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# 8 Land and Soils

## 8.1 Introduction

This section of the EIAR has been prepared by CORA Consulting Engineers to address the issues of land & soils following the EPA guidance documents, “Advice notes on current practice (in the preparation of Environmental Impact Statements)” and, “Guidelines in the information to be contained in Environmental Impact Statements.”

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## 8.2 Proposed Development

The proposal consists of replacing the former Chivers factory with 4 no. proposed blocks (Blocks A1, A2 each with two 12 storey elements, and Blocks B & C ranging from 3 to 7 storeys and associated courtyard spaces). In addition the scheme includes for a service building comprising of a crèche (300 sq. m), café (34 sq. m) and gym (412 sq. m) at the northwest corner of the site, as well as streets, public realm amenity and green open space.

The works will include a bulk excavation of 94,500m$^3$ comprising of 62,500m$^3$ of material to be removed off site and disposed in suitable landfill site with the remainder reused within the development.

## 8.3 Methodology

A preliminary site investigation was carried out to determine the permeability of the subsoils which included a number of soakaway tests. These works and follow up report was carried out by Ground Investigation Ireland Ltd. (see **Appendix 8.1**) The Bedrock Geology Maps of the area produced by the Geological Survey of Ireland (www.GSI.ie) were reviewed.

A site investigation was carried out on the site in August 2018 by Causeway Geotech Ltd. Trial pits & bore holes were excavated & logged, soil samples were taken and laboratory testing carried out. The results of the site investigation have been compiled in a report prepared by Causeway Geotech Ltd. The site investigation report is included in **Appendix 8.2**

## 8.4 Baseline Scenario

### 8.4.1 Topography and Synopsis of Site Investigations

The site, approximately 85% hardstanding as occupied by former factory buildings, is located at Coolock, Dublin and is bound by Coolock Drive to the west, the Cadburys Factory site to the east, Coolock Pitch and Putt course to the south and Greencastle Road to the north.

