Chapter 14
Land, Soils, Geology & Hydrogeology

Contents

14. Land, Soils, Geology & Hydrogeology

14.1 Introduction

This Chapter of the Environmental Impact Assessment Report (EIAR) considers the potential land, soil, geology and hydrogeology impacts as a result of the Construction and Operational Phases of the Blanchardstown to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme). Chapter 4 (Proposed Scheme Description) includes a full description of the Proposed Scheme.

During the Construction Phase, the potential land, soils, geology and hydrogeology impacts associated with the development of the Proposed Scheme have been assessed. This includes the potential for contamination of soils and groundwater, and the loss of natural soils from excavation activities associated with utility diversions, road resurfacing, and road realignments.

During the Operational Phase, the potential land, soils, geology and hydrogeology impacts associated with changes to water supply and the pollution of groundwater and watercourses have been assessed.

Potential impacts in the surface water environment are not considered in this assessment but are considered separately in Chapter 13 (Water).

The assessment has been carried out according to best practice and guidelines relating to land, soils, geology and hydrogeology assessment, and in the context of similar large-scale infrastructural projects.

An assessment is made of the likely significant impacts associated with the Construction and Operational Phases of the Proposed Scheme on these resources. Measures are presented to mitigate or eliminate the impacts of the Proposed Scheme on the soils, subsoils, bedrock, geological resources and heritage and hydrogeology.

The aim of the Proposed Scheme when in operation is to provide enhanced walking, cycling and bus infrastructure on this key access corridor in the Dublin region, which will enable and deliver efficient, safe, and integrated sustainable transport movement along the corridor. The objectives of the Proposed Scheme are described in Chapter 1 (Introduction). The Proposed Scheme which is described in Chapter 4 (Proposed Scheme Description) has been designed to meet these objectives.

The design of the Proposed Scheme has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the Proposed Scheme are attained. In addition, feedback received from the comprehensive consultation programme undertaken throughout the option selection and design development process have been incorporated, where appropriate.

14.2 Methodology

The following sections outline the legislation and guidelines considered, and the adopted methodology for defining the baseline environment and undertaking the assessment in terms of land, soils, geology and hydrogeology.

The potential impacts of the Proposed Scheme on land, soils, geology and hydrogeology have been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of any impact on these attributes.

14.2.1 Study Area

The land, soils, geology and hydrogeology study area for the Proposed Scheme extends 250m (metres) either side of the Proposed Scheme boundary which is in accordance with the Institute of Geologists of Ireland (IGI) Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (hereafter referred to as the IGI Guidelines) (IGI 2013).

The Proposed Scheme has been divided into sub-sections for ease of presentation and due to the volume of information available. The sub-sections of the Proposed Scheme are as follows:

- N3 Blanchardstown Junction to Snugborough Road;
- Snugborough Road to N3 / M50 Junction;
- N3 / M50 Junction to Navan Road / Ashtown Road Junction;
- Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction; and
- Navan Road / Old Cabra Road Junction to Ellis Quay.

14.2.2 Relevant Guidelines, Policy and Legislation

The main documents that have been followed for the preparation of the land, soils, geology and hydrogeology assessment are:

- IGI Guidelines (IGI 2013); and
- National Roads Authority (NRA) Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (hereafter referred to as the NRA Guidelines) (NRA 2008a).

Though the NRA is now known as Transport Infrastructure Ireland (TII), for the purpose of this Chapter the guidelines mentioned above are referred to as the NRA Guidelines.

In addition, the assessment has been prepared using the following guidelines:

- Environmental Protection Agency (EPA). Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the EPA Guidelines) (EPA 2022);
- European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (2017);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008b);
- Strive Report Series No. 100. Evaluating the Influence of Groundwater Pressures on Groundwater-Dependent Wetlands. Strive EPA Programme 2007 - 2013 (EPA 2011); and
- Environmental Research Centre Report Series No. 12. A Framework for the Assessment of Groundwater-Dependent Terrestrial Ecosystems under the Water Framework Directive. Strive EPA Programme 2007 – 2013 (EPA 2008).

14.2.3 Data Collection and Collation

Data was compiled from publicly available datasets, the findings of ground investigations, design information, a scheme walkover survey, and other sources, as outlined below.

14.2.3.1 Publicly Available Datasets

The publicly available datasets listed in Table 14.1 have been acquired and consulted in the assessment of the baseline conditions. All datasets were accessed throughout 2020 and 2021.

