



**OFFICE OF CLIMATE,
LICENSING &
RESOURCE USE**

INSPECTOR'S REPORT ON A LICENCE APPLICATION

TO: DIRECTORS

FROM: Brian Meaney - Environmental Licensing Programme

DATE: 4 June 2014

RE: Application for a waste licence from the Minister for the Department of Agriculture, Food and the Marine in relation to the East Tip, Haulbowline, Co. Cork.
Waste licence application register number **W0289-01**.

1 Application Details

Licence application received:	14 November 2013
Environmental Impact Assessment:	See section 7 of this report. An EIS was provided with the application.
Classes of activity under Waste Management Act 1996, as amended (P = principal activity)	3 rd Schedule: D1(P), D4, D7, D13 and D15 4 th Schedule: R4, R5, R12 and R13
Category of activity under First Schedule to the EPA Act 1992, as amended	None
Third party submissions:	Two
Site inspection:	12 December 2013

2 Applicant and facility - summary

Applicant:	The applicant is the Minister of the Department for Agriculture, Food and the Marine. The site is currently owned by the Minister. On behalf of the Minister, the licence application was prepared by Cork County Council and a large team of specialist consultants.
Type of facility:	The site is classified as a hazardous waste landfill. It was originally developed as a disposal site, however it will not operate as a waste facility. The objective of the project is to remediate the waste

	disposal site.
Description of site:	<p>The East Tip is 9 hectares in area and makes up the eastern one-third (approximately) of Haulbowline Island. The East Tip is surrounded on three sides by Cork Harbour. The western boundary of the East Tip is formed by the historic seawall of the Naval Dockyard against which the waste was deposited.</p> <p>Haulbowline Island is located in Cork Harbour. It is accessed via a 400m bridge from Ringaskiddy, built in the 1960s, that also traverses Rocky Island on which operates a crematorium.</p> <p>The Irish Naval Service is located on the western one-third of Haulbowline Island. The Irish Steel (Irish Ispat) steelworks was located in the middle part of the island and has now been largely dismantled. This part of the island remains undeveloped and is subject to ongoing site investigations pending remediation. Further east is the Naval Dockyard, built on reclaimed land on the Spit Bank (muddy sand and gravel to the east). The East Tip is located to the east of the dockyard, also on the Spit Bank.</p> <p>The town of Cobh is located some 700m from the East Tip across Cork Harbour. The town overlooks the island.</p> <p>Spike Island is located less than 500m from the East Tip and is currently being developed for tourism.</p> <p>See Figure 1 and Figure 2 below for location context.</p> <p>The remediation of the East Tip will result in the development of a public park with access for pedestrians, cyclists and motor vehicles during daylight hours. Public access routes to the park will be separated from the island's Defence Forces facilities.</p>
Main classes of waste in the East Tip:	<p>The East Tip is comprised of waste that was deposited on shallow sediments (the Spit Bank) to form a landmass. An estimated 650,000m³ (1.3-1.7 million tonnes) of waste was deposited. Based on site surveys carried out since closure, the principal waste types are as follows (with estimated percentage of total):</p> <ul style="list-style-type: none"> • Slag (63.52%) • Millscale (13.4%) • Refractories (15.28%) • Scrap metal (6.65%) • Sludge (0.99%) • Furnace dust, C&D waste, refuse, topsoil (0.16%) <p>Approximately 9% of the waste at the East Tip is classified as hazardous waste, some of which is asbestos. Whilst there might be 'hotspots' of hazardous waste within the waste body, hazardous waste is for the most part thought to be dispersed throughout the waste body as a whole.</p> <p>Figure 3 shows a sample of the types of waste at the East Tip.</p>

<p>Activities and processes:</p>	<p>The remediation project will involve the construction of:</p> <ul style="list-style-type: none"> • a Perimeter Engineered Structure around the perimeter of the site, and • an engineered cap and surface water drainage system on the surface of the remediated site. <p>This will comprise the permanent disposal by landfill of the deposited waste. Some waste at the facility, principally non-hazardous slag, will be reused in the engineering works in order to minimise the importation of material from off the island.</p> <p>Construction will take approximately 18 months and this schedule is subject to:</p> <ul style="list-style-type: none"> • suitable materials becoming available for construction purposes, • tidal cycles (for work on the foreshore), and • inclement weather. <p>Some 15-20 workers will be employed during the construction phase of works. The remediated site will be subject to ongoing monitoring, inspection and aftercare procedures.</p> <p>The conditions of the licence will cover all construction and aftercare phases of the works.</p>
<p>Permissions required:</p>	<p>Under the ECJ ruling on case C-494/01, the State is required to remediate the site to ensure compliance with the Waste Framework Directive. The State agreed that the site would be regularised by way of waste licence application, planning application and, if needed, foreshore consents.</p> <p>An application for planning permission was made to An Bord Pleanála. Planning permission was granted with conditions on 1 May 2014 following an oral hearing held on 19 March 2014.</p> <p>The site boundary for planning permission is larger than the waste licence application – see Figure 4. The application for planning permission provides for all permanent and temporary works associated with the remediation project including the creation of a recreational end-use, access roads, public roads and pathways beyond the East Tip boundary.</p> <p>The waste licence application boundary covers only the extent of remedial works to the East Tip itself.</p> <p>Foreshore consent will be sought for all permanent and temporary works associated with the remediation of the foreshore. All such works are within the planning and licence application boundaries.</p>
<p>Public information on the development:</p>	<p>Cork County Council maintains a website at www.corkcoco.ie/haulbowline and presents latest developments as well as technical reports. All information related to the waste licence application are presented at www.epa.ie. All information related to the planning application are presented at www.pleanala.ie.</p>



Figure 1 Aerial view of Haulbowline island (source: EIS, DQRA, Figure 3)

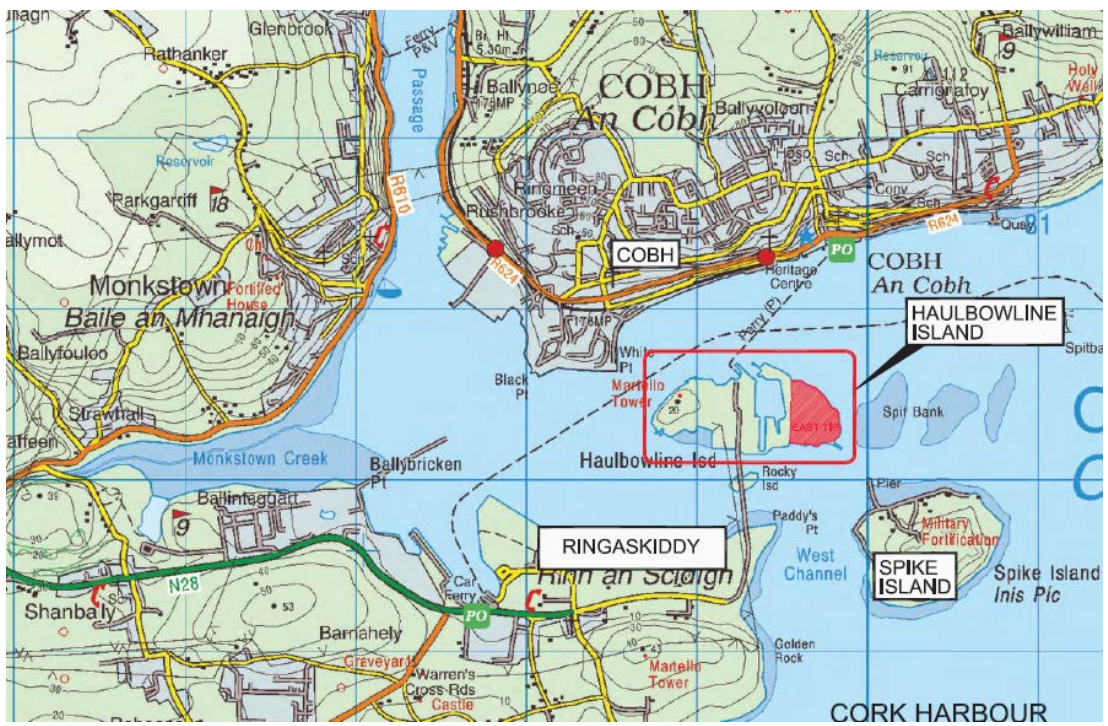


Figure 2 Location of Haulbowline island in Cork Harbour (source: EIS, figure 1.1)



Figure 3 Sample snapshot of waste on the East Tip, showing rubble and scrap metal and mounds of steelworks waste in the background (Source: EPA)

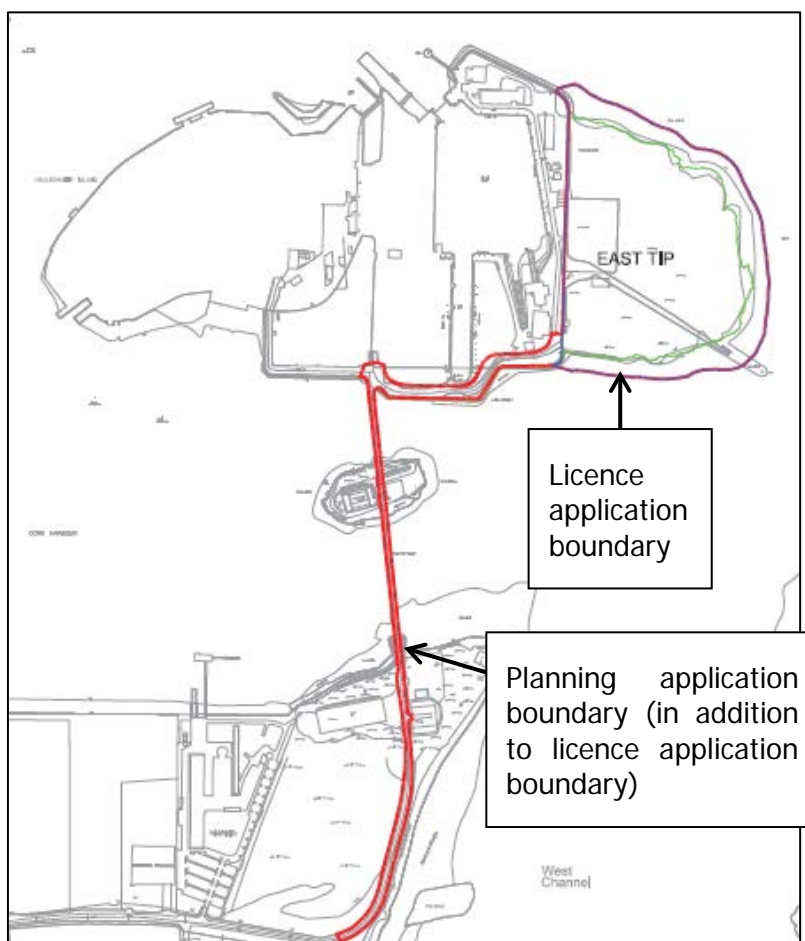


Figure 4 Planning and licence application boundaries (source: EIS figure 1.7)

3 Operational Description

3.1 Brief history of activities at the East Tip

Naval operations have existed on Haulbowline since the 18th century. The naval dockyard was built between 1865 and 1894 using stone quarried on the island itself and imported from the mainland.