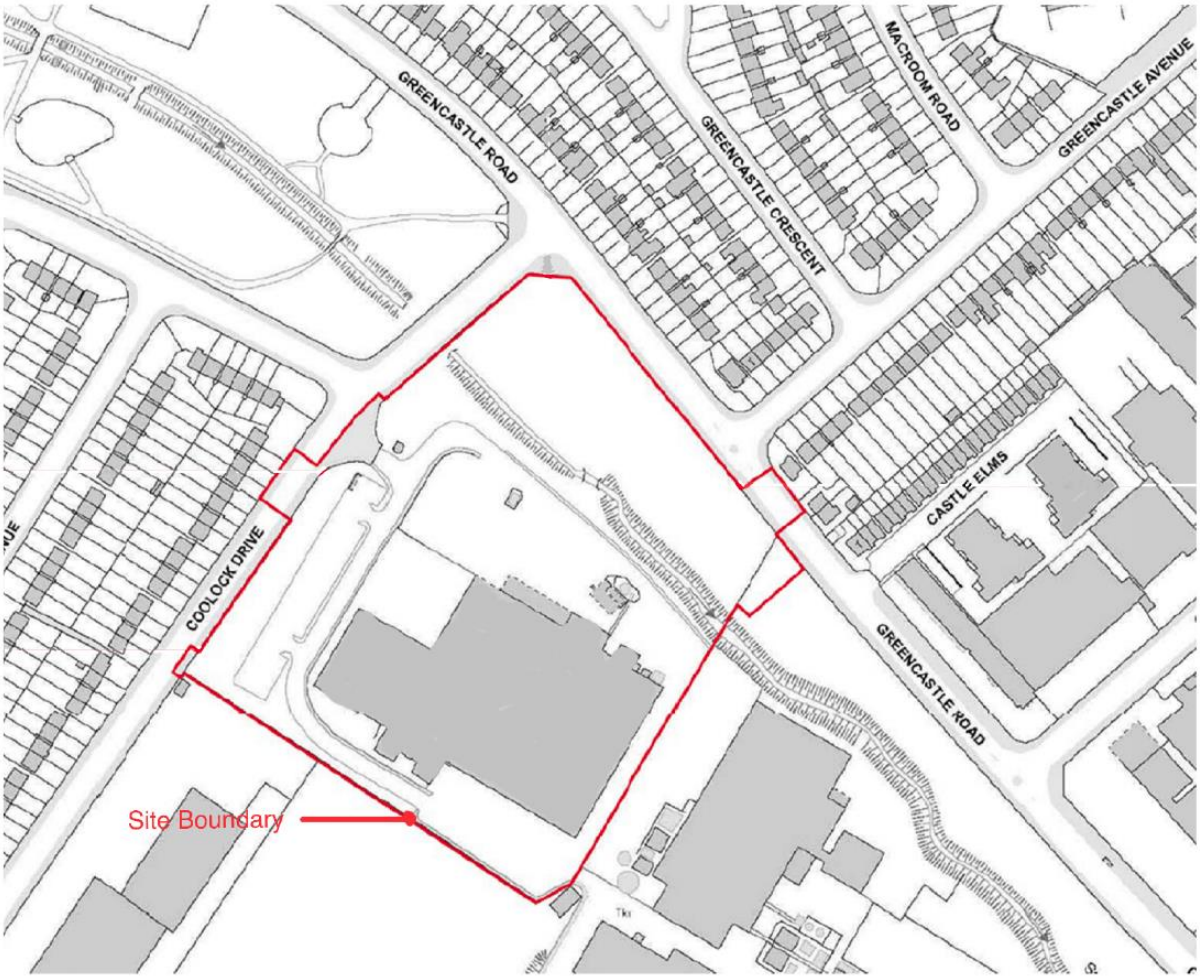


FIGURE 8.1 SITE LOCATION PLAN

The site investigation was carried out to determine the geotechnical properties of the underlying soils plus chemical composition with respect to the design of new foundation systems and to evaluate the waste classifications of the material required to be disposed off site.

### 8.4.2 Historic Land Use

The site contains the former Chivers Factory buildings which has been closed since the 1990s. In the northern part of the site is a linear green space at the banks of the Santry River which flows through the site into the Cadburys Factory Campus from west to east.

### 8.4.3 Soils

Teagasc Soils mapping indicates Made Ground generally, as would be expected with an industrial site. The unconsolidated sediments between the rockhead and surface soils are recorded as a till derived chiefly from Limestone. The area around the Santry River has a gravelly alluvium soil along the line of the river.

Ground Investigations Ireland Ltd carried out 4 No. soakaway tests in October 2017 to determine the permeability of the receiving subsoils. Pit depths are in the order of 2m deep. Details of this site investigation are included in **Appendix 8.1**.

Results of this investigation were similar in each pit with a layer of made ground overlying a firm-stiff sandy gravely clays at around 1 to 12.5m below existing ground level. These underlying clays have low permeability and are not suitable for discharging rainwater to the ground.

Causeway Geotech Ltd carried out a more comprehensive site investigation in August 2018. 8 No. boreholes were carried out by means of cable percussion boring to a depth varying from 2.0 to 4.75m below existing ground level to determine the soil profile and to obtain soil samples for identification and testing. Samples were taken for laboratory and waste classification

The materials encountered in the boreholes at the application site were generally similar and consisted of made ground, which overlies hard brown sandy gravelly clay with occasional cobbles. Water level readings were taken from water interface probes installed in four of the boreholes and monitored weekly over a period of one month. Initial results indicated a water level of between about 1.25m to 3.2m below ground level with one borehole recorded as dry. Final measurements indicate a ground water level of about 0.9m to 3.2m below ground level. It is noted that in an Irish context that the Water Table would typically be expected to be at a similar level to a nearby surface water body such as the Santry River.

