Steelworks site and the required construction works will depend on the results of the risk assessment. As outlined in Chapter 6 of this EIS, the proposed 18 month programme may extend due to reasons relating to the availablility of soil etc. and therefore there is potential for the projects to overlap for a period of time. However the potential for cumulative impacts (should projects occur simultaneously) will depend on the chosen remediation solution for the Steelworks site.

Estimated Start Date: During completion of Remediation Works/Post remediation works at the East Tip – no planning permission/approval yet sought.

Irish Maritime and Energy Resource Centre (IMERC)

The proposed IMERC campus will be located on the mainland at the southern side of Haulbowline Bridge. The IMERC site lies immediately to the west of the access road to the bridge. Already developed and operational at the campus is the National Maritime College of Ireland (NMCI) which is run by Cork Institute of Technology (CIT) and the Irish Naval Service. The Beaufort Laboratory is currently under construction by UCC. It is now proposed to expand the campus and to develop a marine and energy cluster focussing on research, development, commercialisation and innovation. CIT / UCC intend to prepare a masterplan for the layout and design of this future campus development and are in the process of appointing consultants. Given the timelines required to adopted a masterplan and obtain planning permission for any specific development therein, it is possible that some additional building work will commence during the construction stage of the remediation works at the East Tip. In any case between the NMCI and the Beaufort Laboratory the numbers of people attending college or work in the immediate vicinity of Haulbowline Island is due to increase in the short – medium term prior to the commencement of development at the East Tip.

Estimated Start Date: On completion of Beaufort Laboratory any further work at proposed IMERC Masterplan lands will require planning permission but could possibly commence prior to completion of construction/remediation at the East Tip

Possible Waste Management Facility by Indaver Ireland

Indaver Ireland is the prospective applicant for a waste management facility comprising a waste-to-energy plant and a waste transfer station at a site opposite the NMCI. This site is located approximately 1km south of Haulbowline Island. In 2012 Indaver commenced pre-application discussions with An Bord Pleanála. Permission has previously been refused at this site for a similar type development. In the event that a revised proposal can be devised which would address the previous reasons for refusal it is possible that some such waste management facility could be provided here in the coming years. The timing of such a development will of course be dependent on when a

new planning application is made. However, given the likely duration of a planning application process for such a development it is not likely that construction of same could co-incide with the remediation works at the East Tip.

Estimated Start Date: Post remediation works at the East Tip – planning permission not yet sought.

Hammond Lane Metal Company

Planning permission was granted in 2012 for demolition, new build, upgraded facilities, new processing plant etc at the Hammond Lane Metal Company located at Loughbeg, also close to Haulbowline Island. It is likely that construction will commence in 2013/2014, but if they are delayed they could coincide with works at the East Tip.

Estimated Start Date: Possibly 2013 – planning permission in place.

Port of Cork

Port of Cork Company entered into pre-application consultation with ABP regarding proposed new port facilities at Ringaskiddy in 2011. In the event that a revised proposal could be devised which would address the previous reasons for refusal it is possible that some Port of Cork facilities could be moved to Ringaskiddy in the coming years. As with potential proposals outlined above if it is to proceed it will not occur within the next few years due to planning and environmental assessment requirements, etc.

Estimated Start Date: Post remediation works at the East Tip – planning application proposed for lodgement Q1 of 2014.

Spike Island Masterplan

As noted in Chapter 2 of this EIS, the Spike Island Masterplan envisages use of Spike Island for public events, concerts etc. In the long-term it is hoped that the island could attract 300,000 visitors per annum. The Masterplan also identifies the subject site at Haulbowline as a possible future ferry access point.

Estimated Start Date: Fáilte Ireland has allocated funding for the progression of Spike Island Masterplan, as announced on 23rd October 2013. At the time of writing this EIS, it is expected that the funding will be used for the creation of three interpretive centres on Spike Island along with the improvement of marine access facilities to the Island. It is expected that these facilities will be completed in 2015.

Haulbowline Bridge Remediation Works

As mentioned above, the bridge is currently in need of remedial works to secure it's future structural integrity and safe operation. The exact nature of the remedial work required will not be specified until the design is complete. Some works will be required within the Harbour, but it is expected that these will relate to the erection of scaffolding to allow completion of the bridge remediation works..

Estimated Start Date: Works to be undertaken in advance of the East Tip remediation works.

Maintenance Dredging by Port of Cork

The Port of Cork must maintain water depth for navigation and safety reasons in certain parts of the harbour such as navigation channels, around piers and jetties etc. This involves a regular dredging operation which occurs at present every three years. The dredging is carried out under contract in specified areas of the harbour and involves the movement of approximately 250,000 m^3 of sediment per campaign, which takes approximately 7 – 8 weeks to complete. The closest area of dredging to Haulbowline Island is a relatively modest area at the turning circle at the berth at Cobh, with the second closest in the vicinity of the berths at Ringaskiddy.

Estimated Dredging Period: The last dredging was undertaken in the summer of 2011 (POC pers comm., 2013). It is likely then that the next dredging cycle will occur in 2014.

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

16.3.2 Cumulative Impacts

The following section considers the possible cumulative impacts associated with the proposed development/remediation works at the East Tip combined with other possible developments in the surrounding area. It should be noted that once remediated, the East Tip and it's beneficial end-use will not give rise to negative cumulative impacts. The potential for cumulative impacts will only arise during the construction stage with the accumulation of potential impacts arising from other projects particularly those where the construction programmes may overlap. However, such impacts, will be temporary or short term in nature and will be minimised with the implementation of mitigation measures.

Traffic

The main area for potential cumulative impact as a result of other possible development in the area is traffic related. In particular, if the construction of any of the possible development listed above coincides with that of the proposed development it could give rise to an increased cumulative effect on traffic flows through Ringaskiddy.

The potential for any works for Indaver or Port of Cork proposals commencing in the next couple of years is extremely unlikely however given timelines necessary for planning approval and waste licence preparation and achievement. Construction work to Hammond Lane Metal company is a much more likely possibility though given its scale construction traffic will be infrequent in nature and of very low daily average such that the cumulative impact would be negligible. While construction work is currently ongoing at the Beaufort Laboratory, this is also of a relatively modest scale with potential for cumulative impact on traffic remaining negligible. Finally, given the timelines required to prepare and adopt a masterplan for the IMERC lands and secure the necessary planning permissions it is unlikely that any other major work at the IMERC will be coming on stream at the same time as the East Tip remediation works commencement. However, works at IMERC could commence in the course of and prior to the completion of the remediation works.

With regard to the possible future remediation of the neighbouring Steelworks site, it is possible that such works could occur towards the end of the construction programme for the East Tip. Any increase in traffic would lead to a negative cumulative impact, however such an impact would be mimised through the implementation of the Traffic Management Plan. Up to now development at the eastern area of Ringaskiddy has been low intensity. All of the potential and permitted additional developments identified in section 16.3.1 above have potential to increase both HGV and vehicular traffic to this area of Ringaskiddy in the future if / when all such developments are operational.

Noise

Any cumulative impacts from traffic could potentially give rise to a cumulative effect on noise generation. The levels of traffic would need to be considerable for the noise levels increase to a noticeable level along most of the route. Given the likely timing of construction of possible future development in the area relative to the proposed works at the East Tip it is possible that works at Hammond Lane (and possibly IMERC in the later stages of the remediation works) only will coincide with the East Tip remediation. This has potential to give rise to possible slight increases in noise levels due to traffic.

Increased traffic in the area in the long term due to the various potential and permitted developments in the area could give rise to increased levels of traffic related noise.

Air Quality

Possible increased traffic levels in the area associated with both the construction and operation of the various potential developments identified at 16.3.1 above also have potential to increase air emission levels in the area. Modern vehicles and technologies however will minimise this potential.

The waste management techniques which could be adopted at the Indaver site could potentially have air emission potential.

Visual, Human Beings and Architectural Heritage

In the long term, the cumulative effect of the remediation of the Steelworks site as well as the East Tip would have an enhanced impact on views of the areas from Cobh and from the harbour in particular. The remediation of the rest of Haulbowline Island would also greatly enhance the setting of the Architectural Conservation Area of the Naval lands.

Impacts on Marine Ecology

There is potential for cumulative impact on marine mammals due to increased suspended solids within the harbour waters in the event that construction at the East Tip was undertaken at the same time as maintenance dredging by Port of Cork.

Remediation works to the bridge are anticipated to be undertaken prior to the site works. While this extends the exposure of marine mammals to additional anthropogenic (man-made) effects in the region, it is not anticipated that the works will be of long duration, and will have limited cumulative effects with this project. The project will be subject to its own assessment and mitigation to prevent or limit any potential impacts.

Any excavation works required in the foreshore will be co-ordinated with Port of Cork and their contractors to avoid them coinciding with maintenance dredging at Cobh if possible. In the event however of them being conducted at the same time, there would be a low risk of suspended sediment and noise cumulative impacts from any piling operations likely to be required. These works would be of short duration and therefore in consultation with the Port of Cork it is anticipated that activities can be scheduled so as not to overlap. In this case cumulative impacts would be minimised.

Due to the short term nature of construction works in the foreshore from this project and the low numbers of marine mammals expected to be impacted by the works, it is predicted that the cumulative impacts on marine mammals from submarine noise disturbance and increased suspended sediment concentrations and sedimentation during dredging operations will be of *negligible magnitude and negligible significance* to marine mammals in the region.

17 SUMMARY OF IMPACTS AND MITIGATION MEASURES

This chapter provides a summary of potential impacts identified, mitigation measures proposed and residual impacts predicted for both the construction (Table 17.2) and operational phases (Table 17.3) of the proposed project. These are considered under the various environmental topics assessed in detail in Chapters 7-15, which assess impacts on the human environment, natural environment and cultural heritage.

The implementation of the mitigation measures proposed in this EIS will deliver a level of environmental management and performance consistent with national and international standards and legislation. An Environmental Clerk of Works will be appointed for the works, who will undertake regular inspections/audits to ensure the measures outlined are implemented. In addition Cork County Council will have a presence on site to oversee the overall construction works.

The mitigation measures outlined below will be incorporated into the CEMP prepared by the contractor for the execution of the works (See outlined CEMP Appendix I and Chapter 6 'Project Construction').

It is important to note that certain specialists based their assessment of impacts on different significance criteria and therefore for a complete understanding of potential impacts, reference should be made to the relevant chapters and Table 1.1 in Chapter 1 'Introduction' for reference to the guidelines adopted by the various specialists.

Generally, the assessments of impact duration have adopted the EPA definitions as outlined in Table 17.1 below.

Table 17.1: EPA Classification Criteria for Duration of Impacts

Temporary	Impact lasting for one year or less
Short-Term	Impact lasting one to 7 years
Medium-Term	Impact lasting seven to fifteen years
Long-Term	Impact lasting fifteen to sixty years
Permanent	Impact lasting over 60 years

A summary of the potential impacts and mitigation measures for the construction and end-use, aftercare and maintenance stages, under the various chapter headings is outlined below in Tables 17.2 and 17.3 respectively.