A steel works operated on the island from 1938 until 2001. The factory was in State ownership until 1996 when it was sold and became Irish Ispat Ltd. A receiver was appointed to this company in June 2001 and steel production ceased. An IPC licence was subsequently issued by the EPA but the liquidator applied to the High Court in 2002 to disclaim the licence and this was allowed by the Court in 2004. The IPC licence has no status and, to all intents and purposes, does not exist.

Construction of the East Tip commenced in the early 1960s. It was constructed by the deposit of steel works waste against the sea wall at the east of the naval dockyard. The eastern stretch of the sea wall is now buried beneath the waste. Main operations at the East Tip ceased in 2001. Some waste from the demolition of the steel works was deposited there in 2005 and 2006. Figure 5 shows the progression and rate of growth of the East Tip over the decades.

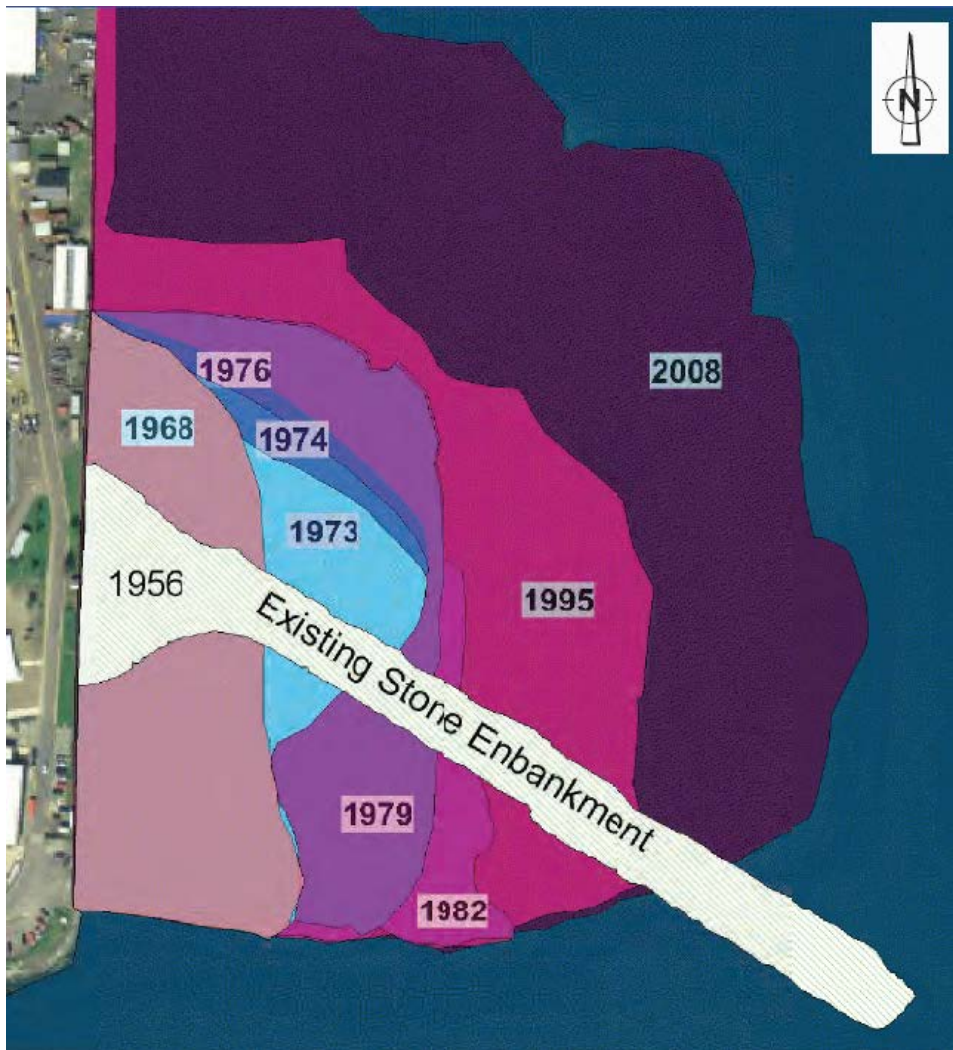


Figure 5 Historic progression of the East Tip 1956-2008 (source: EIS, figure 1.5)

A football pitch was reclaimed from the East Tip in 1984 by the Naval Service. The pitch is within the proposed waste licence boundary and will be subject to remediation along with the remainder of the site before being returned to use as a pitch.

The waste at the East Tip is up to 11m in depth and sits on the muddy sandbanks of Cork Harbour (the Spit Bank). The waste is deeper in the centre and to the east and shallower along the western boundary. The exposed sides of the waste are subject to coastal erosion. Some waste is on the foreshore and all such areas of waste are included in the licence application boundary.

At very high tide, some flooding of the East Tip takes place. This was mitigated in 2013 by the closing of some breaches in the sea wall, however flooding due to high tides and storm surges was reported in the press in early 2014. The prevention of future flooding forms part of the proposed remediation strategy.

3.2 Overall strategy to remediation

At the outset it is worth noting that the environmental investigations and risk assessments carried out at the East Tip have demonstrated the site currently poses a relatively low level of risk to human health and the environment. In its present condition however it poses an ongoing and unacceptable risk to site visitors and ecological receptors in Cork Harbour. The purpose of the remediation works is to fully address the residual risks and ensure that the site can be used safely as a public amenity and not pose a risk to the surrounding environment.

There are two principal elements to the proposed remediation of the East Tip. Firstly, a low permeability cover or cap will be placed *over* the waste to prevent:

- the ingress of rainwater into the waste, and
- contact with the waste by users of the East Tip post-remediation.

The cap will be part of an overall parkland development. It will also manage the discharge of rainwater via a network of drains, wetlands and swales to Cork Harbour.

Secondly, a permeable Perimeter Engineered System will be installed *around* the waste to:

- reduce the hydraulic connectivity (i.e. flow of water) between the waste and Cork Harbour, and
- reduce the contaminant flux (i.e. the movement of contaminants) flowing out of the waste into Cork Harbour.

Rock armour facing will be placed outside the Perimeter Engineered Structure and will limit coastal erosion.

The following alternative approaches to managing the waste at the East Tip were considered:

1. Do nothing – leave the waste in place: This was ruled out as unacceptable due to ongoing health risks to site visitors, risk of dust emissions and potential for water pollution.
2. Remove all materials from the East Tip: This was ruled out as impractical, technically challenging and environmentally and socially disruptive in terms of having to excavate, manage and transport some 650,000m³ of waste (including hazardous waste) to alternative disposal sites.

3. Treat the waste in-situ using stabilisation/solidification techniques: This was ruled out as prohibitively expensive and more than is necessary to achieve the objectives of the project.
4. Install a low permeability cap and perimeter system: Containment, the preferred approach.

For the planning and waste licence applications, the remediation solution was designed in outline to allow for any potential impacts to be identified and assessed in the Detailed Quantitative Risk Assessment (DQRA). The project will be subject to detailed design once all authorisations are obtained. The outline design sets out the parameters and limitations for the necessary works and allows for alternatives to be proposed at detailed design and implementation stages. These parameters and limitations are as set out in the licence application, EIS and Recommended Decision (RD).

An Environmental Clerk of Works will be appointed by the licensee and this person will be responsible for ensuring the efficacy of measures put in place during construction works for the protection of the environment and the prevention or minimisation of emissions.

3.3 Remediation

The Detailed Quantitative Risk Assessment provides a generic framework for the remediation of the site. An engineered capping system is to be installed to break the pathway associated with risks to human health and reduce the infiltration of rain water. A Perimeter Engineered Structure will slow the movement of contaminated groundwater from the waste to Cork Harbour and prevent the erosion of waste into the Harbour. The Perimeter Engineered Structure will have maximum permeability of $1 \times 10^{-5} \text{m/s}$ and this level of permeability is sufficient to reduce to negligible levels the theoretical impact of dissolved phase contaminant discharges to the Harbour.

In outline, the following are the main elements of the remediation project:

- Existing structures and scrap metal will be removed from the site.
- The surface will be reprofiled to achieve the design formation levels and contours.
- The Perimeter Engineered Structure will be constructed.
- The engineered cap will be constructed.
- The surface water drainage system will be installed.
- The landscaping (planting) and end-use elements (e.g. carpark, paths) will be completed.

Once installed, the remediation solution will require no active systems for ongoing operation. There will be no ongoing requirement for energy or works in the management of the remediated site. Long term settlement/compaction of the waste and underlying alluvium is not expected to any significant degree. Visual checks will be required periodically to ensure the ongoing integrity of the solution post-construction. Intervention is envisaged only in the event of damage.

The applicant proposed normal operating hours for construction works. It may be that the construction contractor will choose to exploit tidal cycles to facilitate work on the foreshore. Such work will lead to extended and overnight operating hours in discrete areas of the perimeter for discrete periods of time. As proposed in the EIS,

the timing of such work will be subject to agreement by the Agency and this is facilitated in the proposed **condition 1.6** of the RD.

3.3.1 Removal of structures and scrap

It is estimated that up to 10,000 tonnes of scrap metal might be recoverable from the East Tip. The amount of metal recovered will depend on the market value at the time of works and on the grade of the scrap. A stockpile of millscale (iron oxides residue from hot steel rolling, estimated 400m³) will also be recovered for use off-site if market value and demand is adequate at the time of works. At this time, it is not anticipated that other materials will require off-site disposal or merit off-site recovery. Any such materials uncovered during construction will be dealt with in accordance with a Construction Environmental Management Plan, the preparation of which is a requirement under **condition 2** of the RD.

3.3.2 Reprofiling of the site to create formation level contours

Waste will be moved and reprofiled to address the stockpiles and irregular ground surfaces and create a landform more suited to the installation of the cap and the creation of a recreation area. The extent of cut and fill will be optimised to minimise the import of additional fill material from off the island. Excavation will principally take place in the elevated areas in the east of the site and the majority of filling works will take place in the north-central area of the site where there is currently a depression. The use of rockbreakers and machinery and the movement of waste has the potential to create noise and dust emissions.