Table 14.1: Publicly Available Datasets

Source	Name	Description
Ordnance Survey Ireland (OSI)	Current and historical ordnance survey maps	Current and historical survey maps produced by the OSI.
OSI	Aerial photography	Current and historical survey maps produced by the OSI.
Google	Aerial photography	Current aerial imagery produced by Google
Bing	Aerial photography	Current aerial imagery produced by Bing
Teagasc	Teagasc Soils Data	Surface soils classification and description
Geological Survey Ireland (GSI)	Quaternary Mapping	

Source	Name	Description
	Bedrock Mapping	Geological maps of the site area produced by the GSI and also available on GSI online map viewer.
	Aggregate Potential Mapping	
	Mineral Localities	
	Geotechnical viewer	
	Groundwater Mapping	
	Groundwater Levels	
	National Landslide Database	
	Karst Database	
	Active Quarries and pits	
	County Geological Sites (CGS) and Geological Heritage Areas	
	GSI, Memoirs	
EPA	Corine Land Cover	These datasets are based on interpretation of satellite imagery and national in-situ vector data.
	Designated Natural Heritage Area (NHA). Special Protections Area (SPA), Special Area of Conservation (SAC) sites.	
	River Network Map	
	EPA Hydro Net	Reports of groundwater level monitoring points.
National Parks and Wildlife Service (NPWS)	Mapping within the area of the Proposed Scheme	This dataset provides information on national parks, protected sites and nature reserves
National Monuments Service (NMS)	State Mining and Prospecting Facilities	This dataset provides all recorded archaeological monuments
Department of Communications, Energy and Natural Resources (DCENR)	Minerals Ireland	A booklet contains a list of all current and prospecting mining facilities.
	Historic Mine Sites – Inventory and Risk Classification	Department of the Environment, Climate and Communications

14.2.3.2 Ground Investigation

The details of the existing / historical ground investigation reports located within the study area which have been used in the assessment of the baseline conditions are presented in Table 14.2. These reports are publicly available from the 'EXT GSI Geotechnical Sites layer' of the Geological Survey of Ireland (GSI) Spatial Resources Map Viewer (GSI 2019a).

Table 14.2: Existing Ground Investigations

GSI Report ID	Title	Year	Author	Location	Scope
R150	Mulhuddart Housing	1994	IGSL	Mulhuddart Housing Dublin 15	7 Trial Pits
R67	Housing Development	1980	Irish Soils Laboratories Ltd.	Blakestown Section 2A Blanchardstown Dublin 15	48 Trial pits
R718	Blanchardstown town Centre	1987	Unknown	Blanchardstown Road North Co. Dublin	26 Cable Percussion boreholes
R6617	Hotel and Apartment Complex	2006	IGSL	Crowne Plaza Dublin, Blanchardstown, Co. Dublin	6 Cable Percussion boreholes

GSI Report ID	Title	Year	Author	Location	Scope
R5614	River Tolka Flood Alleviation Works	Unknown	Unknown	Finglas Dublin 15	2 Cable Percussion boreholes and 16 Trial Pits.
R717	North Eastern Pipeline	1984	Site investigations Ltd.	Browns barn – Abbotstown Co. Dublin	83 Trial Pits, 13 Cable Percussion Boreholes, 2 Rotary Drillings and 1 non-specific drilling.
R5619	Commercial Development	Unknown	Unknown	Phoenix Park Racecourse	7 Cable Percussion Boreholes and 24 Trial Pits.
R5376	New Railway Station	2003	IGSL	North-west of Navan Road Parkway	8 Cable Percussion Boreholes and 3 Trial Pits.
R5709	Commercial Development	Unknown	Unknown	Black Hall Place Dublin 7	2 Cable Percussion Boreholes
R838	Lark Homes Apartments, Ellis Quay.	1990	IGSL	Ellis Quay Dublin	5 Boreholes (Unspecified) and 6 Trial Pits.
R2161	Proposed new Liffey bridge	1999	IGSL	River Liffey Blackhall Place Dublin	9 Percussion Boreholes, 4 Rotary Boreholes
R210	Leisure Centre Development	1996	IGSL	Blanchardstown, Dublin	4 Trial Pits
R2516	Proposed Railway Bridge	1972	Site Investigations Ltd.	South of the Royal Canal, Old Navan Road, Dublin	3 Cable Percussion Boreholes
R15	St Brendan's Hospital	1985	IGSL	St Brendan's Hospital	12 Cable Percussion Boreholes
R695	Former Municipal Abattoir	1968	RM Douglas Construction Ltd	Hampton Square, Cabra, Dublin.	9 Cable Percussion Boreholes
R819	Sports Hall	1986	IGSL	Aughrim Street, Dublin 7	4 Cable Percussion Boreholes
R742	Development	1985	Site Investigations Ltd.	Benburb Street, Dublin	7 Cable percussion Boreholes and 3 Trial Pits