A summary of the proposed monitoring proposal for the construction and end-use, aftercare and maintenance stages, under the various chapter headings is outlined below in Tables 17.4 and 17.5 respectively.

17.1 SUMMARY OF MITIGATION

A summary of the mitigation measures proposed throughout the EIS is provided below in Table 17.2 (Construction) and 17.3 (End-use, Aftercare and Maintenance).

Table 17.2: Summary of Potential Impacts and Mitigation Measures Required for Construction Stage

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
Chapter 7 Community and Socio Economic **Demography and Employment**	The construction activity will generate some temporary direct employment (approx. 15 – 20 persons on site) and indirect employment for suppliers, haulage companies etc. which is a slight positive impact for the area and potentially significant impact in a wider context.	None	Slight Short-term Positive Impact
Resident Community	The construction phase has potential to cause inconvenience and irritation to residents due to potential noise, dust and traffic generation.	Mitigation measures outlined in Chapters 5, 6, 8, 9 and 10; including use of licensed transport companies, restrictions on delivery hours, and implementation of a Noise Management Plan etc., ongoing liaison with resident community.	Slight Short term negative impact
Working Community	Processing of the waste on site (including dust generation), and handling of hazardous material during reprofiling of the site has potential to impact on human receptors.	Asbestos Construction Management Plan & Construction Environmental Management Plan (CEMP).	None
	The construction phase has potential to cause inconvenience and irritation to workers in the area due to potential noise, dust and traffic generation.	Mitigation Measures outlined in Chapters 8, 9 and 10; including use of licensed transport companies, restrictions on delivery hours, and implementation of a Noise Management Plan and Dust Management Plan etc. Liaison with the Navy, Island Crematorium, POC etc	Slight temporary negative
	Any works required to be undertaken from sea and possible delivery vessels (if materials are transported by sea) have slight potential to conflict with traffic in the channel or local Naval vessel movements.	Limit construction activity to land based access where possible (Chapter 6). This in turn will eliminate as much as possible any potential for conflict. Control of access to site perimeter and foreshore area by boat. Liaison with the Navy.	None
	Possible health and safety impacts on working community at Naval Base and	TMPs, weight restriction on Haulbowline Bridge, liaison with Navy.	None

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
	disruption to Naval traffic. Potential impacts associated with works for this remediation project resulting in sedimentation in the main navigation channel or in the Port of Cork's Cruise Terminal turning circle. Other impacts from sedimentation. Potential impacts to fisheries and Shellfish.	Coastal Process Study (Appendix N) confirmed that no measurable sedimentation is predicted in the main navigation channel or the Port of Cork's cruise turning circle due to the design and construction technologies proposed in Chapter 5 'Project Description' and Chapter 6' Project Construction' respectively. At worst, sedimentation of 50mm is predicted to occur at the mouth of the Naval Basin, however the model is based on conservative parameters and mitigation in the form of sediment control is set out in Chapter 14 'Ecology'. Pre- and post- work bathymetric surveys to be carried out and sedimentation to be removed if necessary. The design and construction technologies proposed in Chapter 5 'Project Description' and Chapter 6' Project Construction' and Chapter 14 'Ecology ' respectively mitigate against impacts to fish and shellfish. Currently no shellfish is collected from CorkHarbour in the vicinity of the site.	None None
Visiting Community (Tourism)	The visibility of stockpiles on site during construction has potential to have minor adverse impact on the experience of tourists and leisure craft users in the area. There is potential for conflict with water based leisure uses.	Max heights and slopes are specified in the application. Stockpiles to be kept away from the highly visible northern coastal side of the site. Liaison with local water sports groups and clubs and organisers of any water based events.	None
Land Use	Construction traffic has potential to have adverse impacts in terms of volumes, noise and perceived safety issues for sensitive land uses in the area, in particular a primary school at Shanbally and the crematorium at RockyIsland.	Mitigation measures outline in Chapter 8 'Traffic and Transport'. TMPs and restriction on haulage route times to avoid school hours and AM peak flows. Liaison with community, schools, Island Crematorium.	Slight temporary impact on crematorium.
Chapter 8Traffic and Transport	During construction there is potential for increased congestion on local road network due to haulage of material.	Based on a worst case (importation of all material) the traffic assessment has recommended avoidance of haulage during Peak AM Hours to avoid congestion at the Shanbally Roundabout which is already at capacity. It is also recommended that the options of barge and backloading is explored further at the detailed design or construction stage once the source of material and quantities become known to reduce HGV movements.	Slight short term.

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
		Proposals to re-use slag if possible should also be explored further to reduce volume of imported material and HGVs. Improvements to access roads and footpaths pre and post construction on the approach road to the Island and on the Island to access East Tip. Efficient operation i.e. clear signage, turning areas, no queuing of HGVs and maintenance of 2 way traffic flows on the bridge. Contractor liaison with school, navy and crematorium to ensure access is not hindered. Project Programme extended to keep volumes of traffic within acceptable limits. Provision of pedestrian crossing in agreement with the NRA on the N28 near the bus stop at Ringaskiddy including a Road Safety Audit if necessary. Preparation of a detailed Traffic Management Plan by the Contractor which will include the following key measures and will be updated continually as the design and construction details are developed further. • Maintenance of haul routes; • Emergency response procedures; • Liaison with local residents, navy etc through notifications on programme etc; • Speed limit restrictions; • Application of maintenance standards to minimise emissions; • Identification of key roles and responsibilities; and • Implementation of best practice guidelines. The TMP should be updated once the source of material and haulage route is known.	

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
Chapter 9 Air and Climate **Construction Dust**	Once construction commences and site clearance, materials handling and processing commences on site, the impact is predicted to increase to a moderate adverse level over the temporary nature of this phase. Once all materials processing on site has been completed and the capping of the East Tip commences, the potential for dust emissions remains. The impacts to air quality during capping are considered moderate adverse during the temporary nature of this phase. The impact of these phases of construction will be mitigated through a detailed series of specified mitigation measures to be adopted by the Contractor during construction (see column two and Chapter 9). While the impacts to air quality from the construction stage of the project are predicted to increase from the existing slight adverse nature of the East Tip (in its current state) to a moderate adverse impact during the mobilisation, construction and capping phases, the net impact of the remediation will be a long-term positive moderate impact with the elimination of the existing source of pollution (i.e. the East Tip slag material).	Prepare Dust Minimisation Plan as part of Construction Environmental Management Plan (CEMP) to include measures such as:- • Regular cleaning / maintenance of site roads. • Restrict use of un-surfaced roads. • Restrict site traffic to 20km/hr speeds. • Watering of site roads, stockpiles etc. as necessary. • Use of wheel wash facility. • Regular inspection / cleaning of public roads. • Materials handling systems and stockpiling to be designed to minimise exposure to wind and limit heights. • During dry periods cease potentially dusty operations during periods of high wind (>10m.s). • Materials handling procedures to minimise potential drop heights. • Water bowsers used across the site as required. • Careful loading of vehicles to reduce risk of spillage. • Maintenance of construction vehicles, plant etc. Adopt monitoring procedures during construction as follows (See Table 17.4 below and Table 9.21 for summary of the proposed monitoring and Figure 9.2 for monitoring locations):- • Monthly dust deposition levels (5 locations); • Daily fine particulate (PM_{10}) (3 locations); and • Real time analyser for fine particulates and metals (Naval Dockyard).	None
Asbestos Risk	There is potential risk from asbestos within ground materials becoming airborne and fibres migrating on and off-site during construction.	An Asbestos Construction Management Plan has been prepared for the construction stage and includes a series of mitigation measures (See Appendix K). All site operatives will be given asbestos awareness training prior to working on site and attend weekly asbestos awareness briefings. Support will be available from a specialist asbestos contractor on a call-out basis if required. All workers will be provided with appropriate PPE (including specialist	None

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
		asbestos PPE) and suitable welfare facilities (no eating, drinking or smoking allowed in asbestos contaminated areas). An asbestos watching brief will be in place during development works. Any materials suspected of containing asbestos will be collected by designated trained handlers, double bagged and disposed of off-site in accordance with regulations. Visually identifiable hotspots will be mapped, the likely source identified and the requirement for additional mitigation will be considered. Employ specified work practices to minimise the potential for asbestos fibres becoming airborne if unknowingly disturbed. Advise site workers of these practices as part of asbestos awareness training. Materials to be crushed and re-used on site will be visually assessed prior to crushing to remove visually evident asbestos containing material. Service corridors or development features that penetrate the proposed capping layer should be over excavated and a marker layer installed to protect potential future ground workers from inhaling any residual asbestos fibres within the re-processed capping layer. Environmental air monitoring to be carried out. Reassurance air tests shall be run at 4 monitoring points within 20m of the working area. Testing will be repeated in the event of wet weather or if the Contractor needs to change his method statement in the course of construction. Personal asbestos monitor air tests to be undertaken.	
Greenhouse Gases	Greenhouse gas emissions could arise from the imported materials (capping materials, etc.) as well as their transport to the site.	$C0_2$ emissions to be minimised by: • Implement Traffic Management Plan to minimise congestion and queuing, reduce distance of deliveries and eliminate unnecessary loads. • Reduce idle times by providing an efficient materials handling plan to minimise the waiting time for loading and unloading. • Turn off engines when not in use for more than five minutes, unless otherwise required for security or functional reasons. • Regular maintenance of plant and equipment.	Overall net positive impact to climate (as a result of enduse of site)

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
		Materials with a reduced environmental impact will be incorporated into the construction design (refer to Section 9.5.3.1). Implementation of an Energy Management System onsite as part of the CEMP (refer to Section 9.5.3.1).	
Odour	There is low potential for odour generation and nuisance to occur during site preparation works as the material on site typically includes solid materials with low capacity to generate odours. The potential for impact then is 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.	Odour Management Plan (OMP) to form part of CEMP. The plan will consider sources, releases and impacts of odour and use these to identify opportunities for odour management. The OMP will also include for the periodic odour audit of the facility by a suitably qualified expert to identify all sources on site together with nature and scale of the odour release and associated construction details. In addition, the plan should include for complaint recording and investigation to ensure that all complaints received at the site are suitably addressed.	None
Traffic	The potential for local air quality impacts to receptors along the N28 due to construction traffic will be negligible and short term.	Regular maintenance of plant and equipment. Implementation of Traffic Management Plan to minimise congestion	Short term Negligible
Chapter 10 Noise and Vibration **Traffic Related Noise**	There will be no significant noise & vibration impact from traffic movements from the proposed development on the local road network and therefore there is no requirement for mitigation measures.	None	None
Construction Related Noise (main site)	Based on a worst-case assessment there is potential for the construction activities at the site to give rise to noise levels above the existing background levels at the nearest properties. The most significant potential noise impact would be experienced at the Naval dockyard workshops which are located close to the subject site. The estimated potential worst-case noise levels would be in excess of EPA and WHO daytime noise level guidance. These are potentially significant negative impacts.	Install temporary noise barrier along the west edge of the subject site for the duration of the works. General Noise Mitigation Measures to be applied to all works: Prepare a Noise Management Plan prior to construction to include detailed programme for construction, information on notifications, contact numbers, contractor appointment, monitoring, contractual conditions and timescales. Elevated ridges proposed for the north and south of the site shall be created at the start of the earthworks stage to act as large noise barrier to	Slight temporary negative impact