3.3.3 Perimeter Engineered Structure

On the three seaward sides of the East Tip, a 900m long Perimeter Engineered Structure (PES) will be constructed. There will be some waste¹ on the foreshore that will be left outside the PES and this will be covered by rock armour to limit erosion. Removing this waste would require extensive foreshore excavation works and this could cause significant environmental pollution. The DQRA found that this waste does not pose a risk of environmental pollution to the marine or terrestrial environment. Coastal process modelling demonstrates that the better environmental option is to leave this foreshore material in situ. It is oxidised and inert and, in places, covered by sediment and colonised by marine fauna.

The seaward PES will most likely consist of an engineered berm, wedge or trench, or a combination of these. It will be constructed of engineered fill and will be 0.5 to 1.0 metre thick. The side slope will be 1:3, unless the detailed design requires otherwise. The top height will be 3.5mOD. On top of this, the engineered cap (minimum 1.3m) will be integrated into the PES and rock armour applied. The total height of the structure is predicted to be adequate to minimise tidal inundation under a worst case future scenario. The base of the PES will key into the lower permeability alluvium layer that underlies the East Tip.

On the western side of the East Tip, where the 19th century sea wall slopes outwards to its base and forms the boundary of the waste deposit, the PES will be constructed 10m in from the top of the sea wall. This approach to the works will leave a certain

¹ The waste is predominantly slag. Metal pieces, refractory brick, construction and demolition waste and tyres were also encountered.

amount of waste between the PES and the sea wall but will avoid any impact on the sea wall itself. The PES along this boundary will be some 350m long and, subject to detailed design, will consist of a 1m wide trench filled with engineered fill to a minimum 4m depth.

Overall, it is estimated that 5% of the total amount of waste in the East Tip will remain permanently outside the PES.

The PES outline design is reflected in **conditions 3.14** and **3.15** of the RD and variation in the detailed design is provided for.

3.3.4 Impermeable cap and drainage

It is envisaged that the engineered cap will consist of the following (from top to bottom):

- subsoil and topsoil: one metre thick (including topsoil at minimum 150-300mm) to support landscaping; on
- a drainage layer: geocomposite or 300mm drainage stone, including a network of field drains where these are required to augment the stability of the cap; on
- a barrier layer: 600mm of clay or a low permeability liner (e.g. LLDPE) or a geo-composite clay layer to limit the infiltration of rainwater into the waste body; on
- a regulation layer: 300mm of fine material (sand, silt or clay) to provide an even surface for the barrier layer.

This cap design is reflected in **condition 3.16** of the RD and variation in the detailed design is provided for. Some 9 hectares of cap will be required.

Rainwater falling on the surface or percolating down to the sub-surface drainage layer will be collected in a number of discrete drainage networks (including contour drains, swale and wetland area) and discharged to Cork Harbour via diffuse drainage channels. Two emergency overflows will be provided as point discharges from the drainage system.

3.3.5 Use of existing materials as a resource at the facility

To conserve natural resources and minimise the movement of waste within the site, it is proposed to use existing materials as follows:

- the existing stockpiles will be used to create higher ground within the parkland and to provide shelter from the wind;
- the existing waste will be used in the construction of the Perimeter Engineered Structure and as fill, avoiding the importation of material from off the island.

Where necessary, slag will be processed using on-site crushers and screens as well as stabilisation agents to render the material suitable for use as engineering material in the Perimeter Engineered Structure or elsewhere as fill. A magnet will be used in the process to maximise metal recovery from recovered slag.

Condition 2.2.2.3 of the RD requires that criteria governing the use of recovered slag and other waste are established as part of the Construction Environmental Management Plan. The applicant proposed monitoring every 500m³ batch of

recovered slag for its chemical and geotechnical properties and this is reflected in **Schedule C.4 Waste Monitoring** of the RD. The criteria will be set at detailed design stage and will need to be agreed by the Agency under condition 2.2.2.3.

3.3.6 Import of new materials

Some 35,000 tonnes of rock armour and 45,000m³ of inert engineered fill material are required for the construction of the Perimeter Engineered Structure. As mentioned above, slag will be used in construction of the PES, where appropriate, to minimise imports of engineered fill.

3.4 Decommissioning

There will be none, other than demobilising the works infrastructure upon completion.

4 Emissions

The East Tip has been studied extensively by agents of the State since its closure in 2001. Most recently in 2012-13, for this application, extensive site investigations and assessments were carried out including:

- sampling and testing of all waste types at the site,
- sampling and testing of geological strata beneath the site,
- investigation and sampling of groundwater within and beneath the waste in geological strata,
- sampling and testing of water in Cork Harbour,
- sampling and testing of sediments adjacent to the East Tip.

A Detailed Quantitative Risk Assessment (DQRA) was conducted to address the source-pathway-receptor linkages at the site. The DQRA concluded that, in its present form, the East Tip and its emissions present an ongoing risk to site visitors and ecological receptors in and around Cork Harbour and recommended that remedial works are necessary to address the risks. The proposed restoration of the site will mitigate emissions to the extent that environmental pollution will not be caused and no risk will be presented to site visitors.

The following sections consider environmental emissions in more detail.

4.1 Air

There is considerable data on ambient air quality on Haulbowline Island and its vicinity¹, including:

- multi-year monthly dust deposition measurements (201 measurements) at two locations on Haulbowline Island (one adjacent to the East Tip, the second 350m away) and one location in Cobh: Results, 6 exceedences of dust deposition limits;
- multi-year monthly PM₁₀ measurements at the same two locations on Haulbowline: Results, all within air quality standards;

¹ As summarised in chapter 9.3 of the EIS.

- July-September 2008: occupational exposure survey at 10 locations on the East Tip for inhalable/respirable dust, heavy metals, respirable crystalline silica and asbestos: Results, all detected materials were below 8-hour occupational exposure levels, some materials/metals were not detected (including asbestos).
- July-September 2008: ambient air quality survey for dust deposition, PM₁₀, heavy metals and dioxin/furan at locations at the East Tip, the Naval base, Cobh and Ringaskiddy. The following results are noteworthy: For a number of heavy metals, readings were higher at the Dockyard than the other locations. Arsenic was above the WHO guideline for the protection of human health at all locations. One dust deposition sample (of 4) taken on the East Tip breached the standard, with another approaching it.
- ECLIPSE particulates study (2007-2009) in Cork Harbour. All PM_{2.5} measurements taken were within limit values. Chemical analysis of the particulate matter indicated their source to be mainly marine aerosols and combustion activities. Cadmium and chromium particles showed higher concentrations at Haulbowline than Tivoli Docks in Cork City suggesting re-suspension of dust on the East Tip.

Overall, air quality monitoring shows no significant air pollution concerns attributable to the East Tip, however the risk of contaminated windblown dust remains as long as the waste on the East Tip is exposed.

The AERMOD air dispersion model was used to calculate the potential impact of the East Tip (existing, during works and aftercare) on 5 local sensitive receptors, as follows:

1. Naval dockyard (on the north of the island, just outside the East Tip boundary)
2. Naval accommodation unit (on the southwest of the island, 600m west of the East Tip boundary)
3. Cobh Town Hall (800m north of the East Tip)
4. Cobh West (1,000m west of the East Tip)
5. Ringaskiddy (1,600m south-west of the East Tip)

Five phases of development were considered in the model, and the results are summarised in Table 1. Emission factors for construction sites were taken from USEPA guidance.

Table 1 Summary of conclusions drawn in the air dispersion model

Phase of development	Potential impact (worst-case scenario)
<p><u>Phase 1</u>, existing East Tip as is, no construction activity.</p> <p>Modelled as a single (dust generating) stockpile over 9 hectares.</p>	<p>All 1-hour levels at the sensitive receptors are within guidelines for protection of human health.</p> <p>All annual averages at the sensitive receptors are within statutory limits and guidelines for protection of human health and vegetation.</p> <p>Predicted annual averages for dioxin/furan are low when compared to established rural background</p>

Phase of development	Potential impact (worst-case scenario)
	<p>values.</p> <p>Based on the modelled data, the applicant predicts a <i>slight adverse impact</i> over the long term (>15 years).</p>
<p><u>Phases 2 and 3</u> (months 1-9), demolition, site clearance, re-grading and reprofiling of waste, creation of stockpiles, construction and importation of topsoil.</p> <p>Phases 2 and 3 were combined for modelling.</p> <p>Waste excavation activities, bulldozers operating, crushing and screening waste, activity on unpaved areas/roads, coastal works underway.</p> <p>Unworked areas were modelled as a single stockpile as per phase 1 above.</p> <p>Modelling assumes works are carried out:</p> <ul style="list-style-type: none"> • in an uncontrolled manner, • with no mitigation measures. 	<p>All 1-hour levels are within guidelines for protection of human health except total dust, PM₁₀ and PM_{2.5}. Dust and PM₁₀ exceedences are seen at all but the most distant receptor (Ringaskiddy). PM_{2.5} exceedence is seen at all 5 receptors.</p> <p>Some metals values are 30-90% of the limit/guideline value.</p> <p>All annual averages are within statutory limits and guidelines for protection of human health and vegetation except nickel and manganese which are slightly exceeded at the Dockyard (receptor closest to the East Tip).</p> <p>Other metals and particulate values are compliant but elevated.</p> <p>Predicted annual averages for dioxin/furan are high, decreasing at more distant receptors.</p> <p>These model findings indicate the need for mitigation measures to prevent the generation of dust emissions at source (see below for details of proposed actions). With mitigation measures and monitoring in place, as described above, the applicant predicts a <i>moderate adverse impact</i> over the 9 months of works.</p>
<p><u>Phase 4</u> (months 10-18), capping works, placement of liners and cover materials, placement of soils.</p> <p>No further processing of materials.</p> <p>Unworked areas were modelled as a single stockpile as per phase 1 above. The unworked areas (of exposed waste) will gradually decrease in phase 4 as the cap is applied.</p> <p>Modelling assumes works are carried out:</p>	<p>All 1-hour levels are within guidelines for protection of human health except total dust, PM₁₀ and PM_{2.5}. Particulates and PM₁₀ exceedences are seen at all but most distant receptor (Ringaskiddy). PM_{2.5} exceedence is seen at all 5 receptors.</p> <p>The predicted impact from particulates is predicted to be greater than phase 2/3 because there will be more machinery operating.</p> <p>The impact from metals is predicted to be lower than phase 2/3 because the only source of dust emissions is windblown material from the site surface (and therefore similar to phase 1) whereas, in contrast, there will be mechanical handling of waste in phase 2/3.</p> <p>All annual averages are within statutory limits and</p>

Phase of development	Potential impact (worst-case scenario)
<ul style="list-style-type: none"> • in an uncontrolled manner, • with no mitigation measures. 	<p>guidelines for protection of human health and vegetation. Results are similar to phase 1.</p> <p>Dioxin/furan impacts are low and similar to phase 1.</p> <p>These model findings indicate the need for mitigation measures to prevent the generation of windblown dust emissions at source. With mitigation measures and monitoring in place, as described above, the applicant predicts a <i>moderate adverse impact</i> over the 9 months of capping works.</p>
<p><u>Phase 5</u>, end-use and landscaping</p>	<p>No residual impact predicted on air quality. The risk of dust emissions from topsoil will reduce quickly as vegetation grows.</p> <p>A <i>long-term positive moderate impact</i> is predicted because of the elimination of the existing source of air pollution.</p>

The predicted impact on the Cork Harbour SPA is negligible due primarily to the distance to this receptor. This is described further in the Appropriate Assessment in section 6 of this report.