A more comprehensive description of the ground conditions is provided in the Causeway Geotech Site Investigation Report which is included in **Appendix 8.2**.Soil samples tested in the laboratory have been classified as Non-Hazardous and are suitable for disposal in an inert waste landfill.

### 8.4.4 Geology

The proposed development is within the catchment of the Santry River which forms a boundary to the North side of the development area.

The Bedrock Geology Maps produced by the GSI, describe the geology of the area as having a history spanning 530 million years. At the site the bedrock is described as being argillaceous limestone & shale of the Dinantian series. The formation is described as being part of the Malahide Formation (ML). The formation was laid down over an extended period of the Palaeozoic and Carboniferous with a thickness of at least 300m. Adjacent areas are also formed of shaley limestones of different provenances. An extract from the GSI map showing the location of the development is shown in Figure 8.2.

The GSI records for the area note the aquifer in the area in a Bedrock Aquifer, Type LI – Bedrock which is Moderately Productive only in Local Zones. This aquifer encompasses the surrounding environs generally to a similar extent as the Malahide Formation bedrock. A number of groundwater wells are recorded in the vicinity; the two closest are located c400m south of the site at Beechpark Avenue, a residential area. While these wells may be associated with private residences it is more likely that the wells serve the adjacent Cadburys Factory Campus, Pitch & Putt Course or the former Chivers factory on the subject site. GSI records suggest that bedrock is to be found typically in the range of 5m - 10m below ground level at various locations across the site and that the groundwater vulnerability is unlikely.

Adjacent areas, including parts of the Cadburys and Pitch & Putt sites, are noted to include limestone derived till which is interstratified with gravel derived from Lower Carboniferous Limestone.