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
		noise sensitive receptors. Temporary bunds may also be required to screen construction activities and provide a complete visual screen in the direction of the nearest sensitive properties. Use quietest machinery practicable. Apply Best Practice measures outlined in BS5228:2009 – Noise and Vibration Control on Construction and Open Sites. Noise monitoring shall take place during construction works to ensure compliance with noise level limits set by EPA Waste Licence (See Table 17.4 below for summary of monitoring and Figure 10.1 for monitoring locations). The Contractor shall keep regular contact with the relevant local authorities and personnel at the nearest noise sensitive receptors. A complaints procedure shall be adopted by the Contractor for the duration of the construction works.	
Access Road Construction related Noise	The road construction work from the Haulbowline bridge to the East Tip site may result in additional noise impacts at the naval dockyard workshops located adjacent to these works.	A robust temporary noise barrier should be constructed between the proposed works and these workshops to reduce noise levels from the proposed road works by at approximately 10dB(A).	Slight temporary negative impact.
Footpath Improvement works Noise	Footpath improvement works have potential to generate noise. However in most cases it does not have potential to exceed the noise level increases which will be experienced due to construction activities on the main site. The only instance where the proposed footpath improvement works may increase the overall noise impact is in the case of the National Maritime College buildings.	A robust similar temporary barrier should be placed between the footpath construction works and the National Maritime College building that is adjacent to these works.	Slight temporary negative impact.
Vibration Impacts	The most significant potential source of vibration may be piling. The potential for vibration impacts from construction works and particularly from piling must be considered further at the detailed design	The Naval Dockyard workshops are located very close to the proposed site boundary. Any plans to conduct vibration generating activities in the vicinity of this boundary must be outlined in detail in the Construction Plan and all potential vibration activities must be completed in full collaboration with the Irish Naval Service to ensure no sensitive activities potentially	None.

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
	stage when more precise details are known about the exact nature and locations construction activities such as piling.	taking place in the workshops are detrimentally affected.	
Chapter 11 Landscape and Visual Landscape Character	The proposed works are located directly within the Estuarine Harbour-based Industrial and Maritime Landscape Character Area.	Temporary site compounds and fencing used during the construction phase will be carefully located to avoid unnecessary visual impacts. Construction areas will be kept tidy at all times.	Slight Negative Short Term.
Planning Policy Designations	3 Scenic routes could potentially be impacted by the construction phase. However for all three routes The predicted visual impact for the Scenic Route S51 and S54 is no change. The change in visual resource to S53 is considered to be low. The predicted significance of visual impact is moderate.	Temporary site compounds and fencing used during the construction phase will be carefully located to avoid unnecessary visual impacts. Construction areas will be kept tidy at all times.	Moderate Negative Short Term impact to Scenic Route S53.
Zone of Visual Influence	Overall no significant visual impacts are predicted for residential properties at Monkstown and Ringaskiddy. There is potential for moderate short term visual impacts during the construction stage for harbour users.	Temporary site compounds and fencing used during the construction phase will be carefully located to avoid unnecessary visual impacts. Construction areas will be kept tidy at all times.	There is potential for moderate short term visual impacts during the construction stage for harbour users.
Viewpoint Assessment	There will be a short term impact from views from: Lake Road, Cobh; Cobh Cathedral; High Road, Cobh; Rocky Island; and Ringaskiddy shoreline. There is no potential for impact on views from: Martello Tower, Ringaskiddy; Whitepoint, Cobh; and Diamond Hill, Monkstown.	Temporary site compounds and fencing used during the construction phase will be carefully located to avoid unnecessary visual impacts. Construction areas will be kept tidy at all times.	Short term negative impacts to Viewpoints No. 1, 2, 3, 7 and 8.
Chapter 12 Material Assets **Utilities**	There is potential for utility supply to Haulbowline Island to be interrupted on a temporary basis during construction due to road widening and improvement works.	Identify exact location of utilities prior to construction. Maintain utility supply to Haulbowline Island during construction with use of temporary arrangements where necessary. If short term disruptions to supply are unavoidable to bring new arrangements on line, prior notice will be given to the Irish Naval Service and appropriate times agreed.	None

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
Water Supply	Large amounts of water are potentially required during construction works which will place a large demand on the public supply. The area is well served with water supply however so this is only a slight impact.	The use of water during construction should be controlled and minimised where possible.	None
Lighting	Lighting will be extended to the East Tip during the construction phase. Lighting of the site has potential to cause slight temporary light pollution at night to harbour users.	Night time lighting will only be used where necessary for security and also for safety purposes when works are required in the foreshore to optimise working within the tidal cycle.	None
Irish Naval Service	The construction activities at the site have potential to conflict with Naval operations and / or cause inconvenience.	Close consultation with the Irish Naval Service will be maintained throughout the construction stage to minimise potential for inconvenience.	None
Harbour Users	Works may be required within the sea for the purposes of the PES construction and possible sea going delivery vessels.	Any works will be close to shore, any delivery vessels will be subject to normal seafaring rules and the Contractor will liaise with the Navy and other harbour users to ensure any conflicts in boat movements are avoided.	None
Chapter 13 Soils, Geology and Hydrogeology **Impact on Marine Environment**	Possible disturbance of sediment and release to the marine environment due to works in the foreshore.	Use of protective berms, geotubes, sediment screens, bunds, sheet piling, etc. 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. Sediment monitoring once every 6 months. Continual visual monitoring for turbidity by Environmental Clerk of Works.	Negligible (refer to Chapter 14' Ecology')
Water Quality	To install the PES, there is potential for impacts to receiving water quality in the surrounding marine environment from dissolved phase contaminants present in seepages.	Seepage along the foreshore will be collected and recirculated for infiltration into the waste body at the working face of the construction of the PES. Appointment of Environmental Clerk of Works to oversee the works. Monitoring of marine water quality during construction stage. Water quality monitoring once every two months for the duration of the construction stage.	Negligible.
Impact of Dust and Dissolved Contaminants	Potential for dust dispersion will increase through the construction stages at the material is processed and handled across	Dust Minimisation Plan including all mitigation measures outlined in the Air Quality Chapter (Section 9 of EIS).	None (Refer to Chapter 9 'Air Quality and Climate').

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
	the site through regarding, processing etc.	All construction activities will be conducted in according to strict Health and Safety Procedures in order to minimise risks to from Dust.	
Human Health	Potential impacts to human health through direct contact with exposed contamination on the East Tip	All construction activities will be conducted in according to strict Health and Safety Procedures in order to minimise risks to human health	None
Impacts on Groundwater	Infiltration of surface water into the waste body during construction and collection of marine water seepage and recirculation / infiltration into the waste body, has potential to generate temporary higher groundwater levels in the infiltration areas which could temporarily change groundwater flow directions and contaminant transport on the site.	The relatively high permeability of the waste material will allow recirculated groundwater to dissipate without substantial head build-up. It is also proposed to use several infiltration areas across the site to spread the recirculation and provide infiltration areas in the same zones as where the groundwater seepage has collected. The natural attenuating capacity of the silt alluvium will naturally mitigate any significant vertical downward increase in contaminant transport. Two rounds of groundwater monitoring at key representative locations in the waste and natural geological strata during the course of construction (See Chapter 13 and Summary of Monitoring Table 17.4 below).	Negligible
Fuel Spills	Potential impacts to groundwater and surface water quality from any such significant spillage of fuel for plant and machinery if uncontained.	Environmental management plan for the construction stage which will include specific measures to prevent accidents and mitigate impacts through the use of mobile bunding, spill containment systems, knowledge and awareness and routine auditing and inspection of the construction site.	None
Chapter 14 Ecology **Designated Sites and Sites of National Importance**	Potential for indirect temporary impacts due to hydrological changes, siltation or turbidity during the construction works.	Natura 2000 sites are outside the zone of influence. Coastal Processes Study (Appendix N) showed that sediment deposition will be restricted to the immediate vicinity of Haulbowline Island with a maximum deposition of approximately 50mm in the immediate vicinity of the proposed perimeter area. Increased suspended sediments are likely to be restricted to the area around the East Tip, with maximum increases of 0.5kg/m^3 extending 0.1km and 0.17km to the north and east of the area respectively. In addition robust and effective mitigation measures have been proposed including use of protective berms, geo-tubes, sediment screens, sheet piling, bunds, etc. 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. Sediment monitoring once every 6 months and water quality every 2 months. Continual visual monitoring for turbidity by Environmental Clerk of Works. See also Volume 4 NIS.	None

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
Marine Habitats and Flora	Potential for direct impact through minor loss of intertidal habitat within the vicinity of the site	Habitats are not considered to be of significant ecological value and existing habitats are considered to be degraded. The areas will be sealed during construction and it is expected that infralittoral rock communities will establish on rock armour.	Negligible
	Subtidal habitats in the vicinity of the site are considered to be of ecological value and maybe minimally affected due to localised changes.	The communities in these mixed sediments are robust to localised change in sedimentation, and disturbance and have rapid recovery and re-colonisation times.	Negligible
	Indirect impacts may occur through siltation, changes in flow and turbidity in areas around the site resulting in changes in food sources for benthic invertebrates resulting in changes to community composition.	Use of protective berms, sheet piling or geotubes and or sediment screens or bunds 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. Sediment monitoring once every 6 months and water quality every 2 months. Visual monitoring for turbidity by Environmental Clerk of Works.	None
Non Marine Habitats and Flora	No ecological habitats or species of value identified and no potential for direct or indirect impacts were identified.	None Cork County Council and/or site agent appointed Environmental Clerk of Works to oversee works.	None
Marine Mammals	A number of possible direct impact have been identified to marine fauna including: Submarine acoustic noise disturbance to marine mammals, in particular during the piling activity, if required. Noise and visual disturbance to seals from intertidal activities. Physical disturbance to marine mammals due to construction vessel activity in the area.	Limited works in the foreshore. No physical barrier created to marine species movements. Use of 'Soft Start' measures for piling, if required, to minimise potential noise impacts on marine mammals and fish species. Conducting any piling works in accordance with Draft Guidance on the Minimisation of Man Made Noise. Appointment of an MMO and conducting scans in accordance with the guidance for piling activities. Consideration will be given to the scheduling of the works between the end of May and August, which is a particularly sensitive time for seabirds, marine mammals and fish. Environmental Clerk of Works to oversee works.	Minor Temporary Negative Impact
	Effect of increased suspended sediments and sedimentation on the behaviour of	Robust and effective mitigation measures have been proposed including use of geotextile tubes, sediment screens or other sediment abatement	Negligible