A range of measures are proposed to reduce dust emissions and mitigate their impact including:

- road cleaning and speed limits;
- dampening of roads, working areas, dusty stockpiles and vehicle loads;
- use of wheelwash;
- limitation of stockpile height to reduce exposure to wind;
- cessation of certain operations during high winds;
- minimisation of drop heights;
- water misting on crushers and screening machinery;
- crushers and screening machinery will be moved closer to the waste to minimise waste movement.

Condition 2.2.2.3 of the RD reflects the EIS and requires a dust emissions minimisation and management plan to be prepared. **Condition 5.9** states that dust emissions shall not be allowed to impair amenities or the environment beyond the site boundary. A detailed monitoring programme is proposed in the EIS and this is reflected in **Schedule C** of the RD.

Asbestos is known to be present in the waste and is very dispersed at concentrations estimated to be 0.003-0.006%. Health and safety legislation requires action to reduce exposure of asbestos to employees and the actions proposed at the East Tip will also reduce windblown environmental emissions of asbestos fibres. The

mitigation measures proposed are broadly similar to those for dust emissions management as described above. **Condition 2.2.2.3** of the RD reflects the EIS and requires an asbestos management plan to be prepared.

Naturally occurring methane (ground gas) is generated in certain locations in the alluvium underlying the waste. Currently this gas vents to atmosphere and post-construction will vent through the Perimeter Engineered Structure. No buildings are proposed as part of the remediation project. In the event that the contractor for the construction works proposes any temporary buildings to facilitate the works, **conditions 3.21** and **5.8** set out the limitations for buildings construction and allowable gas levels.

4.2 Emissions to groundwater and the marine environment from the waste

The existing environment

The Waulsortian limestone that makes up the original Haulbowline Island is classified as a Locally Important Karst Aquifer (Lk). The aquifer beneath the East Tip is however of limited value due to its saline nature. The groundwater beneath the island is downgradient of any terrestrial groundwater and this is an important consideration with respect to the risk posed by potentially contaminated groundwater within the aquifer beneath the East Tip.

The groundwater in the natural strata beneath the East Tip is in direct continuity with the water in Cork Harbour. It is not a usable resource. The impermeable cap over the waste will prevent the ingress of rainwater. The low permeability of the Perimeter Engineered Structure will limit the ingress of seawater. The overall objective is to reduce the leaching of contaminants from the waste and their movement to the Harbour and the groundwater beneath the waste.

Table 2 summarises the geological setting upon which the East Tip sits. The silt/marine alluvium is of fine grain size and low permeability and provides attenuation of dissolved phase contaminants in groundwater that vertically infiltrates it from the much more permeable waste above.

Table 2 Summary of geological units beneath the East Tip

Material	Thickness in metres (approximate range beneath the East Tip)	Average permeability (calculated from rising and falling head tests ¹)
Waste	3-11m, shallowest towards the west of the site.	184m/d (2.1×10^{-3} m/s)
Silt/marine alluvium	6-15m	0.15m/d (1.8×10^{-6} m/s)
Clay	Not uniformly present	-
Sand and gravel	2-19m (base not proven at thickest location).	3.9m/d (4.6×10^{-5} m/s)

¹ On the waste only, particle size distribution was also used in the calculation of average permeability.

Limestone bedrock	Top of bedrock encountered between 24m and 43m. Base not proven.	2.26m/d (2.6×10^{-5} m/s)
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Groundwater levels measured in the body of the waste show that the waste is in a perpetual state of hydraulic interaction with the tidal waters of Cork Harbour. There is not in fact a water table within the waste, in the traditional understanding of land-based groundwater. In fact, a substantial part of the waste is subject to water levels that rise and fall in response to the tides in Cork Harbour. Approximately 65% of the waste is below mean sea level. Thus a significant portion of the waste goes through wetting and draining cycles according to the tides. The tide does not however flow freely into the waste. Rather, there is a time lag in the rise and fall of water in the waste that prevents the water levels in the waste from ever being anywhere near as high or low as the tide in the Harbour. The less permeable underlying alluvium also confines water within the waste and adds to the time lag in its draining during low tide. The influence of the tide varies through the waste. Level fluctuations as high as 2.5m are seen at the periphery of the waste but only 0.5m in the interior of the waste.

Due to the confinement and attenuation provided by the low permeability alluvium beneath the waste, the lateral migration of contaminated groundwater into Cork Harbour, under the influence of the tidal cycle, is the predominant groundwater migration pathway.

Baseline contamination

In detailed studies of the contaminants in the waste and their environmental impact, a list of "contaminants of concern" was drawn up, as follows:

Arsenic	Benzo[a]pyrene	Anthracene
Cadmium	Aluminium	Fluoranthene
Lead	Chromium (total)	pH
Nickel	Chromium (VI)	Manganese
Vanadium	Copper	Benzo[k]fluoranthene
Zinc	Mercury	Ammoniacal nitrogen

The contaminants are observed in the waste and in the alluvium beneath the waste. The contaminants are also observed in the groundwater in the waste, the alluvium, the sand and gravel and the bedrock. Chemical concentrations in the natural strata were generally found to decrease with increasing depth and were much lower than in the overlying waste. Figure 6 illustrates the data for chromium and its occurrence in the waste and the underlying strata. This is typical of similar plots presented in the EIS for zinc and arsenic and suggests that only limited downward migration of contaminants is occurring.

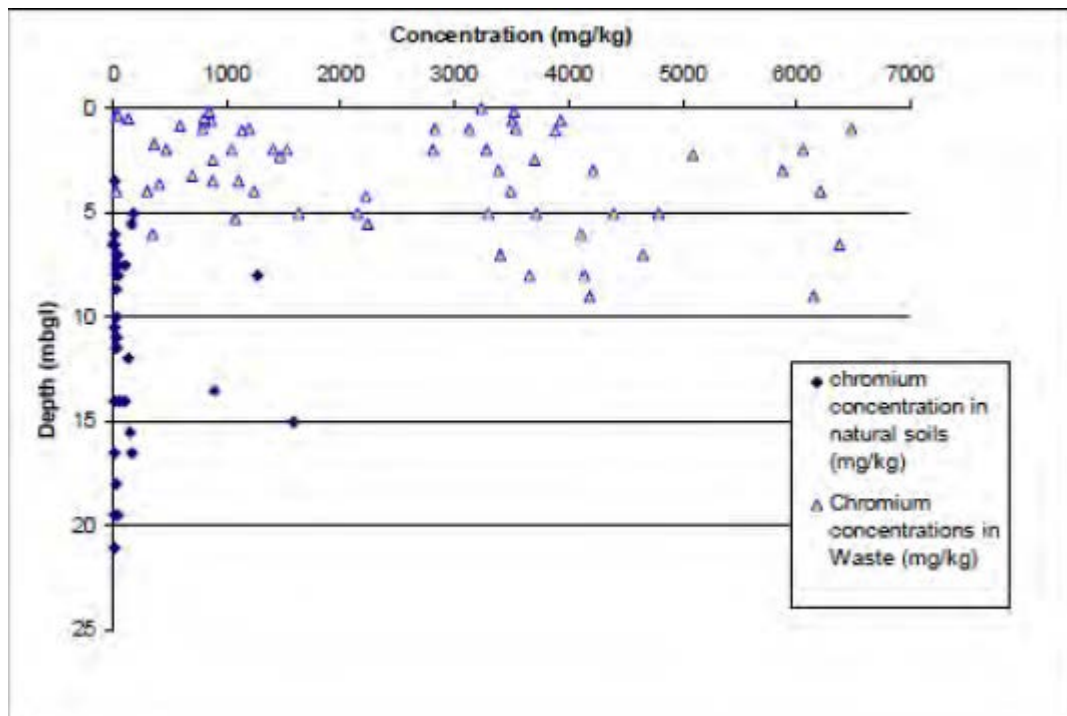


Figure 6 Concentration of chromium in waste and natural strata as a function of depth

Notwithstanding the presence of the contaminants of concern in the natural strata and the groundwater, only a relatively small number of dissolved phase contaminants actually emerge from the site as seepages along the foreshore and at concentrations in the groundwater that exceed the water quality standards. In fact, none were observed in the most recent sampling in November 2012 and not all have been observed in all seepages. Modelling carried out in the DQRA predicts, theoretically, that only chromium VI and manganese might be present in seawater, following dilution of seepages, at concentrations that exceed water quality standards at distances up to 25m and 10m from the shoreline respectively. The actual fact is that these compounds have not been detected in seawater samples at concentrations that exceed the water quality standard. It is concluded that the leaching of contaminants from the waste into the dissolved phase is low and the effect of dissolved contaminants on the surrounding seawater negligible.

Detailed Quantitative Risk Assessment (DQRA)

The DQRA itself is a detailed document presented as an appendix to the EIS. It is possible to present only a snapshot of its content and conclusions in this report. The DQRA is a distillation of very large amounts of data on:

- the waste itself, its volume, characteristics and nature;
- the natural geological and hydrogeological environment;
- the marine environment; and
- their interactions.

Overall, it presents a detailed study of the theoretical and actual impact of the waste on the water (groundwater and marine) environment of which it is part.

An initial Conceptual Site Model (CSM) was developed early in the DQRA and amended over time as analysis and modelling was completed. The CSM examines and graphically illustrates the relationship between the **source** of contamination, the **pathway** (mechanism) by which receptors can be exposed to contaminants and the **receptor** (the component/person at risk of exposure). A complete pollutant linkage through the source-pathway-receptor chain must be present before a risk (of adverse effects from contaminants) can be realised. Figure 7 below illustrates the conceptual site model and the source-pathway-receptor linkages as they exist today. The pathways to human receptors and the water environment (marine and ground) are generally open and unrestricted.