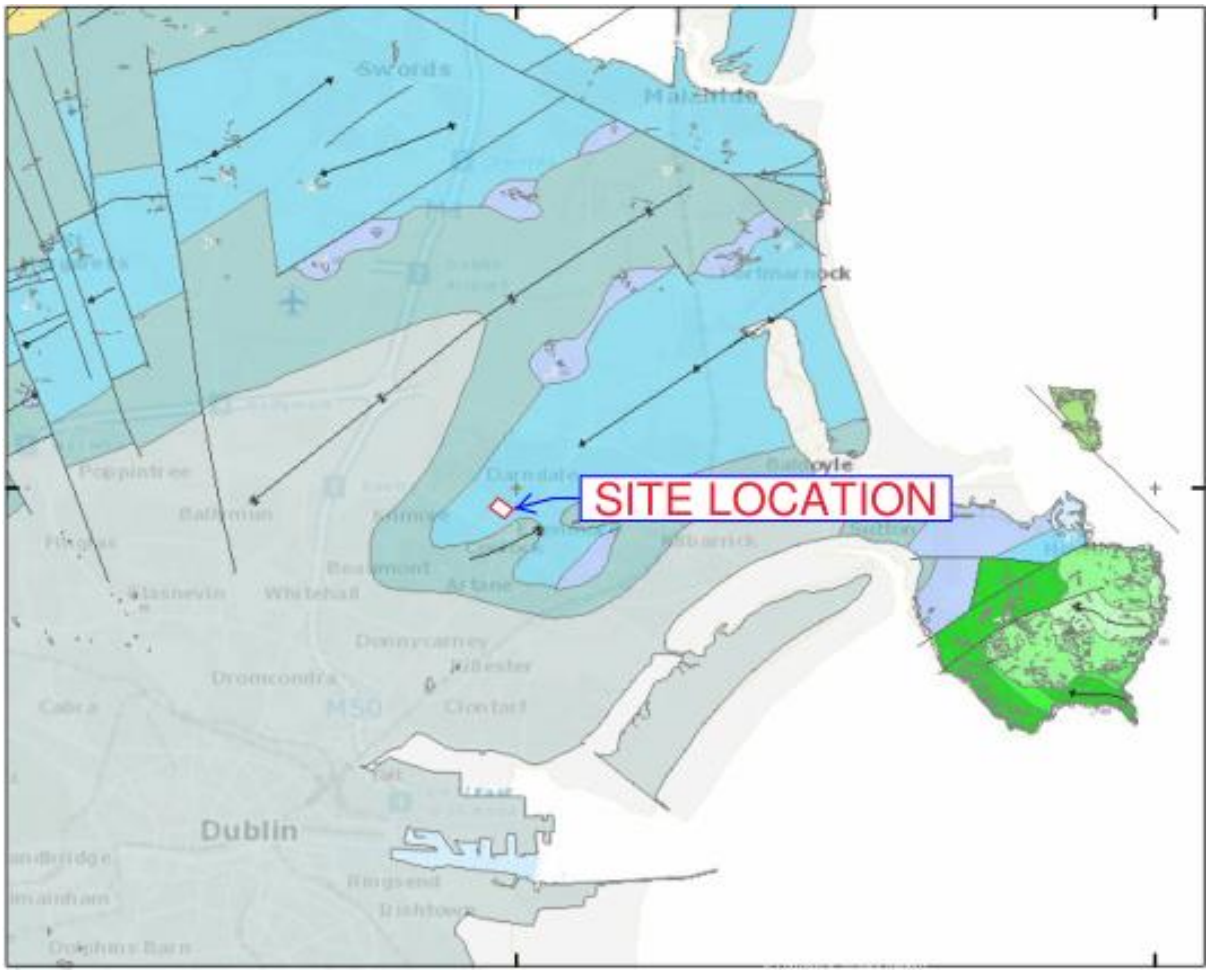


FIGURE 8.2 EXTRACT FROM GSI MAP


FIGURE 8. 3 EXTRACT OF LEGEND FROM GSI MAP

### 8.4.5 Potential Pollutant Linkage

Radon levels on the site are low according to the EPA Radon Maps for the area (Figure 8.4).