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
	marine mammals during construction works. Indirect effects of prey availability due to changes in the fish and shellfish resources as a result of the proposed construction works	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. Sediment monitoring once every 6 months and water quality every two months. Continual visual monitoring for turbidity by Environmental Clerk of Works.	
Non Marine Mammals	No potential impacts to non marine mammals (including bats and otters) were identified.	None	None
Other Fauna non marine	No direct impacts on other faunal groups such as invertebrates or amphibians are possible as no significant populations occur at the site. No indirect impacts on non-marine fauna species anticipated during the construction works	Environmental Clerk of Works to oversee works.	None
Marine Invertebrates	Potential localised smothering of habitats in the lower shore within sediment abatement measures. Re-suspended site material may include elevated levels of heavy metals or other contaminants whether from the site boundary or sediments in the area. Concentrations are comparable to sediments located in the Cork Inner Estuary and therefore no additional impacts are anticipated. In addition, the contaminants are in most cases likely to remain bound to the particulate matter.	Refer to Appendix N Coastal Process Study Conclusions. Robust and effective mitigation measures have been proposed including use of 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. Sediment monitoring once every 6 months. Continual visual monitoring for turbidity by Environmental Clerk of Works.	Minor localised impact due to losses of benthic marine habitat.
Birds	No potential for direct impacts There are potential for indirect effects to birds through two mechanisms: due to indirect effects of prey availability due to changes in the fish resources as a result of	See above mitigation for marine invertebrates and marine mammals. Environmental Clerk of Works to oversee works.	None

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
	the proposed construction works and through contamination to fish resources as a result of the proposed construction works.		
Fish and Shellfish	Potential for indirect effects of nursery/spawning due to changes in the fish and shellfish resources as a result of the proposed construction works. Indirect effects of reduction in sediment or water quality as a result of the proposed construction works. Introduction of invasive species or anti- bio-fouling contaminants to the area during operation.	See above mitigation for Marine invertebrates and marine mammals, results of Coastal Process Study (Appendix N). Use of geotextile tubes, sediment screens or other sediment abatement measuresin 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. Sediment monitoring once every 6 months and water quality monitoring every two months. Continual visual monitoring for turbidity by Environmental Clerk of Works. Invasive Species Management Plan will be prepared by the Contractor.	Negligible
Chapter 15 Archaeology and Cultural Heritage **Underwater and Intertidal Archaeology**	During any proposed construction in the foreshore there is potential for significant impact on an underwater causeway feature extending from Haulbowline towards Spike Island, stone-built sea walls and unrecorded archaeology.	All ground disturbances within the upper foreshore, inter-tidal, and sub-tidal areas shall be archaeologically monitored during the construction stage. Any underwater archaeological features revealed during construction will be recorded and resolved by the monitoring archaeologist in consultation with the Department of Arts, Heritage and Gaeltacht as necessary.	None
Archaeology (Terrestrial)	None	None	None
Architectural and Cultural Heritage (Terrestrial)	Although not protected there is likely to be a direct impact to all or part of the 'Priests Stairs' which are considered to be of architectural merit. Similarly there may be impacts to steelwork features that are due to be removed from	A measured, photographic and written survey of the steps and sea wall in this area will be carried out prior to the site construction works. This will provide a record of the past. The majority of the features associated with the steelworks have already been removed from the site, it is recommend that prior to site clearance	None

Environmental Chapter & Topic	Potential Impacts during the Construction Stage (including source and scale)	Mitigation and Management Measures	Residual Impact
	the site.	works that a photographic survey of any vestiges of the twentieth century steel works that remain on site e.g. machinery, tracks, cranes etc (e.g. Plates 15.13) is carried out in order to provide a record of the past. If appropriate, consideration for the new-life reuse/recycle or reconstitution of some of the steel features might also be given and used for features/sculptures associated with the landscaping of the site.	

Table 17.3: Summary of Potential Impacts and Mitigation Measures required for the End-Use, Aftercare and MaintenanceStage

Environmental Chapter & Topic	Potential Impacts during the Operational Stage (including Source and Scale)	Mitigation and Management Measures	Residual Impact
Chapter 7 Community and Socio Economic **Resident Community**	The provision of a park at the site will be a significant addition to the amenities of the area with significant positive impacts for local residents. The remediation of a waste site for a recreational end-use will have significant positive benefits in terms of public perception of the area.	None None	Long-term Positive Impact Long-term Positive Impact
Working Community	The working population of the area are likely to make some use of the public park which it a moderate positive impact Increases in passing traffic through Ringaskiddy and Shanbally has potential to have a slight positive benefit on local business, in particular the grocers / newsagents in Ringaskiddy.	None None	Long-term Positive Impact
Visiting Community	Enhanced visual context of the site in particular from Cobh and the sea will have positive implications for tourism. The public park may attract short term use by tourists accessing the Brittany Ferries passenger ferry at Ringaskiddy.	None None	Long-term Positive Impact
Landuse	Enhanced landuse value.	None	Long-term Positive Impact
Chapter 8Traffic and Transport	Traffic congestion and traffic nuisance caused by the end-use, aftercare and maintenance of the site when works are completed is expected to be negligible and temporary, and greatly outweighed by the benefits to the local population of the additional amenity value of the remediated site and improved pedestrian facilities.	None	Overall slight positive impact due to improvement works. Negligible and temporary due to increased numbers to the site.
Chapter 9 Air and Climate	There are no significant impacts to the atmosphere identified when the recreational end-use is established and the aftercare and maintenance of the site are ongoing. In fact it is considered that the remediation project will remove the existing sources of impact on air quality. There is a slight potential for negligible impact due to car emissions from vehicles using the car park.	None	Long term positive impact. Negligible

Environmental Chapter & Topic	Potential Impacts during the Operational Stage (including Source and Scale)	Mitigation and Management Measures	Residual Impact
Chapter 10 Noise and Vibration	No significant impacts identified.	None	None
Chapter 11 Landscape and Visual **Landscape Character**	The greening of the eastern side of Haulbowline Island and removal of the disturbed industrial landscape within its immediate estuarine harbour-based industrial and maritime landscape will have a slight / moderate positive impact.	None	Slight/ Moderate Beneficial Impact
CorkCounty Development Plan Designations	The proposed development will provide a much more attractive backdrop to Cobh which will have an indirect slight positive impact.	None	Moderate Beneficial Impact.
Visual Impact on Residential Properties	There are glimpse views of the site available from Scenic Route S53 as it approaches Cobh town. When operational, the green parkland setting will make a positive visual impact when compared to the current disturbed industrial landscape. This will be a moderate beneficial impact. There will be moderate beneficial impacts on views of the site from residential properties in Cobh.	None	Moderate Beneficial Impact.
Viewpoint Assessment	The proposed development will have a moderate positive impact on views from: Lake Road, Cobh; Rocky Island; Ringaskiddy shoreline; Martello Tower, Ringaskiddy; Cobh Cathedral; and High Road Cobh. There is no potential for impact on views from White Point, Cobh; and Diamond Hill, Monkstown.	None	Moderate Beneficial Impact.
Chapter 12 Material Assets	The provision of a public recreational area at Ringaskiddy is a positive addition to the amenity provision of the area. This park can accommodate passive and active recreation activities as well as hosting local events. The provision of a new football pitch for the Navy is a moderately positive impact.	None None	Significant Positive Impact Moderate Positive Impact

Environmental Chapter & Topic	Potential Impacts during the Operational Stage (including Source and Scale)	Mitigation and Management Measures	Residual Impact
Chapter 13 Soils, Geology and Hydrogeology **Groundwater**	There will be a significant reduction in rainfall infiltration and potential leachate generation through the waste mass due to the emplacement of the low permeability cap, particularly in the centre of the waste mass where tidal effects are smallest. The installation of the perimeter engineered structure will significantly reduce the volume of seawater inflow to the waste during high tide. This structure will also reduce the volume of groundwater discharge from the site during low tide, thereby significantly reducing the flux of dissolved phase contamination emanating from the site. No impact on groundwater quality.	Remediation Solution Groundwater quality monitoring to ensure effectiveness of the solution. Approx. 3 years (see Table 17.5 below)	Negligible to Minor beneficial
Marine Waters	Baseline water quality impacts to the surrounding water body are imperceptible, however the installation of the perimeter engineered structure will significantly reduce the flux of dissolved contaminants into the surrounding marine waters as predicted in the DQRA. Construction of the engineered structure will prevent erosion of the waste material and its release into the surrounding environment.	Remediation Solution Surface water quality monitoring to ensure effectiveness of the solution. Approx. 3 years (see Table 17.5 below)	Moderate Beneficial
Human Health through Direct Contact With Exposed Waste	The capping solution for the waste will break the pathway between contamination and human health (direct contact exposures) enabling the site to be of beneficial use for the community.	Remediation Solution.	Major Beneficial
Human Health through Windblown Dust Containing Contamination	The pathway for existing pollutant dispersion will be severed.	Remediation Solution.	Net Permanent Positive Impact
Chapter 14 Ecology	Without the remediation solution erosive effects on the East Tip could continue causing localised impacts as additional solid waste is eroded from the shoreline and, if allowed to continue, contamination from heavy metals and other elements recorded at the site may be dispersed. The remediation solution will therefore provide a positive impact to the surrounding sediment and faunal communities by providing protection against erosion of the site. Positive impacts to birds due to screening of the southern promontory of the site from the remainder of the site and provision of modified rock armouring along the shoreline to increase its attractiveness as a roosting location for birds and removal of waste metal and other hazards from foreshore.	Ecological enhancement measures associated with the remediation solution.	Net Permanent Positive Impact

Environmental Chapter & Topic	Potential Impacts during the Operational Stage (including Source and Scale)	Mitigation and Management Measures	Residual Impact
	The coverage of the site with topsoil and amenity grassland will provide suitable feeding habitats and perhaps loafing/roosting habitat for a number of bird species such as Oystercatcher. The creation of a wet grassland area will further increase the biodiversity of the site and enhance the attractiveness of the site for birds.		
Chapter 15 Archaeology **Architectural and Cultural Heritage**	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 architectural heritage of the area. In addition the views towards the East Tip from Cobh will be significantly improved.	It is recommended that the history of the site should be communicated to the public in some format such as guide book, information panels and / or smart phone media.	Slight Positive Impact

17.2 MONITORING

This section sets out to identify and summarise specific monitoring activities proposed throughout the EIS required in order to ensure optimal environmental performance throughout the construction phase (Table 17.4) and end –use, aftercare and maintenance (Table 17.5) for East Tip. All monitoring proposals should be reviewed and updated during the detailed design, in consultation with relevant statutory bodies, and be incorporated into the EMP.