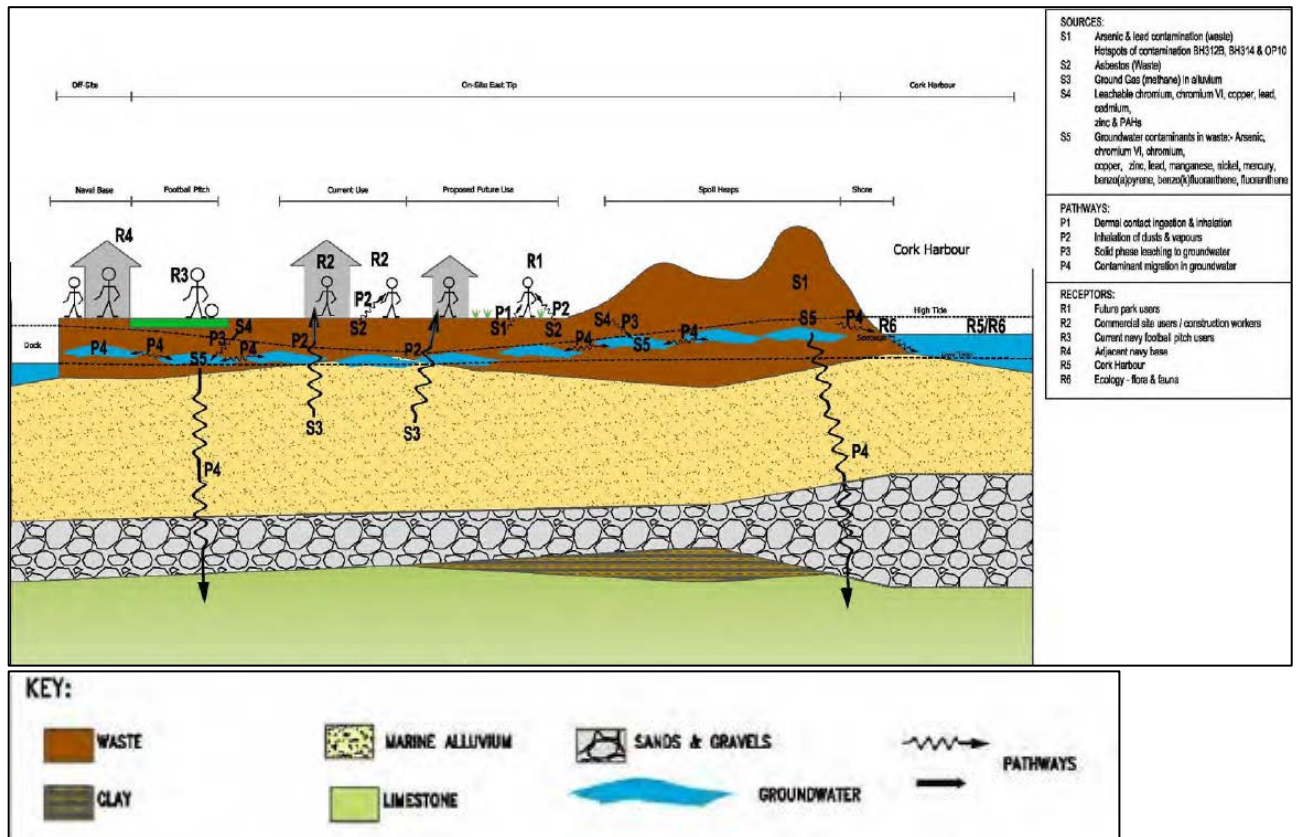


Figure 7 Initial Conceptual Site Model - current situation (source: EIS, Figure 13.9)

Figure 8 illustrates the predicted conceptual site model post-works after a successful remediation project. The pathways are closed or controlled such that there is no impact on human receptors and the water environment.

The construction of the Perimeter Engineered Structure with a maximum permeability of $1 \times 10^{-5} \text{m/s}$ will significantly reduce the tidal influence on groundwater in the waste. Sensitivity analysis in the DQRA shows that the contaminant flux to Cork Harbour is more dependent on the hydraulic conductivity of the waste than any other factor. Reducing the lateral hydraulic conductivity of the waste where it meets Cork Harbour will remove any predicted impacts on the seawater immediately adjacent to the site and beyond. The proposed permeability of the Perimeter Engineered Structure is 100 times less than the average permeability of the waste mass. It will therefore limit the extent of tidal inflow and, importantly, the outflow (seepages) from the waste, thus reducing the predicted movement of dissolved

phase contaminants to Cork Harbour to insignificant levels that will not cause water quality standards to be breached.

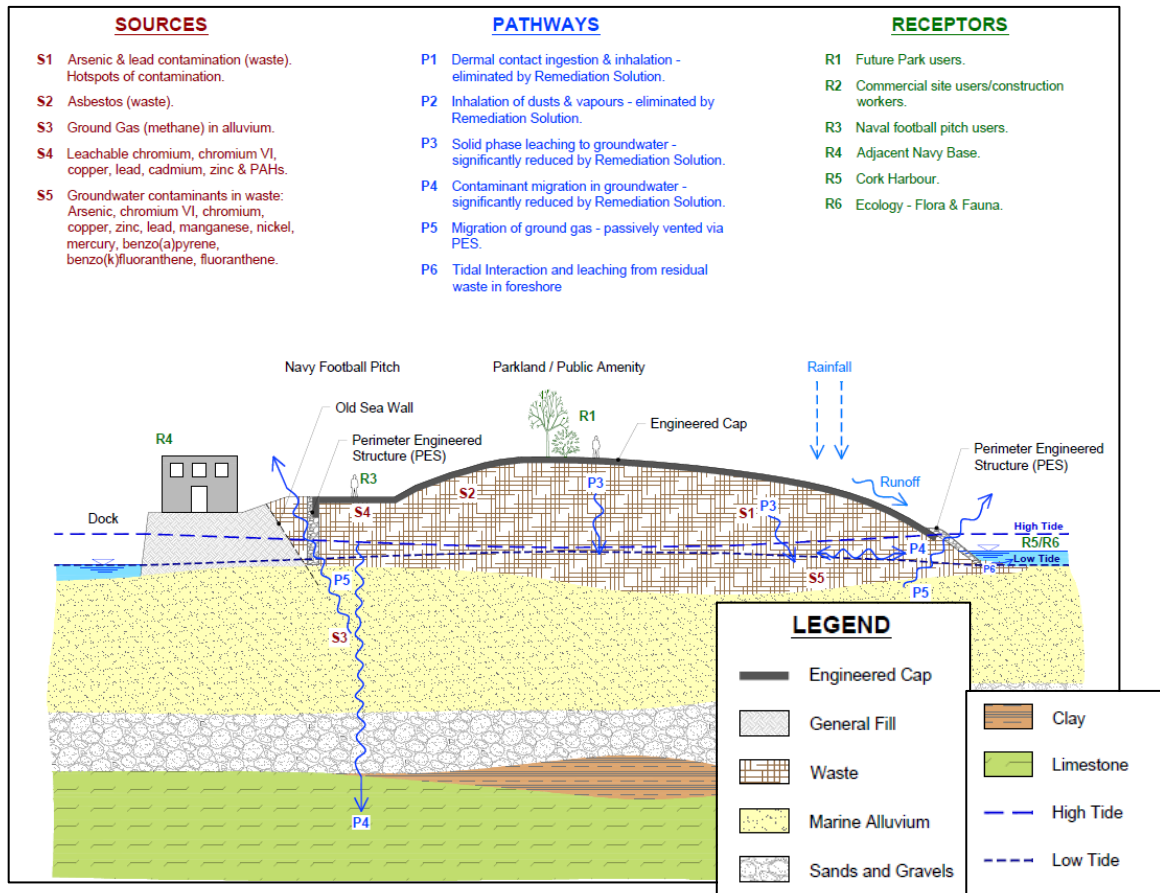


Figure 8 Revised Conceptual Site Model – end-use for the site (source: EIS, Figure 13.10)

The construction of the engineered cap will isolate the waste from people using the remediated parkland. The cap will reduce the infiltration of rainwater and reduce the amount of water present in the waste, particularly in the areas not wetted by tidal inflow. The actual extent of wetted areas will be reduced as a result of the Perimeter Engineered Structure and its restriction of tidal inflow.

The reduced introduction of water into the waste will reduce the infiltration of contaminated groundwater into the underlying alluvium. The contained waste body is expected to become a more reducing environment, resulting in lower chromium VI concentrations.

There will continue to be waste on the foreshore outside the Perimeter Engineered Structure, as described above. Modelling has predicted that surface water quality within 10m of the shoreline will be within water quality standards. This modelling is based on conservative factors and assumptions. As mentioned earlier in this section on page 17, theoretical contamination of Cork Harbour has not been borne out by actual measurements. To minimise erosion of this waste on the foreshore, it will be capped by rock armour.

During the reprofiling of the waste, it may be necessary to backfill areas of the East Tip that are below the naturally varying water table within the waste. In order to minimise the new mobilisation of dissolved phase contaminants, the backfilling, if not

using inert materials from off the island, will be completed using less leachable waste (i.e. slag) available on the island. As mentioned above and specified in **condition 2.2.2.3** of the RD, the licensee is to develop criteria governing the use of recovered slag and other waste for this and other uses.

A detailed water monitoring programme is proposed in the EIS and this is reflected in **Schedule C** of the RD. The list of parameters for monitoring is restricted to those that have already been detected in groundwater, surface water or leachate.

4.3 Emissions to the marine environment from construction works

The risk of emissions of waste and/or marine sediment into Cork Harbour during construction work on and near the foreshore is high. The applicant has set engineering parameters in the EIS to limit and control such emissions and contractors working in this area will be obliged to observe these limitations. For example, temporary structures, in the form of berms and/or barriers, will be established to contain the waste and foreshore sediment and prevent their emission into the broader waters of Cork Harbour. Work will be undertaken from the landward side and in the dry to the extent possible whilst observing tidal cycles.

Condition 2 of the RD requires a surface water management plan to be prepared as part of the Construction Environmental Management Plan. The EIS contains comprehensive proposals and limitations in this regard. **Condition 6.8** of the RD requires that all reasonable steps are taken to prevent or minimise emissions into the marine environment. The exceedence of EQSs for Cork Harbour water quality (**condition 5.4**) is to be treated as an incident.

4.4 Storm water runoff after construction

For the purposes of storm water runoff and collection post-construction, the facility is divided into zones. Most storm water will drain to a wetland area to be constructed in the north-central part of the site. The wetland will overflow to a diffuse outfall located outside the Perimeter Engineered Structure. The western part of the site will drain to a swale running northwards along the western boundary. The swale will discharge via a second diffuse outfall. Emergency overflows (point discharges) will be provided at each diffuse outfall in case of excess flow over design capacity. To the east of the site, runoff from raised ground will be collected in contour drains and will discharge diffusely over the Perimeter Engineered Structure.