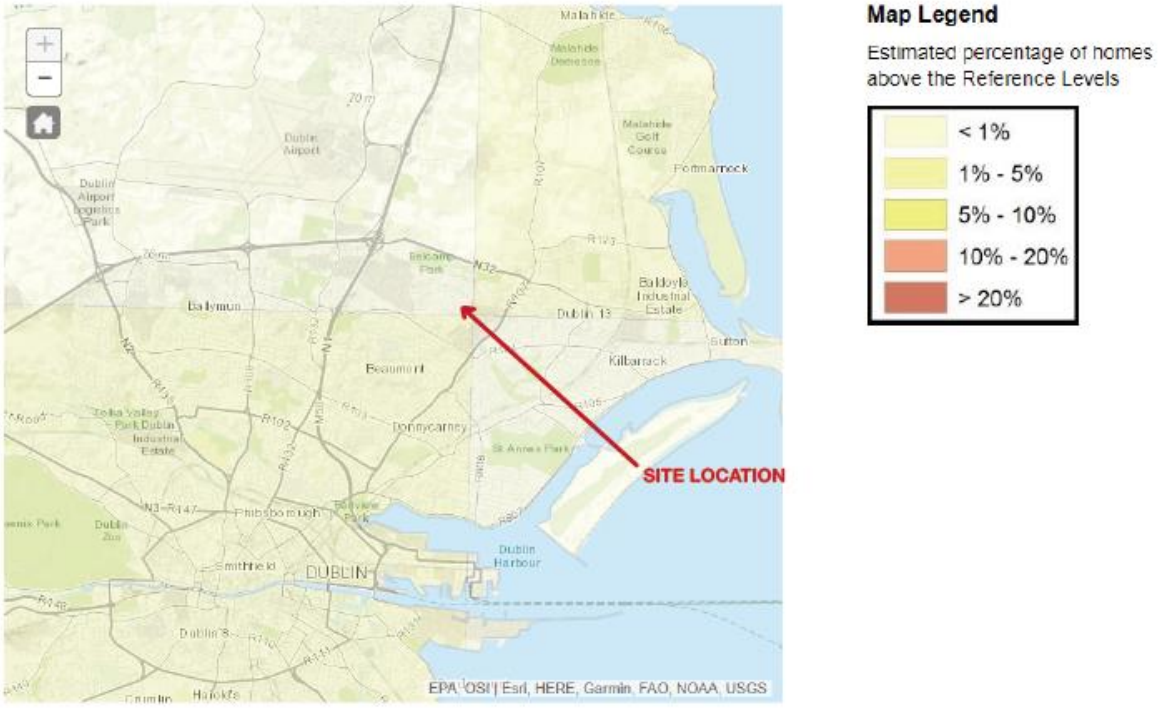


FIGURE 8.4 EXTRACT OF EPA RADON MAP

## 8.5 Difficulties encountered

The dis-used site allowed for a comprehensive site investigation to be carried out. Background information from GSI.ie was used to determine the scope of the investigations. While there was no access within the factory building, to carry out investigations of the ground conditions under the expansive factory building sufficient and consistent information has been gathered for the residual site.

## 8.6 Impact Assessment

### 8.6.1 Do Nothing Scenario

There will be no impact on the soils and geology of the area in the “Do Nothing” scenario.

The site is zoned for residential use that is designed to facilitate increased availability of residential units in a largely residential area. In the ‘Do Nothing’ scenario, the derelict industrial site would likely remain idle. It is highly likely that in the absence of the proposed development that the site shall be developed for residential purposes in a similar manner to this application and the impacts being broadly similar.

### 8.6.2 Construction Phase Impact

The proposed development will result in a surplus of fill material within the works area. Approximately 94,500 $m^3$ of topsoil and excavated material will arise during the construction phase. The surplus material will be sampled, tested and classified with respect to Waste Acceptance Criteria. Where possible the material will be reused onsite; the remainder, estimated to be 62,500$m^3$ will be exported to an appropriate suitable approved facility. Where made ground is encountered, the soil deposits will undergo additional environmental sampling and analysis to determine if the material is contaminated. Material classified as contaminated will be segregated and exported to a licensed waste facility.

Rock profiles have not been encountered during the site investigations and the excavation depths of approximately 4m below the general site datum required shall not impact on the underlying rock profiles.

During adverse weather conditions surface water runoff across the exposed sub-soil could result in increased levels of standing water within the excavated basement areas.

Similarly, surface water runoff across the exposed sub-soil during the construction of the works could result in silt run-off to the adjacent watercourse, given the close proximity to the Santry River.

Proposed construction works shall be typically remote from the Santry River and pollution by cementitious materials is considered unlikely.

There is a risk of contamination to the soil from fuel spills from construction traffic which could occur during refuelling or storage of fuel.

Similarly, surface water runoff across the exposed sub-soil during the construction of the works could result in silt run-off to the adjacent watercourse, given the close proximity to the Santry River.

Construction impacts will be for a short duration only and not more than 3 years.

### 8.6.3 Operational Phase Impact

On completion of the construction phase, no direct impacts on the soil environment are envisaged.

### 8.6.4 Worst case scenario

A possible impact for the site in a worst case scenario, i.e. in the event of an accidental disaster is one of effluent & pollutants from the site or main sewer discharging into the ground, contaminating the soil and geological substrate. The likelihood of this scenario is considered, unlikely. All pipelines shall be tested prior to connection to the main sewer and the main sewers shall be monitored for breakages occurring due to work in the vicinity of the pipeline.

## 8.7 Risks to Human Health

According to the waste classification report of the site investigation soils have been classified as Non- Hazardous and therefore are unlikely to create any risk to human health.

## 8.8 Cumulative Impacts

The proposed development will increase the impact on the existing land and soils. These have been assessed as follows:

### 8.8.1 Construction Phase

Extensive earth moving operations will be undertaken over a significant area across a multi-year (circa 3 years) construction programme. In the absence of mitigation there is a potential for the processes to result in accumulations of top-soil and sediments in the Santry River, on the adjacent roadways or in the adjacent existing drains.