Table 17.4: Summary of Monitoring Proposed during the Construction Phase

EIS Chapter	Monitoring Parameters	Location	Frequency	Responsibility
Chapter 9 Air Quality and Climate	The construction contractor will be required to monitor monthly dust deposition levels for comparison with the guideline of 350mg/m^2/day.	Figure 9.2 shows the location for the monitoring locations and Table 9.21 describes them.	Monthly	Project Manager/Contractor. Environmental Clerk of Works to oversee.
	Daily fine particulate (PM_{10}) will be monitored.	At the two existing locations described in Table 9.21 of Chapter 9 as well as an additional monitoring location at Cobh Town Hall. Figure 9.2 Shows the location for monitoring locations.	Daily	Project Manager/Contractor. Environmental Clerk of Works to oversee.
	Fine particulates and metals will be located at monitoring point AA1 (Naval Dockyard) which is to be used as an indicator location for off -site dispersion.	Figure 9.2 Shows the location for the monitoring locations.	Daily (real time)	Project Manager/Contractor. Environmental Clerk of Works to oversee.
	Asbestos	Four monitoring locations with 20m working area. Personal asbestos monitor air tests.	Daily (personal asbestos monitoring)	Contractor to employ Specialist Asbestos Consultant to implement Asbestos Management Measures. Environmental Clerk of Works to oversee.
Chapter 8 Traffic and Transport	Degradation of roads from HGVs	Visual inspects for cracking, potholes etc.	Ongoing during the construction stage.	Project Manager/Contractor. Environmental Clerk of Works to oversee.

EIS Chapter	Monitoring Parameters	Location	Frequency	Responsibility
Chapter 10 Noise and Vibration	Noise	Figure 10.1 Shows the location for noise monitoring.	To be agreed with Cork County Council and the HSE in detailed Noise Management Plan.	Project Manager/Contractor Environmental Clerk of Works to oversee.
Chapter 13 Soils, geology, hydrology and hydrogeology	Groundwater –Waste (See Table 13.24)	Figure 13.11	Twice – months 6 and 12 (See Table 13.24 for parameters).	Project Manager/Contractor. Environmental Clerk of Works to oversee.
	Groundwater – silt Alluvium (See Table 13.24)	Figure 13.11	Twice – months 6 and 12 (See Table 13.24 for parameters).	Project Manager/Contractor. Environmental Clerk of Works to oversee.
	Groundwater –gravel and limestone (See Table 13.24)	Figure 13.11	Twice – months 6 and 12 (See Table 13.24 for parameters).	Project Manager/Contractor. Environmental Clerk of Works to oversee.
Marine Surface Water	Waterquality and Sediment	Figure 13.12	Waterquality- Once every two months for the duration of the construction stage.(See Table 13.24 for parameters). Sediments - Once every 6 months for the duration of the construction stage.	Project Manager/Contractor. Environmental Clerk of Works to oversee.
Marine Sedimentation	Turbidity	N/A	Daily observation during activity only.	Project Manager/Contractor. Environmental Clerk of Works to oversee.

EIS Chapter	Monitoring Parameters	Location	Frequency	Responsibility
Chapter 14 Ecology Marine Mammals	Noise	At any location if foreshore piling activities are undertaken.	30 minute scan pre and during activity. Soft start procedure where possible.	Contractor to employ Marine Mammal Observers. Environmental Clerk of Works to oversee.
Chapter 15 Archaeology and Cultural Heritage Underwater Archaeology	Unrecorded archaeology in the Foreshore	Archaeological monitoring licensed by the Department of Arts, Heritage and the Gaeltacht must be conducted during all seabed and inter-tidal/foreshore disturbances associated with the development.	Ongoing during the construction phase.	Contractor to employ Qualified Archaeologist. Environmental Clerk of Works to oversee.
Health and Safety	Workers PPE	To ensure humans are not exposed to asbestos and dust.	Ongoing during the construction stage.	Project Manager/Contractor. Health and Safety Officer.

Table 17.5: Summary of Monitoring Proposed during End-use, Aftercare and Maintenance

EIS Chapter	Monitoring Parameters	Location	Frequency	Responsibility
Chapter 11 Landscape and Visual	Landscape Management Plan	East Tip	Ongoing.	Licensee
Chapter 13 Soils, Geology and Hydrogeology	Groundwater –waste (See Table 13.1)	Figure 13.11	Bi-annual for 1 year followed by annually for a further 2 years.	Licensee
	Groundwater – silt Alluvium (See Table 13.1)	Figure 13.11	Bi-annual for 1 year followed by annually for a further 2 years.	Licensee
	Groundwater –gravel and limestone (See Table 13.25)	Figure 13.11	Bi-annual for year 1 followed by annually for years 2-3.	Licensee
Marine Surface Water (including measures to address drainage)	Water Quality and Sediment (See Table 13.25)	Figure 13.2	Water and sediment quality quarterly – for 1 year followed by annually for years 2-3.	Licensee
Chapter 14 Ecology (Terrestrial)	Birds to measure effectiveness of enhancement measures.	East Tip	To be agreed with the NPWS- At minimum this will include regular examination (the timeframe to be agreed with NPWS) of the flora species present in the wetland area and monitoring of the numbers of birds roosting along the shoreline of the site by an experienced ecologist.	Licensee

Any additional monitoring commitments as required under the Waste License will also be implemented.

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GLOSSARY

AERMOD Modelling System	A steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain
Ambient Noise	Totally encompassing sound in a given situation at a given time usually composed of a sound from many sources near and far.
Ameliorate	Take measures to reduce a negative impact /effect.
Aquifer	A stratum (layer) of rock which, is permeable or has voids within it, that allows water to be stored or transmitted within it.
Baseline Studies	Work done to collect and interpret information on the condition / trends of the existing environment.
Bedrock	The solid rock lying beneath superficial material such as gravel, soil and vegetation.
Benthic	Describes flora and fauna that live on or in the seabed or lake bottom. Benthic epifauna live upon the seafloor or upon bottom objects and benthic infauna live within the surface sediments.
Bioaccumulation	Occurs when an organism absorbs a toxic substance at a rate greater than that at which the substance is lost.
Biodiversity	The number, variety and variability of living organisms in a particular habitat.
Biotic	Means relating to, produced by, or caused by living organisms.
Carboniferous	The Carboniferous is a geological period and system that extends form the end of the Devonian period, about 359.2 ± 2.5 Ms (Million years ago), to the beginning of the Permian period, about 299.0 ± 0.8 Ma.
Cofferdam	A watertight enclosure pumped dry to permit work below the water level.
Commissioning	The rendering fully operational of a project or process.
Composite Sampling	The formation of a composite sample which is obtained by blending or mixing two or more individual samples.
Competent Authority	This is being taken to refer to any agency or body statutorily charged with making a decision or other determination in respect of an application for a proposed development.
Conceptual Site Model	A conceptual site model represents the characteristics of a site in diagrammatic or written form that shows the possible relationships between contaminants, pathways and receptors (pollutant linkages).
Contaminant	A substance that is in, or under the land and has the potential to cause harm or to cause pollution of the surrounding environment.
Contaminants of Concern	Refer to contaminants which should be considered within future investigations and risk assessments due to the expectation that they are likely to be present in elevated concentrations and therefore this determination indicates that further consideration should be given with respect to future investigations and risk assessments. It has not yet been determined that they are capable of causing risks to receptors that would require remedial action.
Crustacea	Phylum of mostly aquatic arthropod invertebrates (e.g. crabs, lobsters, amphipods, shrimps, isopods).
Cyanide	Cyanide is any chemical compound that contains the cyano group (C=N), which consists of a carbon atom triple-bonded to a nitrogen atom.
Dataloggers	Instruments placed in boreholes that can record frequent measurements of water levels.
Decibel (dB)	The unit of sound pressure level, calculated as a logarithm of the intensity of sound, normally relative to an established reference level.
Decibel A (dB)A	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sound of different frequency (pitch) in a similar way to the human ear.
Development Plan	Development plans are prepared by each Local Authority every 5 years and outline the Council's general policy for the development of the County.

Dioxins and Furans	'Dioxins' is a collective term for the category of 75 polychlorinated dibenzopara-dioxin compounds (PCDDs) and 135 polychlorinated dibenzofuran compounds (PCDFs). Seventeen PCDD and PCDF compounds are likely to be of toxicological significance. The most toxic of these is 2, 3, 7, 8-tetrachloridibenxo-pdioxin (2, 3, 7, 8-TCDD). The toxicity of each compound depends on the number and position of the chlorine atoms within the molecules.
Diversity	Variety of taxa; represented herein by both-species richness (simple count of number of species) and Shannon-Wiener diversity Index (H') – a widely used measure of diversity, providing an integrated index incorporating abundance.
Ecosystem	A community of living things and the environment in which they live.
Enclosure (Archaeology)	Any monument consisting of an enclosing feature such as a bank or a ditch, usually earthen, such as barrows or ringforts. In this report, enclosures are circular or oval unless otherwise stated.
Environmental Impact Assessment (EIA)	The process of examining the environment al effects of development – from consideration of environmental aspects at design stage, through to preparation of an Environmental Impact Statement (EIS), evaluation of the EIS by a competent authority and the subsequent decision as to whether the development should be permitted to proceed, also encompassing public response to that decision.
Environmental Impact Statement (EIS)	A statement of the effects, if any, which the proposed development, if carried out, would have on the environment.
EPA	Environmental Protection Agency. The agency protects the environment through its licensing, enforcement and monitoring activities in Ireland.
EPA EQS AA	Environmental Protection Agency Environmental Quality Standard Annual Average. This means that for each representative monitoring point within the water body, the arithmetic mean of the concentrations measured over a twelve month monitoring period does not exceed the standard.
EPA EQS MAC	Environmental Protection Agency Environmental Quality Standard Maximum Allowable Concentration. This means for each representative monitoring point within the water body no measured concentration exceeds the standard.
Estuarine	Of an area where a river which empties into the ocean; of a bay, influenced by the ocean tides, which has resulted in a mixture of salt water and fresh water.
Eutrophication	An increase in chemical nutrients – typically compounds containing nitrogen or phosphorus – in an ecosystem, and may occur on land or in water.
Fauna	A collective term for the animals of a region.
Fines	Fine particle fractions i.e. grains of sand or silts.
Flora	A collective term for the plants of a region.
Foreshore	Any land covered and uncovered by the flow and ebb of the tide at mean spring tides. The area between mean low water and mean high water. Foreshore is defined under the Foreshore Act as meaning: "the bed and shore, below the line of high water of ordinary or medium tides, of the sea and of every tidal river and the tidal estuary and of every channel, creek and bay of the sea or of any such river or estuary.
Generic Assessment Criteria	Contaminant concentrations values used for comparison purpose to assess risk associated with contaminant concentrations found on site and are derived using non-site-specific information.
Geotextiles	Permeable fabrics which, when used in association with soil, have the ability to separate, filter, reinforce, protect or drain.
Groundwater	Water stored in the soil and rock both above and below the water table.
Groundwater Abstraction	The process of taking water from a ground source, either temporarily or permanently.
Habitat	The dwelling place of a species or community, providing a particular set of environmental conditions (e.g. forest floor).