Stormwater emissions post-construction will be uncontaminated as they will have had no contact with the deposited waste beneath the engineered cap. **Condition 5.5** sets a trigger level for suspended solids for storm water discharges via the two diffuse outfalls and associated emergency overflows at SW7 and SW8. **Schedule C.3** proposes regular visual inspection of the outfalls and quarterly monitoring for suspended solids.

4.5 Noise

A noise survey was carried out in accordance with the Agency guidance document NG4 to characterise the worst-case scenario regarding noise emissions during the construction phase of works. The studied scenario, at its simplest, involves all possible vehicles, plant and machinery in operation at the facility at the same time and at the site boundary. Clearly, in reality, this will not happen. The impact at 18 sensitive receptors was calculated on the Naval base, the National Maritime College and the closest residences in Ringaskiddy and Cobh. The predicted noise at the

receptors was in the range 45-98dBA, depending on distance, the closest being the Naval dockyard workshop at 10m and the furthest being Ringaskiddy at 1,340m. Thus the construction activities have the potential to cause noise levels considerably above background at the nearest sensitive receptors.

A number of mitigation measures are proposed in the EIS, including:

- a noise management plan (proposed in **condition 2.2.2.3** of the RD as a noise and vibration minimisation and management plan) that will deal with timing of works, minimisation of noisy work close to the site boundary and collaboration with neighbours;
- limitation on operating hours (**condition 1.6** of the RD);
- consultation with regulatory authorities and residents prior to commencing night-time work on the foreshore;
- erection of a temporary noise barrier along the western boundary with the Naval dockyard;
- early construction of elevated areas of the final design, to act as a noise barrier to sensitive receptors to the north and south of the East Tip; and
- use of on-machine noise reduction equipment and selection of quiet machines.

In addition, **condition 6.10** of the RD requires a noise survey to be carried out during night-time operations at relevant monitoring locations unless otherwise agreed by the Agency.

The most significant potential source of vibration at the facility is piling, and it will only be known at detailed design stage whether piling will be required as part of the construction works. Structural damage to buildings is not expected if vibration levels are less than 5mm/s. The noise and vibration minimisation and management plan will ensure that, at detailed design stage, the potential for vibration emissions will be assessed and minimised.

Once construction works are completed, there will no noise emissions from the facility.

5 Use of Resources

Fuel will be stored on-site for machines. Mains electricity and water will be available from existing supplies to the island. The applicant has estimated that the use of material resources at the East Tip (quarried materials, plastic, transport) will result in the emission of 17,899 tonnes CO₂-equivalent of greenhouse gases.

6 Habitats Directive (92/43/EC) & Birds Directive (79/409/EEC)

There are two European sites in the vicinity of the proposed facility, as follows:

- Cork Harbour Special Protection Area (SPA) [site code 004030] designated under the EU Birds Directive (79/409/EEC and 2009/147/EC). The SPA is comprised of several non-contiguous areas around the harbour. The closest elements to Haulbowline are at Lough Beg 1.4km to the south and Monkstown Creek 2.2km to the west. The SPA comprises most of the main intertidal areas of Cork Harbour. Salt marshes are scattered through the site and these provide high tide roosts for birds. Cork Harbour is an internationally

important wetland site for wintering wildfowl. Qualifying interests for the SPA includes a list of 22 wintering bird species in addition to the common tern, great crested grebe, cormorant, black-headed gull and common gull.

- Great Island Channel candidate Special Area of Conservation (cSAC) [site code 001058] designated under the Habitats Directive (92/43/EEC). The cSAC is located 4.2km north of Haulbowline. The main habitats of conservation interest are the sheltered tidal sand and mudflats and Atlantic salt meadows. The site is extremely important for wintering waterfowl. The main land use within the site is oyster farming but the greatest threat to its conservation significance come from road works, infilling, sewage outflows and marina developments. Qualifying interests for the cSAC are mudflats and sandflats not covered by seawater at low tide and Atlantic salt meadows.

For both sites, the conservation objectives include maintaining the favourable status of the qualifying interests, maintaining the extent, species richness and biodiversity of the sites and establishing effective liaison and co-operation with landowners, legal users and relevant authorities. The SPA and cSAC are illustrated in Figure 9.

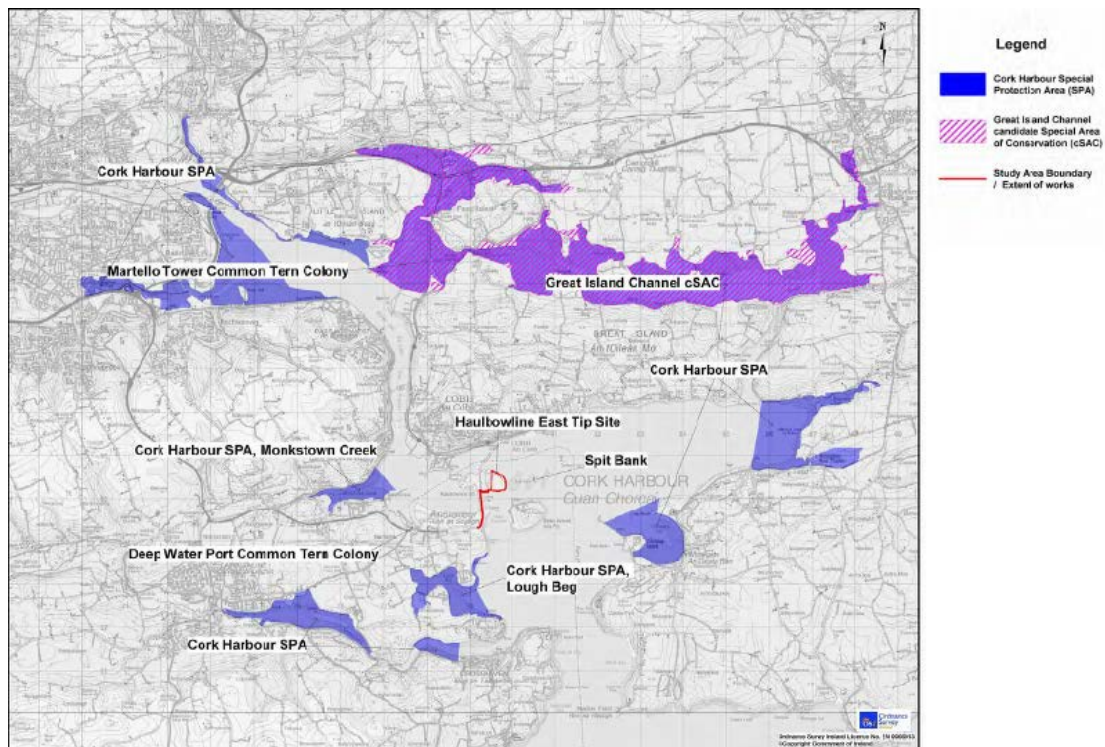


Figure 9 SPA and cSAC around Haulbowline Island

A screening for Appropriate Assessment was undertaken to assess, in view of best scientific knowledge and the conservation objectives of the site, if the proposed activity, individually or in combination with other plans or projects is likely to have a significant effect on a European Site(s). In this context, particular attention was paid to the European sites at Cork Harbour Special Protection Area [site code 004030] and Great Island Channel candidate Special Area of Conservation [site code 001058] and the Agency considered, for the reasons set out below, that the proposed activity is not directly connected with or necessary to the management of those sites as European Sites and that it cannot be excluded, on the basis of objective scientific information following screening under this Regulation, that the proposed activity,

individually or in combination with other plans or projects, will have a significant effect on a European site and accordingly determined that an Appropriate Assessment of the proposed activity is required. Whilst there will be no direct impacts on European sites as a result of the proposed works, there may be indirect impacts during construction work at the East Tip on Cork Harbour SPA affecting birds that are the qualifying features of the SPA, and these are the reasons why an Appropriate Assessment is required:

- contamination of Harbour water during construction work by the release of harmful substances from disturbed waste and/or sediments:
 - contaminating food chains outside the SPA boundary but having effects within the SPA, and
 - contaminating habitats within the SPA.
- combination of the potential contamination of Harbour water from the proposed works and other potential release of contaminants from the densely populated and heavily industrialised periphery of Cork Harbour as well as the potential for increased sedimentation as a result of Port of Cork maintenance dredging (the permit for which expired in 2012, but a new application is currently before the Agency).

In accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), pursuant to Article 6(3) of the Habitats Directive, the proposed activity will not adversely affect the integrity of a European Site(s) in particular Cork Harbour Special Protection Area [site code 004030] and Great Island Channel candidate Special Area of Conservation [site code 001058], having regard to its conservation objectives and will not affect the preservation of those sites at favourable conservation status.

In coming to this conclusion, the Agency is satisfied that it has identified all aspects of the proposed activity which can, by themselves or in combination with other plans or projects, affect the conservation objectives of a European Site in particular Cork Harbour Special Protection Area [site code 004030] and Great Island Channel candidate Special Area of Conservation [site code 001058] and is certain, in the light of the best scientific knowledge in the field, that the proposed activity will not, if carried out in accordance with this Licence and the conditions attached hereto, have lasting adverse effects on the integrity of those sites, will not hinder the preservation of those sites at a favourable conservation status, and will not hinder the lasting preservation of the constitutive characteristics of those sites that are connected to the presence of the habitat types, flora and fauna, whose preservation was the objective justifying the designation of those sites, will respect the strict protection of animal types and plant types listed in Annex IV of Council Directive 92/43/EEC, in particular the following animal and plant types: otter, common pipistrelle, soprano pipistrelle, leisler's bat, dauberton's bat, harbour porpoise, bottle-nosed dolphin, and will not cause any disturbance to those species or any deterioration in their conservation status.

The Agency is satisfied that no reasonable scientific doubt remains as to the absence of such effects for the following reasons:

- despite there being a theoretical presence of manganese and chromium VI in the waters of Cork Harbour at concentrations above surface water quality standards and distances of 10m and 25m respectively from the shoreline, neither of these contaminants has actually been detected in water samples at

concentrations above surface water quality standards;

- the proposed option of leaving waste on the foreshore outside the Perimeter Engineered Structure, as opposed to its excavation, will ensure that the suspension/re-suspension of sediment will be minimised and controlled during the works. Any suspension/re-suspension of sediment, in a worst case scenario, will be redistributed locally within the site environs;
- to the extent possible, dredging activities at the Port of Cork will not be scheduled to occur concurrently with the proposed works at the East Tip (see **condition 1.8** of the RD);
- as mitigation, the following is proposed by the applicant:
 - piling operations will be subject to detailed method statements to be agreed by NPWS;
 - areas of foreshore construction will be protected from sediment re-suspension by suitable abatement techniques;
 - water and sediment quality will be monitored periodically;
 - an ecologist will be employed by the contractor to monitor for any negative effects on wildlife.