The use of chemicals, fuels and oils on site gives rise to the potential for spills of toxic materials to ground. Similar considerations apply to ongoing use of concrete, grout and other cementitious materials during construction.

Increase in traffic levels due to construction vehicles and deliveries may lead to on-going traffic delays and more rapid wearing of road surfaces.

### 8.8.2 Operational Phase

As noted above other than spills of chemical, etc., no Construction Stage Impacts are likely to potentially persist to the Operational Phase.

The change in use of the development site from a redundant industrial factory to residential is a significant positive for human beings.

In the event of ongoing leaks from foul & surface water drains occurring there is the potential for contaminant to infiltrate to ground & to water, and, for fine particles in the soil matrix to be washed out; potentially leading to ground movement and/or structural damage.

### 8.8.3 Overall Cumulative Impacts

Taking account of the overall environment prior to the development of The Chivers Site to date, the current environment in the broader area, the current buildings & infrastructure, the development proposed under the current application and potential future developments on the subject site in the context of the current City Development Plan and the proposed design life & life cycle for the current proposals the potential cumulative impacts may be considered to be Moderate and Long-term impacts, that is, any impact which may occur would be consistent with existing and emerging trends, and the proposed development will have a design life of fifty years.

## 8.9 Mitigation

### 8.9.1 Design Mitigation

All new-build infrastructure is to be designed in accordance with the Technical Guidance Documents of the Building Regulations and associated codes of practice, which require due cognisance of the receiving environment. Design depths of proposed infrastructure are to be optimised so that excessive excavations are avoided where possible, and by association a reduction in resultant waste and machinery operation time.

It is proposed that products and materials are supplied locally, where practicable and available; in order to reduce carbon footprint of travel and production.

The proposed basement is set back at least 10m from the site boundary and adjacent roads & footpaths. It is proposed to provide support to external areas during construction by the formation of a stable batter around the perimeter of the excavation.

### 8.9.2 Construction Phase

Given the topography of the area, underlying geotechnical characteristics and ground water regime it is expected that de-watering of the basement excavation can be controlled by pumping from sumps formed in the excavations.

During adverse weather conditions surface water runoff across the exposed sub-soil could result in increased levels of standing water within the excavated basement areas. Temporary sumps will be used to gather the ground water which will then be pumped from the excavated area which shall be re-circulated by pumping into the ground adjacent to the excavation area to mitigate against hydrogeological effects from changes to the water table level during construction works.

Where this is not possible and discharge of surface water runoff or water pumped from the excavation works is required it is proposed to discharge to the Santry River via a silt trap and settlement pond. Check dams and sediment traps formed from hay or straw bales will be used at the outfall to filter surface water, removing contaminants, and to control the flow of filtered surface water into the water course. Temporary works shall be designed and implemented to prevent runoff entering the dig area.

The adjoining road network will be cleaned on a regular basis, if required, to prevent the build-up of soils from the development site on the existing public roads.

To protect against soils entering the existing drainage networks, soil and silt wash down protection measures such as filters or fences shall be put in place at vulnerable locations including road gullies, drainage channels and kerb inlets.

Measures will be implemented throughout the construction stage to prevent contamination of the soil and adjacent watercourses from oil and fuel leakages. Suitable bunded areas will be installed for oil and petrol storage tanks. Designated fuel filling points will be put in place at secure locations, remote from the Santry River with appropriate oil and petrol interceptors to provide protection from accidental spills. Oil-absorbent materials shall be provided as an emergency measure in the event of a fuel spill.

All 2-stroke power tools used on-site shall be stored in suitably protected areas when not in use and shall be maintained in good working order.

All vehicular machinery used on site shall be stored in suitably protected areas when not in use and shall be maintained in good working order.