Hexavalent Chromium	Chromium is a transition metal which exists in the environment in a number of oxidation states ranging from -2 to +6. The CR (III) or trivalent state is the most stable form. Cr (VI) hexavalent chromium is the form primarily used in the manufacture if steel. Both forms are present as cations in solution as well as forming several different oxyanions and oxide or hydroxyl conpounds. In natural groundwaters, trivalent Cr is the prevalent form as hexavalent Cr is readily reduced to the trivalent form. Hexavalent chromium is considered toxic to human health through the inhalation pathway.
Hydrocarbon	A compound containing only the elements hydrogen and carbon. May exist as a solid, liquid or a gas.
ICP	Inductively coupled plasma spectrometry is a technique for elemental analysis which is applicable to most elements over a wide range of concentrations.
Integrated Pollution Control	A system of licensing which covers all emissions to air, water and land, including noise and is intended to minimise the impact on the environment by taking account of pollution that may be transferred from environmental medium to another.
Invertebrates	An animal, such as an insect or a mollusc that lacks a backbone or spinal column.
Leachate	A solution resulting from leaching. As of soluble constituents from soil, landfill, etc., by downward percolating ground water.
Littoral	The zone of the seashore between the high and low tide mark..
Macroinvertebrate	An animal without a backbone large enough to be seen without a microscope.
Mammal	A warm-blooded animal with hair that breathes air, has internal fertilization and nurses its live-borne young.
Millscale	Mill scale is a milling waste generated while rolling the metal in metal extrusion industries.
Mitigation Measures	Mitigation measures are ways to avoid or lessen the negative impact / effects of a project on the environment.
Molluscs	Large group (phylum) of mostly aquatic invertebrates including mussels, snails, octopuses, etc.; soft bodied, often with a hard shell.
Mud Flat	A muddy, low-lying strip of ground usually submerged, more or less completely, by the rise of the tide.
NHWMP	National Hazardous Waste Management Plan
Natura 2000	Identified as sites of Community Importance under the Habitats Directive (candidate Special Areas of Conservation (cSACs) or classified as proposed Special Protection Areas (pSPAs) under the Birds Directive 79/409/EEC.
Natural Heritage Area	Natural Heritage Areas (NHAs) are protected under the Wildlife (Amendment) Act of 2000. Some sites have been fully designated while others are still awaiting designation and are referred to as proposed NHAs (pNHAs).
Non-technical Summary	This document provides an overview of the project for the planning authorities, statutory authorities and members of the public. It should cover all relevant impacts and emphasise the most important issues.
NRA Leachability Tests	A laboratory test derived from the UK's Environment Agency recommended test (R&D note 301). The leaching fluid used in this method is intended to represent materials coming into contact with acid rain. Leaching is carried out by adding to the required sample weight, a volume of water left overnight to attain carbonate equilibrium (pH ~ 5.6) to give a 10:1 ratio of water to soil. The bottle is tumbled at a rate of ~ 0.5 revolutions per minute at room temperature for 24 hours. The resultant leachant can then be analysed for any parameters desired.
Overburden	Describes all soil and ancillary material above the bedrock horizon in a given area.
PAHs	Polycyclic Aromatic Hydrocarbons are chemical compounds that consist of fused aromatic rings and do not contain hetreoatoms or carry substituents. They are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat.
ParticianCoefficent (Kd)	The Kd parameter is a factor related to the portioning of a contaminant between the solid and aqueous phases.

Particulate Matter (PM10)	Particulate Matter (PM) less than ten micrometers ion size (PM10).
Pathway	A route or means by which a receptor can be exposed to, or affected by, a contaminant.
PCBs	Polychlorinated Biphenyls are a class of organic compounds with 1 to 10 chlorine atoms attached to biphenyl which is a molecule composed of two benzene rings each containing six carbon atoms. The chemical formula for all PCBs is C12H10xClx.
Perched Groundwater	A zone of saturation in the waste material / overburden that is discontinuous from the bedrock aquifer.
Phenol	Phenol is both a manufactured chemical and a natural substance. It is a toxic, colourless crystalline solid with a sweet tarry odour.
Pollutant Linkage	The relationship between a contaminant, pathway and receptor.
Pollution	The direct or indirect alteration of the physical, chemical, thermal, biological or radioactive properties of any part of the environment in such a way as to create hazard or potential hazard to the health, safety or welfare of living species.
Polyvalent fishing licence	A multi-purpose licence which entitles the licensed and registered owner, subject to certain conditions and restrictions, to fish for a wide range of species and with a range of fishing gear.
Prescribed Bodies	Bodies that have been prescribed by regulations made by a Minister or other Statutory legislation. In this instance, certain prescribed bodies have been identified under the various governing legislation which must be consulted in the application and EIS, and given the opportunity to make comment thereon.
Prescribed Period	The specified period in which any person, prescribed body, or other party, can make a submission in relation to the application and EIS.
Protected Views	The protected views are identified as “Highly Scenic or Scenic Views” in the County Development Plan.
Quaternary	The Quaternary Period is the geologic time period after the Neogene Period roughly 2.588 million years ago to the present.
Q Rating	A quality rating for watercourses ranging from Q1 to Q5, the higher the rating the better the quality of the water.
Ramsar Site	An area designated under the internationally agreed convention on Wetlands of International Importance, especially as waterfowl sites.
Rating Level L_{ArTr}	The specific noise level plus any adjustment for the characteristic features of the noise..
Receptor	Any element in the environment which is subject to impacts.
Refractory	A refractory is a material that retains its strength at high temperatures.
Residual Noise	The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.
Risk Assessment	An analytical study of the probabilities and magnitude of harm to human health or the environment associated with a physical or chemical agent, activity or occurrence.
Scenic Route	Scenic routes indicate public roads form which views and prospects of areas of natural beauty and interest can be enjoyed. Sightseeing visitors are more likely to be concentrated along these routes.
Screening	The process of assessing the requirement of a project to be subject to Environmental Impact Assessment based on project type and scale and on the significance or environmental sensitivity of the receiving environment.
Scoping	The process of identifying the significant issues, which should be addressed by a particular Environmental Impact Statement.
Seepage	Seepage is where groundwater exits the waste during low tide onto the foreshore.
Soil Guideline Values	Soil guideline values are a series of measurements and values used by the United Kingdom’s Department for Environment, Food and Rural Affairs (DEFRA) to measure contamination of the soil.
Slag	The by-product of smelting ore to purify metals.
Source	A substance that is capable of causing harm.

Special Areas of Conservation	Special Areas of Conservation (SAC) are protected under the European Union (EU) Habitats Directive (91/43/EEC), as implemented in Ireland by the European Communities (Natura l Habitats) Regulations , 1997. Where an area is proposed for this status it is described as being a candidate SAC (cSAC).
Special Protection Area	SpecialProtection Areas (SPAs) are protected under the EU Habitats Directive, which compliments EU Directive 79/409/EEC, The Directive on the Conservation of Wild Birds ('The Birds Directive'), under which the SPAs were initially established.
Stakeholder	Refers to any individual or organisation who has an interest in a project. Examples of stakeholders include: landowners, members of the public, statutory bodies and non-government organisations.
Statutory Body	Government department of public / state company. For example An BórdPleanála and the National Parks and Wildlife Service are statutory bodies.
TA Luft	TechnischeAnleitungzurReinhaltung der Luft is a German air pollution control regulation.
Temporary Working Area	The area along the pipeline which is temporarily used by the developer to facilitate construction. The temporary area is larger than permanent way-leave. Also referred to as (working / pipeline) spread.
Threshold	The magnitude of a project which, if exceeded, will trigger the requirement for an Environmental Impact Assessment to be carried out.
Topographical Surveys	Mapping of land surface shape.
TOX	Contaminants in Soil: Collation of Toxicological Data and Intake Values for Humans (TOX Series)
Total Petroleum Hyrdocarbons	TPH is a term used to describe a large family of several hundred chemical compounds that originally come from crude oil.
VOCs	Volatile Organic Compound(s) are organic chemical compounds that have high enough vapour pressures under normal conditions to significantly vaporize and enter the atmosphere.
Waulsortian Limestone Formation	Waulsortian Limestone consists of poorly bedded, dense, grey mudstone – wackestone and fine-grained packstonegrainstone.
AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
ABP	An BórdPleanála
ACA	Architectural Conservation Area
ACMP	Asbestos Construction Management Plan
AEP	Annual Exceedance Probability
AERMOD	Atmospheric Dispersion Modelling System
AMSL	Above Mean Sea Level
AOD	Above Ordnance Datum
ASL	Above Sea Level
ASTM	American Society for Testing Materials
ATC	Automatic Traffic Count
BAT	Best Available Technique
BGÉ	BórdGáisÉireann
bgl	Below Ground Level
BH	Borehole
BIM	BórdÍascaighMhara
BOD	Biochemical Oxygen Demand (a measure of pollution in the water)
BS	British Standard
BWI	Birdwatch Ireland
CASP	Cork Area Spatial Plan
CCC	Cork County Council
CEMP	Construction Environmental Management Plan
Cd	Cadmium
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research and Information Association
CIT	Cork Institute of Technology

ClAIRE	Contaminated Land: Application in Real Environments
CLEA	Contaminated Land Exposure Assessment
CMRC	Coastal and Marine Resources Centre
CO	Carbon Monoxide
COC	Contaminants of Concern
COD	Chemical Oxygen Demand
CO_2	Carbon Dioxide
Conc.	Concentration
CQA	Construction Quality Assurance
CRTN	Calculation of Road Traffic Noise
cSAC	Candidate Special Area of Conservation
CSM	Conceptual Site Model
CSO	Central Statistics Office
CV-AF	Cold Vapour AutomicFlourescence
DED	District Electoral Divisions
DMRB	Design Manual for Roads and Bridges
DoE	Department of the Environment
DECLG	Department of the Environment, Community and Local Government
DEHLG	Department of the Environment, Heritage and Local Government
DO	Dissolved Oxygen
DQRA	Detailed Quality Risk Assessment
DR	Dilution Required
DWS	Drinking Water Standard
EA	Environment Agency
EAL	Environmental Assessment Level
ECJ	European Court of Justice
EEC	European Economic Community
ED	Electoral Division
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ELIPSE	Environmental Linkages of In-port Ship Emissions of Particulate Matter, their chemical analysis and their effects on health
EMP	Environmental Management Plan
EP	Evening Peak
EPA	Environmental Protection Agency
ERM	Effects Range-Median
EQS	Environmental Quality Standard
ESB	Electricity Supply Board
EU	European Union
FDI	Foreign Direct Investment
FOP	Fractional Organic Content
FPO	Floral Protection Order
GAA	Gaelic Athletic Association
GAC	Generic Assessment Criteria
GCL	Geosynthetic Clay Liner
GEH	Traffic Modelling Formula
GGBS	Ground Granulated Blast-furnace Slag
GHG	Greenhouse Gas
GIS	Geographical Information System
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GPS	Global Positioning System
GSI	Geological Survey of Ireland
GSV	Gas Screening Value
HEFS	High end future scenario
HEL	Higher Explosive Limit
HGV	Heavy goods Vehicle
HAS	Health and Safety Authority
HSE	Health Service Executive