7 Environmental Impact Assessment

The applicant submitted an Environmental Impact Statement (EIS) which was prepared in support of planning application reference PL04.MT0001. Planning permission was granted for this development by An Bord Pleanála on 1 May 2014.

7.1 Content of EIS

I have considered and examined the content of the EIS and other material (information submitted in the licence application, the planning permission, planning inspector's report, correspondence between the Agency and An Bord Pleanála carried out under Section 42 of the Waste Management Acts and submissions made by third parties in relation to the EIS). I consider that having examined the relevant documents and with the addition of this Inspector's Report that the likely significant direct and indirect effects of the activity have been identified, described and assessed in an appropriate manner as required in Article 3 and in accordance with Articles 4 to 11 of the EIA Directive as respects the matters that come within the functions of the Agency. I consider that the EIS also complies with the requirements of the Waste Management (Licensing) Regulations 2004.

7.2 Environmental Impact Assessment (EIA)

An EIA, as respects the matters that come within the functions of the Agency, has been carried out in accordance with Section 40(2A) of the Waste Management Acts, as detailed below.

An EIA as regards the functions of An Bord Pleanála was carried out by An Bord Pleanála when granting planning permission for the development (Planning File Ref. PL04.MT0001). That EIA addressed the likely significant effects of the construction and operational phases of the development. An Bord Pleanála's EIA was considered as part of the Agency's assessment.

Consultation was carried out between An Bord Pleanála and the Agency in accordance with Section 42(1D) of the Waste Management Acts. An Bord Pleanála raised no issues in relation to the licence application and EIS.

The assessment outlined in this report considers the submissions and observations exchanged between An Bord Pleanála and the Agency. All third party submissions received which are relevant to impacts on the environment have also been considered and taken into account.

The submitted EIS and the assessment as described in this Inspectors Report address the likely significant direct and indirect effects arising from the activity, as respects the matters that come within the functions of the Agency.

7.3 Likely significant effects

The following section identifies, describes and assesses the likely significant direct and indirect effects of the proposed activity on the environment, as respects the matters that come within the functions of the Agency, for each of the following factors: human beings, flora, fauna, soil, water, air, climate, the landscape, material assets and cultural heritage. The main mitigation measures proposed to address the range of predicted significant impacts arising from the activity have also been outlined.

1. Human Beings

Likely significant effect	Description of effect	Mitigation measures proposed by applicant in EIS or licence application ^{Note 1}
Reduction in air quality due to dust and odour emissions	Emissions of dust and other windblown material into the local environment. Disamenity due to odour emissions.	Dust and odour prevention and minimisation measures will be employed, and these are described in section 5 (air) of the EIA below. Dust deposition limits are proposed in the RD with monitoring for dust (and heavy metals) to take place at sensitive receptors away from the facility.
Disamenity due to noise emissions and vibration.	Construction activities can be noisy and, particularly in close proximity to the facility, noise emissions above background are predicted under a worst-case scenario. Disamenity due to vibration is generally assessed as low, but may be a greater problem if piling is required (decision to be made at detailed design stage). See	The RD limits operating hours although night-time operations on the foreshore might periodically be necessary due to tidal movements. The RD requires agreement of a <i>Noise and Vibration Minimisation and Management Plan</i> . A range of mitigation measures to contain and minimise the impact of noise emissions are proposed by the applicant in the EIS, including:

	section 7 (Material Assets) below.	<ul style="list-style-type: none"> • consultation regarding night-time operations; • erection of temporary and permanent barriers; • noise containment on machines and selection of quiet machines; • assessment and minimisation of vibration should the need arise at detailed design.
Impacts to human health through direct contact with the waste	Dermal, inhalation or ingestion effects due to direct contact with the waste at the facility.	<p>There will be no public access to the site until it opens as parkland by which time the source-pathway-linkage to people will have been severed. The engineered cap will ensure no contact is possible between the waste and users of the park.</p> <p>During construction, health and safety procedures will protect construction staff and visitors from exposure to the waste at the facility.</p>

Note 1: and/or as outlined above in this report

2. Flora & fauna

Likely significant effect	Description of effect	Mitigation measures proposed by applicant in EIS, licence application or planning permission ^{Note 1}
Disturbance of marine mammals including cetaceans and seals.	<p>Whilst there is no evidence of marine mammals using the site, noise arising during piling operations and other foreshore construction activities could disturb marine mammals. Seals may experience visual disturbance. Other possible disturbances include:</p> <ul style="list-style-type: none"> • physical disturbance due to vessels on the water; • suspension of sediments and 	<p>Detailed method statements for piling will be agreed with NPWS.</p> <p>Works schedules will avoid sensitive periods where possible.</p> <p>Sediments will be contained within work areas on the foreshore using sheet piles, sediment screens and other techniques.</p> <p>The EIS proposes the use of 'soft start' methods for piling operations to gradually increase noise levels over a 20-minute period.</p> <p>Night-time work will be</p>

	<p>sedimentation;</p> <ul style="list-style-type: none"> • light from night-time works; and • effect of the works on prey. <p>No negative effects on marine mammals are predicted from foreshore construction operations.</p>	<p>minimised to the extent possible and limited to excavations only (as opposed to piling).</p> <p>The appointed contractor will employ an ecologist to monitor for any negative effects on wildlife.</p> <p>A marine mammal observer will be employed during piling operations.</p>
Disturbance of non-marine mammals such as otters and bats.	<p>Whilst there is no evidence of otter or bat use of the East Tip, these are the only candidates thought to be potential users of the site. No negative effects are predicted. Remediation of the site may attract bats and otters by the creation of new habitat.</p>	None.
Improvement of habitat for non-marine mammals and birds.	<p>Overall, the creation of parkland, wet grassland areas (with periodic standing water) and screened platforms on the rock armour for roosting birds will provide a positive benefit for biodiversity.</p>	None.

Note 1: and/or as outlined above in this report

3. Soil

Likely significant effect	Description of effect	Mitigation measures proposed by applicant in EIS or licence application ^{Note 1}
None at the East Tip. There is no natural soil at the East Tip except that on the existing playing pitch. The pitch will be stripped and the engineered cap placed on this area as elsewhere.	Natural subsoil and topsoil will be imported as part of the remediation project and construction of parkland. This will be an overall positive effect.	The natural soils applied at the East Tip in the construction of parkland will be isolated from the waste body by the impermeable engineered cap and will not be subject to ongoing contamination.
Contamination of natural soils	Deposition of windblown	Mitigation measures for the prevention and minimisation of

elsewhere on Haulbowline, Great Island and the mainland.	dust.	dust emissions are described in <i>Air</i> (below).
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Note 1: and/or as outlined above in this report

4. Water

Likely significant effect	Description of effect	Mitigation measures proposed by applicant in EIS or licence application ^{Note 1}
Impact on quality of groundwater beneath the East Tip.	<p>Release of leached dissolved phase contaminants from the waste body into groundwater.</p> <p>The groundwater body beneath the East Tip is of low importance (it is saline). It is of greater significance as a pathway for contaminants to Cork Harbour.</p>	<p>Capping of the East Tip and construction of the Perimeter Engineered Structure will reduce the infiltration of water and leaching of contaminants from the waste. The consequent benefit of this is reduced flux (in terms of volume of discharge and concentration of contaminants) to seawater in Cork Harbour.</p> <p>The impact on the groundwater body (including improvement from works) is negligible.</p>
Contamination of marine water in Cork Harbour	<p>Release of dissolved phase contaminants through seepages from the waste body into Cork Harbour or via groundwater in natural strata beneath the East Tip.</p> <p>Release of sediment (including granular waste) from works on the foreshore.</p> <p>Ongoing contamination (dissolved phase or erosional/sedimentary) from waste left on the foreshore outside the Perimeter Engineered Structure.</p>	<p>Construction of Perimeter Engineered Structure and engineered cap will significantly reduce ingress of sea and rain water respectively with consequent reductions in the contaminant flux to Cork Harbour.</p> <p>During the construction period, any perimeter seepages captured during foreshore work will be recirculated back to source for percolation and attenuation through the waste body on the East Tip.</p> <p>The Foreshore Construction Environmental Management Plan will address the containment of sediment raised during foreshore construction works.</p> <p>Residual waste left outside the Perimeter Engineered Structure has been deemed to have a</p>

		<p>minimal risk of ongoing environmental impact. Rock armour will be placed over this waste to avoid its erosion and suspension in the marine water.</p> <p>Ambient monitoring of marine water and sediment will detect any impacts arising during construction works.</p>
Contamination of groundwater and marine water through fuel spills	Catastrophic failure at storage or refuelling facilities could result in spillage to the water environment.	<p>The Construction Environmental Management Plan will address prevention.</p> <p>The RD requires accident prevention and emergency response procedures to be developed.</p>

Note 1: and/or as outlined above in this report

5. Air

Likely significant effect	Description of effect	Mitigation measures proposed by applicant in EIS or licence application ^{Note 1}
Generation/release of dust as a result of waste treatment and construction activity	Dispersal of dust, which might contain heavy metals and other contaminants, into the local environment. Air dispersion modelling shows that, without mitigation, there might be a significant environmental impact resulting from the release of dust, including PM ₁₀ and PM _{2.5} particles.	<p>Under the control of a Dust Prevention and Minimisation Programme, a number of mitigation measures are proposed in the EIS:</p> <ul style="list-style-type: none"> • road cleaning and speed limits; • dampening of roads, working areas, dusty stockpiles and vehicle loads; • use of wheelwash; • limitation of stockpile height to reduce exposure to wind; • cessation of certain operations during high winds; • minimisation of drop heights; • water misting on crushers and screening machinery; • crushers and screening machinery will be moved closer to the waste, not the other way around.

		By employing mitigation measures, the generation/release of dust and resultant potential for environmental impact will be prevented and minimised.
Generation/release of asbestos fibres as a result of waste treatment and construction activity	<p>Dispersal of dust that might contain asbestos fibres into the local environment.</p> <p>Although primarily a health and safety issue due to localised effects, there is a risk of asbestos fibres travelling on the wind, especially to the nearer receptors, e.g. the Naval base.</p>	<p>Similar mitigation measures are proposed as for governing dust prevention and minimisation. These measures will prevent or minimise asbestos dust dispersal.</p> <p>In addition, an Asbestos Management Plan will be prepared, as proposed in the EIS.</p>
Generation/release of odours as a result of excavation and exposure of odorous waste	Disamenity due to odours.	Under the control of an Odour Management Plan, odour audits will be carried out to identify and assess any sources of odour and to implement mitigation measures.