During excavation works for basement areas water pumped from the excavated area shall be re-circulated by pumping into the ground adjacent to the excavation area to mitigate against hydrogeological effects from changes to the water table level during construction works. Where this is not possible and discharge of surface water runoff or water pumped from the excavation works is required it is proposed to discharge to the Santry River via a silt trap and settlement pond. Check dams and sediment traps formed from hay or straw bales will be used at the outfall to filter surface water, removing contaminants, and to control the flow of filtered surface water into the water course. Temporary works shall be designed and implemented to prevent runoff entering the dig area.

Earthworks undertaken to re-profile the South Bank of the Santry River shall be excavated while the existing river course is kept live and temporary erosion measures (e.g. straw bales) shall be employed prior to the permanent erosion protection measures (e.g. seeded mats, geotextile mats & stone mats filters) being installed.

Works to form the new linear park alongside the Santry River shall maintain existing vegetation cover wherever possible and excavation shall be phased to minimise the extent of exposed soil. Soil erosion shall be minimised by implementing the following measures as appropriate to the sequencing and phasing of works:

Planting & seeding shall be undertaken at the earliest possible date. Temporary protection may be provided by application of wood chips, mulch or organic mat materials, e.g. straw, jute or burlap. Silt fences, slope drains and roughening of slopes shall be utilised to reduce runoff and minimise erosion prior to smoothening & seeding.

Where chemicals are to be used as part of stripping, planting or maintenance; e.g. herbicides & fertilisers; any such materials shall be suitable for use near water and shall only be applied in strict accordance with Regulations.

Dampening down measures with water sprays will be implemented during periods of dry weather to reduce dust levels arising from the development works.

After implementation of the above measures the proposed development will not give rise to any significant long term adverse impact. Moderate negative impacts during the construction phase will be short term only in duration.

There is a net surplus of soils that will be excavated during the construction of basement areas. Where possible the surplus material will be used in the construction of the development. The surplus material remaining which cannot be incorporated into the works (estimated at 62,500m$^3$) will be exported off-site to a suitable approved/licensed facility.

All excavated materials shall be sorted and separated on site to suitable stockpiles. Stockpile areas shall be designed with suitable drainage and erosion protection to prevent the creation of soil bearing runoff and mixing of materials.

If encountered, contaminated soils should be excavated and disposed off site in accordance with the Waste Management Acts 1996-2001 & all associated Statutory Instruments, and guidance provided in the NRA's Guidelines for the Management of Waste from National Road Construction Projects (National Roads Authority 2008).

### 8.9.3 Operational Phase

Mitigation measures taken during the design process ensures that mitigation measures are not necessary for the operational phase.

## 8.10 Monitoring

There is no monitoring proposed as part of the excavation works as there are no pre-existing buildings or other infrastructure that are significantly impacted by the proposed works.

Records of volumes and quality of material being removed off-site shall be retained during the construction phase.

## 8.11 References and Sources


- Guidelines on the information to be contained in Environmental Impact Statements, EPA, 2002
- Advice notes on current practice (in the preparation of Environmental Impact Statements), EPA, 2003
- Geological Survey of Ireland on-line map portal, www.gsi.ie
- Dublin City Council Development Plan 2016 – 2022, DCC, 2016
- Dublin City Council, Variation (No.5) of the City Development Plan 2016 – 2022, DCC, 2018
- Environmental handbooks for building and civil engineering projects: Part 2: Construction, Publication C528, CIRIA, 2000
- Environmental handbooks for building and civil engineering projects: Part 3: Demolition and site clearance, Publication C529, CIRIA, 2000
- Control of water pollution from construction sites – Guidance for consultants and contractors, Publication C532, CIRIA, 2001
- Control of water pollution from linear construction projects – Technical guidance, Publication C648, CIRIA, 2006
- Guidelines for the preparation of soils, geology & hydrogeology chapters of Environmental Impact Statements – IGI
- Guidelines on Procedures for Assessment & Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes - NRA
- The rock manual – The use of rock in hydraulic engineering, Publication C683, CIRIA, 2007