HWM	High Water Mark
HWMS	High Water Mark (Spring Tides)
Hz	Hertz
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
ICP-OES	Inductively Coupled Plasma Optical Emission Spectrometry
ICPSS	Irish Coastal Protection Strategy Study
IFI	Inland Fisheries Ireland
IGVs	Interim Guide Values
IGI	Institute of Geologists of Ireland
IMERC	Irish Maritime and Energy Resource Centre
INS	Irish Naval Service
IPC	Integrated Pollution Control
IPPC	Integrated Pollution Prevention and Control
ISTSM	Irish Seas Tidal and Surge Model
Kd	Patrician Co-efficient
LAP	Local Area Plan
LK	Locally important Karst aquafier
LLDPE	Linear Low-density Polyethylene
LOD	Laboratory Detection Limit
LQM	Land Quality Management
LVIA	Landscape and Visual Impact Assessment
LWM	Low Water Mark
LWMS	Low Water Mark (Spring Tides)
mAOD	Metres Above Ordnance Datum
mbgl	Metres Below Ground Level
MDL	Method Detection Limit
MP	Morning Peak
MRFS	Mid range future scenario
NA	Not applicable
NAD	No Absestos Detected
NAQS	National Air Quality Standards
ND	None Detected (usually refers to VOC and / SVOC TICs).
NDP	National Development Plan
NDP	No Determination Possible
NGR	National Grid Reference
NGO's	Non-Governmental Organisations
NHA	Natural Heritage Area
NHWMP	National Hazardous Waste Management Plan
NIAH	National Inventory of Architectural Heritage
NIS	Natura Impact Statement
NMCI	National Maritime College of Ireland
NMI	National Museum of Ireland
NNG	Night Noise Calculations
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NSS	National Spatial Strategy
OD	Ordnance Datum
OEE	Office of Environmental Enforcement
OELV	Occupational Exposure Limit Values
OPW	Office of Public Works
OS	Ordnance Survey
OSI	Ordnance Survey Ireland
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCOC	Potential / Preliminary Contaminants of Concern
pcu	Passenger Car Unit

PES	Perimeter Engineered Structure
PGL	Priority Geotechnical Limited
PICADY	Priority Intersection Capacity and Delay
pNHA	Proposed Natural Heritage Area
POC	Port of Cork
ppm	Parts per million
PPU	Planning Policy Unit
PPV	Peak Particulate Velocity
PSCS	Project Supervisor for the Construction Stage
PSD	Particle Size Distribution
PSDP	Project Supervisor for the Design Process
QRA	Quantified or Quantitative Risk Assessment
RMPs	(Archaeological) Record of Monuments and Places
Rms	Root mean square
RPS	Record of Protected Structures
RSAs	Road Safety Audit
RTM	Remedial Targets Methodology (developed by the UK's Environment Agency)
SAC	Special Area of Conservation
SGVs	Soil Guideline Values
SI	Site Investigation
SMRs	(Archaeological) Sites, Monuments and Records
SO_2	Sulphur Dioxide
SPA	Special Protection Area
SS	Calibrated against a Single Substance
SSTL	Site Specific Target Levels
SUDS	Sustainable Urban Drainage System
SVOC	Semi-Volatile Organic Compounds
SWRBD	South Western River Basin District
TA Luft	TechnischeAnleitungzurReinhaltung der Luft
TEL	Threshold Effects Levels
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
TOC	Total Organic Carbon
TOMPs Network	Toxic Organic Micro Pollutants Air Monitoring Network
TP	Trial Pit
TPH	Total Petroleum Hydrocarbons
TSP	Total Suspended Particles
UCC	University College Cork
UCL	Upper Confidence Limit
UK	United Kingdom
UK EA EQS	United Kingdom Environment Agency Environmental Quality Standard
USA	United States of America
US EPA	United States Environmental Protection Agency
VDV	Vibration Dose Value
VOC	Volatile Organic Compounds
WFD	Water / Waste Framework Directive
WHO	World Health Organisation
WQS	Water Quality Standard
WYG	White Young Green Environmental (Ireland) Limited
ZVI	Zone of Visual Influence
dB	Decibels (units for measurement of a parameter (frequently sound pressure level) relative to a defined reference level for that parameter). The established reference levels for sound are 20micropascals (in air) and 1micropascal (in water).
G	A gram is one one-thousandth of a kilogram. g/l Grams / litre is a measurement of concentration used to measure how many grams of a certain substance there are present in one litre of liquid.
Kg	A Kilogram is the base unit of mass in the International System of Units. 1Kg is

	1000 grams.
Km	A Kilometre is 1000 metres
L	A litre is a unit of volume. It is defined as special name for a cubic decimetre (1 L = $1dm^3$)
$L\ (A)_{10}$	The noise level is equalled or exceeded for 10% of the measurement period.
$L\ (A)_{90}$	The noise level is equalled or exceeded for 90% of the measurement period.
L_{eq}	The equivalent continuous sound level (Leq) that is the notional steady noise level which, over a given period, would deliver the same amount of sound energy as the actual fluctuating level.
L_{Aeq}	The A-weighted equivalent continuous steady sound pressure level and effectively represents an average level.
$L\ (A)_{10}$	The noise level is equalled or exceeded for 10% of the measurement period.
l/hr	Litre per hour. The SI derived unit for volume flow rate is the cubic metre / second. 1 cubic metre / second is equal to 3.6E+6 litre / hour
m	A metre is a unit of length
mg	Milligram. An SI unit of mass, equivalent to one thousandth of a gram.
mg /kg	Milligram /kilogram is equal to one ppl (see definition of ppm below)
mg /l	Milligram / litre is a measure of density. It is equal to one ppm.
mg / m^3	Milligrams per metre cubed is mass in volume.
ms	Milli-second
mS /cm	MicroSiemens / centimetre
ml	Milimetre is a thousandth of a litre in the metric system.
m/s	Metres per second is an SI derived unit of both speed (scalar) and velocity (vector quantity which specifies both magnitude and a specific direction), defined by distance in metres and divided by time in seconds.
m^2/s	Metres squared per second is the SI derived unit of angular momentum, defined by distance or displacement in metres multiplied by distance again in metres and divided by time in seconds.
N/m^2	One Newton (N) per square metre (m^2) is one Pascal (Pa) and is a unit of pressure. ng/ kg nanogram / kilogram is equal to 1 ppt. (See definition of ppt below)
ng /l	Nanogram / litre is equal to 1 ppt. (see definition of ppt below)
pH	Potential of hydrogen ion activity.
PM_{10}	Particulate Matter (fine airborne particles) less than 10 micrometers in diameter
ppb	Parts per billion denotes one part per 1,000,000,000 parts, one part in 109, and a value of 1 x 10-9
ppm	Parts per million is a measure of concentration that is used where low levels of concentration are significant. The ppm value is equivalent to the absolute fractional amount multiplied by one million (106)
ppt	Parts per trillion is equivalent to the absolute fractional amount multiplied by one trillion (1012)
% v/v	Percent volume per volume describes the volume of the solute in ml per 100ml of the resulting solution.
% w/w	Percentage weight / weight
µg	Microgram is 1/1,000,000 of a gram (1 x10-6), or 1/1000 of a milligram
µg/l	Micro-gram /litre. One microgram of a substance dissolved in each litre of water. This unit is equal to parts per billion (ppb) since one litre of water is equal in weight to one billion micrograms.
$\mu g/m^3$	Micro-grams per metre cubed
µm	Micro-metres

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PLANTING SCHEDULES

Table 1: Proposed grass mix

Amenity Grass Seeding	***Sowing Rate***
Grass for general areas	
(Cobarns Irish Premier Low Maintenance Mixture, as supplied by Cobarns)	
20% Hard Fescue	As per manufacturers instructions
30% Strong Creeping Red Fescue	
15% Smooth Stalked Meadow Grass	
20% Chewings Fescue	
15% Browntop Bentgrass	Total Area: 67365 m2

Table 2: Proposed Ornamental and Native Planting

Woodland Planting: Total Area: 10366m2
Pioneer Species 60% of woodland mix & 40% understorey

Common Name	Botanical Name	Transplanted/Pot Size	Spacing m2	% Mix	Quantity
Hazel	*Corylus avellana*	1/1,40-60cm, B,branched,2 breaks	1m2	6	622
Holly	*Ilex aquifolium*	40-60cm, C, 3L, leaders and laterals	1m2	6	622
Hawthorn	*Crataegus monogyna*	1+1,40-60cm, B	1m2	6	622
Wild Cherry	*Prunus avium*	1+1,40-60cm, B	1m2	6	622
Blackthorn	*Prunus spinosa*	1+1,40-60cm, B	1m2	6	622
Birch	*Betula pubescens*	1+1,60-80cm, B	1m2	10	1037
Alder	*Alnus glutinosa*	1+1,60-80cm, B	1m2	10	1037
Willow	*Salix caprea*	0/1,60-80cm, B	1m2	20	2073
Alder	*Alnus glutinosa*	1+2,100-125cm, B	1m2	10	1037
Downy Birch	*Betula pubescens*	1+2,100-125cm, B	1m2	10	1037
Common Oak	*Quercus robur*	1+2,100-125cm, B	1m2	10	1037