Note 1: and/or as outlined above in this report

6. Climate

Likely significant effect	Description of effect	Mitigation measures proposed by applicant in EIS or licence application ^{Note 1}
Release of climate altering substances	Emission of greenhouse gases	<p>Mitigation measures to minimise CO₂ emissions are proposed in the EIS, including:</p> <ul style="list-style-type: none"> • implementation of a traffic management plan; • reducing waiting and idling times; • maintenance of vehicles, plant and equipment; • consideration of alternatives to Portland cements and virgin steel; • implementation of an energy management system; • provision of vegetation to replace the existing barren

		landscape.
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Note 1: and/or as outlined above in this report

7. Landscape, Material Assets & Cultural Heritage

Likely significant effect	Description of effect	Mitigation measures proposed by applicant in EIS or licence application ^{Note 1}
Risk of structural damage as a result of vibration.	Piling, if carried out, presents the greatest risk of vibration with the potential for structural damage to buildings close to the activity.	As per item 1, Human Beings, above (Disamenity due to noise emissions and vibration.).
Visual impact at Cobh and Cork Harbour due to construction works.	Disamenity due to view of construction site.	Construction activity will be short in duration. Temporary site compounds and fencing will be located to avoid unnecessary visual impacts. The completed project will enhance the local visual amenity.
Interference with Naval and crematorium operations during construction works.	Interference with access due to traffic, access and requirement for works on Naval property. Other impacts due to dust, noise and traffic, described elsewhere in this section of the report.	Close consultation will be maintained with affected parties to minimise potential for inconvenience.
Use of water from public supply.	Use of large volumes from public water supply.	Use of water will be controlled and minimised. The contractor will be obliged to prepare an Energy Management Plan to include water consumption during construction. There will be no water supply to the remediated East Tip.
Use of lighting during night-time construction activities.	Light pollution.	Lighting will be localised to works and only used for security and safety purposes.

Note 1: and/or as outlined above in this report

7.4 Assessment of parts 1 to 7 and the interaction of effects and factors

The detailed assessment set out in the preceding sections of this Inspector's Report fully considers the range of likely significant effects of the activity on human beings, flora, fauna, soil, water, air, climate, landscape, material assets and cultural heritage, as respects the matters that come within the functions of the Agency, (as identified in parts 1-7 above), with due regard given to the mitigation measures proposed to be applied. The assessment also has regard to the EIA carried out by An Bord Pleanála and all relevant observations and submissions made on the licence application and EIS. The RD includes conditions as considered appropriate to address the likely significant effects of the activity.

Table 3 is a matrix of the potential significant interaction of impacts, as provided by Table 16.1 of the EIS. The numbers in the body of the matrix indicate the section of the EIS where the interaction is described.

I have considered the interaction between the factors referred to in parts 1-7 above and the interaction of the likely effects identified (as well as cumulative impacts with other developments in the vicinity of the activity). The mitigation measures identified above to address individual factors will also address any potential significant interactions.

I am satisfied that the proposed mitigation measures are adequate. I do not consider that the interactions identified are likely to cause or exacerbate any potentially significant environmental effects of the activity. The RD includes conditions as considered appropriate to address key interactions associated with the licensable activity.

Table 3 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								

7.5 Overall Conclusion on Environmental Impact Assessment

All matters to do with emissions to the environment from the activity proposed, the licence application documentation and EIS have been considered and assessed by the Agency. The assessments carried out by An Bord Pleanála and the submissions and observations exchanged between An Bord Pleanála and the Agency have been considered as part of this assessment. Third party submissions have also been taken into account.

I consider that having examined the relevant documents and with the addition of this Inspector's Report that the likely significant direct and indirect effects of the activity have been identified, described and assessed in an appropriate manner as required in Article 3 and in accordance with Articles 4 to 11 of the EIA Directive, as respects the matters that come within the functions of the Agency.

It is considered that the mitigation measures as proposed will adequately control any likely significant environmental effects from the activity.

It is also considered that the proposed activity, if managed, operated and controlled in accordance with the licence conditions included in the RD will not result in a significant detrimental impact on the environment.

8 Compliance with Directives/Regulations

Waste Framework Directive	The RD implements the appropriate provisions of the Waste Framework Directive including: <ul style="list-style-type: none">- Article 13 on protection of human health and the environment;- Article 23 on the issue of licences and what they must specify.
Landfill Directive	The RD implements the appropriate provisions of the Landfill Directive including: <ul style="list-style-type: none">- Articles 8 and 9 on the conditions and content of a licence. The project is the remediation of a disused landfill. There will no construction of a new landfill or operational phase as a landfill. Consequently not all of the Directive's provisions can or will apply. Paragraph 3.4 of Annex I of the Directive allows for derogation from the Directive's basic requirements for landfill liners and leachate collection systems if it is decided, on the basis of an assessment of environmental risks, that collection and treatment of leachate is not necessary and the landfill poses no potential hazard to soil, groundwater or surface water. The assessment carried out as part of this licence application has demonstrated that, based on environmental risk, there is no technical justification for requiring the installation of a landfill liner or leachate collection system at the East Tip.

Water Framework Directive [2000/60/EC]	The provisions of the RD, implementing the findings of the licence application and EIS, will ensure that water quality standards are not exceeded in surface waters.
Seveso II Directive	Not applicable. The East Tip does not require regulation under the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2006.
Environmental Liabilities Directive	Any environmental pollution or damage caused during construction works may trigger a response under the Directive.

9 Best Available Techniques (BAT)

I have examined and assessed the application documentation and I am satisfied that the site, technologies and techniques specified in the application and as confirmed, modified or specified in the attached Recommended Decision comply with the requirements and principles of BAT. I consider the technologies and techniques as described in the application, in this report, and in the RD, to be the most effective in achieving a high general level of protection of the environment having regard - as may be relevant - to the way the construction/remediation activity is to be carried out, managed, maintained, operated and decommissioned.

10 Fit & Proper Person Assessment

It is intended that technical control of the project will be retained by Cork County Council, on behalf of the Minister for the Department of Agriculture, Food and the Marine, regarding the appointment of contractors and supervision of the engineering works. The Council will appoint an Environmental Clerk of Works whose job is to ensure that the commitments and limitations in the EIS and the waste licence are complied with. **Condition 2.1** of the RD requires that the project is put in the hands of competent persons.

From a financial perspective, it is intended that the East Tip will remain in State ownership. The State is committed to carrying out the remediation of the East Tip and developing the parkland amenity.

Article 8 of the Landfill Directive requires that the Agency does not grant a licence unless it is satisfied that adequate provisions have been or will be made by the applicant to ensure that the obligations arising from the licence are discharged. In this case, the applicant has stated that the Department of Agriculture, Food and the Marine is committed to providing the necessary funding to meet the requirements of the ECJ ruling against Ireland in respect of the East Tip. Accordingly, the RD proposes no financial provision in respect of the project and does not require the preparation of an Environmental Liabilities Risk Assessment.

The Minister for the Department of Agriculture, Food and the Marine is a fit and proper person as defined in the Waste Management Acts 1996, as amended.

11 Proposed Decision

I am satisfied that the conditions set out in the RD will adequately address all emissions from the facility and will ensure that the carrying on of the activities in accordance with the conditions will not cause environmental pollution. In particular, the mitigation measures and monitoring proposed by the applicant and reflected in the RD will provide a high level of environmental protection during construction works at the East Tip.

12 Submissions

There were two submissions made in relation to this application.

Submission from Inland Fisheries Ireland

IFI proposes that the following precautionary measures are appropriate:

1. Ongoing assessment of the impact of the East Tip on aquatic life should be carried out pre-works, during construction and after. The assessment should include sampling of fish and other aquatic life and testing for bio-accumulation using control populations from outside Cork Harbour as controls.
2. Sampling and analysis of tidal muds and waters in the vicinity of the site pre-works, during construction and post-construction.
3. Control measures during construction to prevent escapement to waters as a result of works combined with a water monitoring programme during the construction phase.
4. An assessment of the impact of the construction phase on local usage of the fishery

In response, the RD requires sediment and seawater sampling and monitoring during construction and post-construction. Pre-works sampling and analysis has already been completed. It is noted that the EIS and licence application sets out that the environmental impact on the marine environment in terms of contamination of the water body is negligible.

An assessment of the impact on the fishery was completed by the applicant in response to a request for further information from An Bord Pleanála. Residual impacts will be negligible and temporary, the latter principally associated with possible piling activities on the foreshore.

Submissions from Health Services Executive

The HSE has no objection in principle to the proposed works as there will be a long-term benefit arising from the proposal. The HSE recommends the following:

- a complaints line and noise complaints procedure:
 - Response: **Condition 2.2.2.9** of the RD requires a communications programme be established. **Condition 11.5** states how complaints are to be dealt with.
- liaison with local school, navy and crematorium in relation to traffic:

- Response: The applicant has proposed liaison with neighbours on a number of issues. The issue of traffic is outside the remit of the Agency and the waste licence.
- development of a pest control management plan to manage any rodent activity arising from vibrations from construction works:
 - Response: **Condition 5.9** of the RD prohibits the creation of nuisance caused by vermin.
- implementation of the proposed asbestos construction management plan:
 - Response: Required under **condition 2.2.2.3** of the RD.
- an additional air monitoring point at Shanbally village:
 - Response: Proposed by the applicant and implemented through **Schedule C.6.1** of the RD.
- implementation of BS5228:2009 Noise and Vibration Control on Construction and Open Sites:
 - Response: A noise and vibration minimisation and management plan is required under **condition 2.2.2.3** of the RD.

13 Charges

The proposed annual charge for licence enforcement is €23,794 based on a W-A1 risk category.

The OEE proposed that the applicant make a contribution to the costs of the Cork Animal Health Surveillance Scheme operated by Cork County Council. This arises from the potential for construction works at the site to generate emissions of particulates and possibly other pollutants that would be of concern to the local public. This would provide the public with an additional layer of confidence, focussed specifically on possible long term effects, of appropriate environmental protection additional to licensee performance monitoring and EPA compliance verification monitoring.

14 Recommendation

I have considered all the documentation submitted in relation to this application and recommend that the Agency grant a licence subject to the conditions set out in the attached RD and for the reasons as drafted.

Signed



Brian Meaney

Procedural Note

In the event that no objections are received to the Proposed Decision on the application, a licence will be granted in accordance with Section 43(1) of the Waste Management Acts 1996 as amended.