Table 3: Proposed Trees

Common Name	Botanical Name	Transplanted/Pot Size	Spacing m2	Quantity
Common Alder	*Alnus glutinosa*	Semi Mature', 4x, 25-30cm girth, min 450 height,5 breaks, RB	Planting as shown	40
Common Alder	*Alnus glutinosa*	Extra Heavy Standard', 3x, 18-20cm girth, min 450 height,5 breaks, RB	Planting as shown	31
Downy Birch	*Betula pubescens*	Semi Mature', 4x, 25-30cm girth, min 450 height,5 breaks, RB	Planting as shown	38
Downy Birch	*Betula pubescens*	Extra Heavy Standard', 3x, 18-20cm girth, min 450 height,5 breaks, RB	Planting as shown	31
Rowan	*Sorbus aucuparia 'Sheerwater Seedling'*	Extra Heavy Standard', 3x, 18-20cm girth, min 450 height,5 breaks, RB	Planting as shown	6
Scots Pine	*Pinus sylvestris*	Semi Mature', 4x, 25-30cm girth, min 450 height,5 breaks, RB	Planting as shown	44
Scots Pine	*Pinus sylvestris*	Extra Heavy Standard', 3x, 18-20cm girth, min 450 height,5 breaks, RB	Planting as shown	27
Oak	*Quercus robur*	Semi Mature', 4x, 25-30cm girth, min 450 height,5 breaks, RB	Planting as shown	60
Oak	*Quercus robur*	Extra Heavy Standard', 3x, 18-20cm girth, min 450 height,5 breaks, RB	Planting as shown	49
Caucasian Lime	*Tilia x euchlora*	Extra Heavy Standard', 3x, 18-20cm girth, min 450 height,5 breaks, RB	Planting as shown	11

Table 4: Proposed Wetland Mix

Wetland Species Area: 6632m2

Common Name	Botanical Name	Form	Sowing Rate	% Mix
Creeping Bent	*Agrostis stolonifera*	Seed	As per manufacturers instructions	6
Yorkshire Fog	*Holcus lanatus*	Seed		7
Tufted Hair-grass	*Deschampsia cespitosa*	Seed		7
Common Bent	*Agrostis capillaris*	Seed		6
Meadow Foxtail	*Alopecurus pratensis*	Seed		7
Sweet Vernal-grass	*Anthoxanthus odoratum*	Seed		7
Red Fescue	*Festuca rubra*	Seed		6
Meadow Buttercup	*Ranunculus acris*	Seed		6
Devil's-bit Scabious	*Succisa pratensis*	Seed		6
Ragged-robin	*Lychnis flos-cuculi*	Seed		6
Greater Bird's-foot Trefoil	*Lotus pedunculatus*	Seed		6
Yellow Iris	*Iris pseudacorus*	Seed		6
Water Avens	*Geum rivale*	Seed		6
Meadowsweet	*Filipendula ulmaria*	Seed		6
Square-stalked St.John's-wort	*Hypericum tetrapterum*	Seed		6
Fleabane	*Pulicaria dysenterica*	Seed		6

Table 5: Proposed Hedge Mix

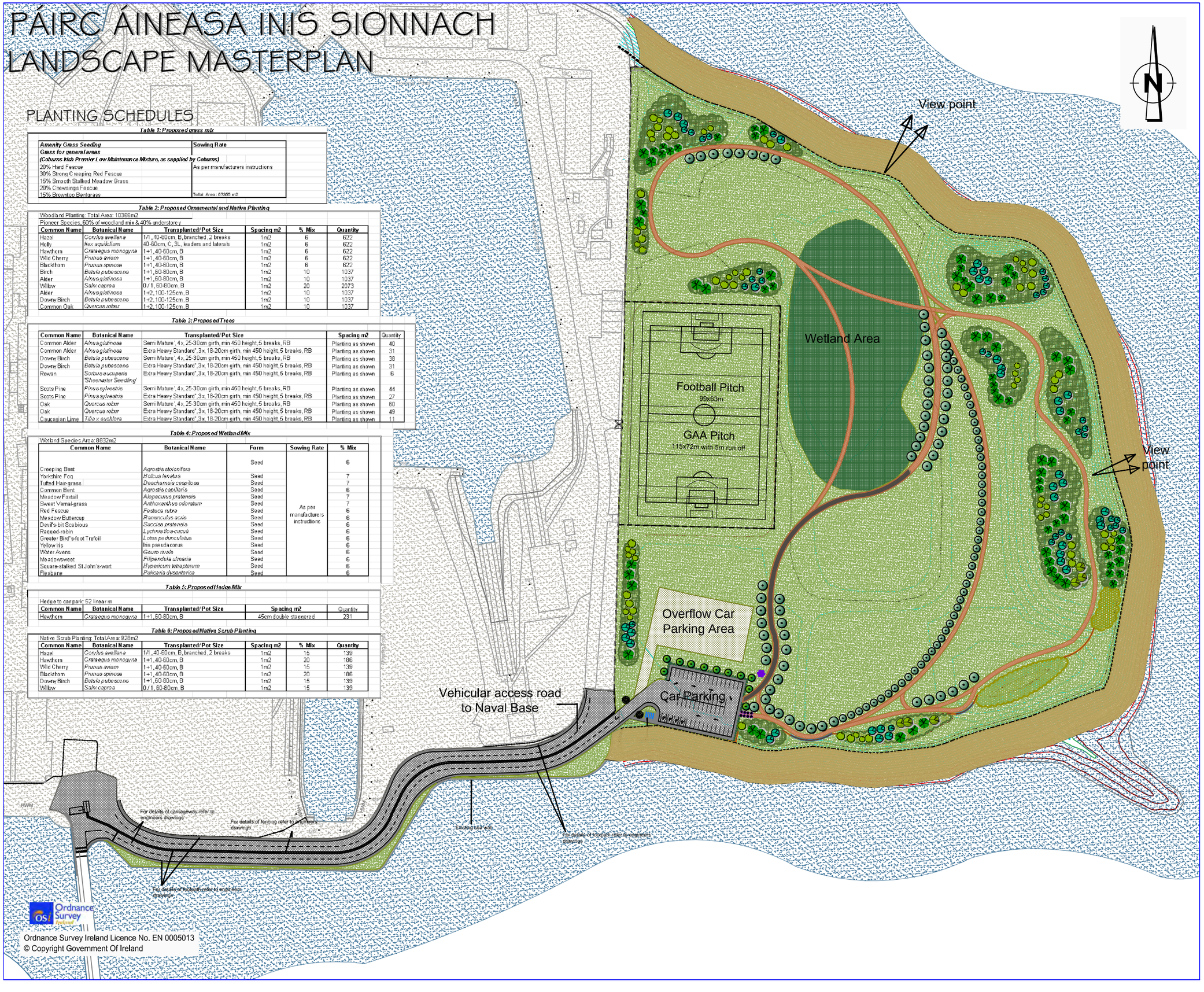
Hedge to car park: 52 linear m

Common Name	Botanical Name	Transplanted/Pot Size	Spacing m2	Quantity
Hawthorn	*Crataegus monogyna*	1+1,60-80cm, B	45cm double staggered	231

Table 6: Proposed Native Scrub Planting

Native Scrub Planting: Total Area: 928m2

Common Name	Botanical Name	Transplanted/Pot Size	Spacing m2	% Mix	Quantity
Hazel	*Corylus avellana*	1/1,40-60cm, B,branched, 2 breaks	1m2	15	139
Hawthorn	*Crataegus monogyna*	1+1,40-60cm, B	1m2	20	186
Wild Cherry	*Prunus avium*	1+1,40-60cm, B	1m2	15	139
Blackthorn	*Prunus spinosa*	1+1,40-60cm, B	1m2	20	186
Downy Birch	*Betula pubescens*	1+1,60-80cm, B	1m2	15	139
Willow	*Salix caprea*	0/1,60-80cm, B	1m2	15	139



KEY: GENERAL

- Proposed Grassed Areas (Refer to Table 1)
- Reinforced grass area — Tarmac Netpave Geosynthetics Ltd,Blackwater Trading Estate, The Causeway, MALDON, CM9 4GG +44 (0) 1621 874200
- Proposed Resin Bound Gravel Path 2.0m and 3.0m widths
  - 25mm Wearing Course
  - 50mm Binder Course
  - 150mm Granular Sub Base (Type 3)
  - Layer of Tensar Geogrid TX170
  - Variable depth Granular Sub Base (Type 3)
  - Layer of Tensar Geogrid TX170 and Protection Geotextile
  - Edging: Precast Concrete Country Kerb, 'dished' flush (width x height x length) : 125 x 150 x 915mm. Kerb of 15 m or less. To BS EN 1343:4 Series 1100 Vol.1 Specification for Highways
  - Note: full construction make-up to continue under kerbline and apron 250mm beyond to reduce/combat uneven settlement
- Proposed Resin Bound Gravel Path 3.0m width as make up as above with low level (solar panelled)lighting set in path staggered at edges
- Proposed Ornamental and Native planting (Refer to Table 2 and Sheet 2 of 5.7)
- Proposed Native scrub planting (Refer to Table 6 and Sheet 2 of 5.7)
- Proposed Trees (Refer to Key: Tree Species, Table 3 and Sheet 2 of 5.7)
- Proposed Wetland Areas (Refer to Table 4 and Sheet 2 of 5.7) Location and area TBC
- Proposed Double Staggered Hedge to car park (Refer to Table 5 and Sheet 2 of 5.7)
- Proposed Football/ GAA Pitch
- Proposed 1.4m high chestnut pale fencing to prevent pedestrian and dog access to Oystercatcher roosts (Refer to Sheet 1 of 5.7)
- Proposed 3.0m maximum height security fence to Football/ GAA pitch with gate to Naval Base (Refer to Sheet 1 of 5.7)
- Proposed bird viewing screens 1.8m high timber close boarded fence with sliding pane to permit viewing (Refer to Sheet 1 of 5.7)
- Proposed entrance features in steelwork maximum height 5m (Refer to Sheet 1 of 5.7)
- Existing naval base
- Proposed Cycle Stands Sheffield Type Cycle Stands (Refer to Sheet 1 of 5.7)
- Electrode from arc furnace clean treated and erected as bollards at footpath entrance
- Industrial plant feature focal point shot blasted 'Blacksmith's Hammer'
- Proposed gate for access from the Naval Base to the sports pitch only
- Proposed Perimeter Engineered Structure rock armour refer to engineers drawing for details

KEY: TREE SPECIES

- *Alnus glutinosa* (Common Alder) 'Semi Mature'
- *Alnus glutinosa* (Common Alder) 'Extra Heavy Standard'
- *Betula pubescens* (Downy Birch) 'Semi Mature'
- *Betula pubescens* (Downy Birch) 'Extra Heavy Standard'
- *Sorbus aucuparia 'Sheerwater Seedling'* 'Extra Heavy Standard'
- *Pinus sylvestris* (Scots Pine) 'Semi Mature'
- *Pinus sylvestris* (Scots Pine) 'Extra Heavy Standard'
- *Quercus robur* (Oak) 'Semi Mature'
- *Quercus robur* (Oak) 'Extra Heavy Standard'
- *Tilia x euchlora* (Caucasian Lime) 'Extra Heavy Standard'

Title
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Figure 5.7

File Ref : MCE0734 Figure 5.7
Date : October 2013 Rev : F02

East Tip Remediation Project

EAST TIP REMEDIATION PROJECT

RPS