The scheme specific ground investigation carried out to inform the Proposed Scheme and EIAR is listed in Table 14.3 and the factual report provided in Appendix 14.2 Ground Investigation Report in Volume 4 of this EIAR. This provides a useful verification for the data already compiled relating to the baseline environment.

Table 14.3: Scheme Specific Ground Investigations

Title	Contractor	Year	Location	Scope
GI Report Bus Connect R5 18-06-21 Rev D	Ground Investigation Ireland	June 2021	Blanchardstown to the City Centre	5 Cable Percussion boreholes, 6 Rotary Core boreholes and 13 Trial Pits.

14.2.3.3 Design Information

The design information as provided in Chapter 4 (Proposed Scheme Description) and Chapter 5 (Construction) as well as the Plan and Profile Drawings (BCIDC-ARP-GEO_HV-0005_XX_00-DR-CR-9001 in Volume 3 of this EIAR) have been used in the assessment.

14.2.3.4 Scheme Walkover

A scheme walkover survey was carried out on 25 February 2020 and 9 July 2021 to inform and verify the review of publicly available datasets.

The findings of the Proposed Scheme walkover survey including photos and scheme walkover survey notes are included in Appendix A14.1 Scheme Walkover Summary in Volume 4 of this EIAR.

14.2.4 Appraisal Method for the Assessment of Impacts

The impact assessment for this Chapter has been carried out in accordance with the NRA Guidelines (NRA 2008a) and the IGI Guidelines (IGI 2013).

The likely significant impacts have been assessed by classifying the importance of the relevant attributes and quantifying the magnitude of any likely significant impacts on these attributes, as outlined below:

14.2.4.1 Baseline – Initial Assessment

In order to identify and quantify the likely significant impacts of the Construction Phase and Operational Phase of the Proposed Scheme, it is first necessary to undertake a detailed study of the (baseline) geological and hydrogeological environment of the study area for the Proposed Scheme.

The existing land, soils, geology and hydrogeology conditions in the study area have been interpreted from review of existing data, consultation, scheme walkover surveys and from Proposed Scheme specific ground investigations.

This assessment includes the development of a preliminary Conceptual Site Model (CSM), which describes the ground conditions expected throughout the study area of the Proposed Scheme based on existing literature. Also, as part of this initial assessment, the preliminary generic type of geological / hydrogeological environment is determined. The IGI Guidelines (IGI 2013) provide five types of environments as examples (Types A to E, as described in Step 3 of the IGI Guidelines.

14.2.4.2 Baseline – Direct and Indirect Site Investigation

Information gathered on the baseline environment during specific ground investigations for the Proposed Scheme corresponds to the second element of the methodology, 'Direct and Indirect Site Investigation and Studies'.

As part of the second element, relevant site investigations and studies close to the Proposed Scheme are gathered and assessed. Then, the preliminary CSM is refined accordingly.

14.2.4.3 Gradation of Impacts

The NRA Guidelines (NRA 2008a) provide criteria and examples for determining likely significant impacts. The relevant tables from the NRA Guidelines (NRA 2008a) are as follows:

- Box 4.1: Criteria for Rating Site Attributes – Estimation of Importance of Soil and Geology Attributes (as outlined in Table 14.4);
- Box 4.3: Criteria for Rating Site Attributes – Estimation of the Importance of Hydrogeology Attributes (as outlined in Table 14.5);
- The magnitude of impacts should be defined in accordance with the criteria provided in the NRA Guidelines (as outlined in Table 14.6).
- Box 5.1: Criteria for Rating Site Attributes at Environmental Impact Assessment (EIA) Stage – Estimation of Magnitude of Impact on Soil / Geology Attribute (as outlined in Table 14.7);
- Box 5.3: Criteria for Rating Site Attributes at EIA Stage – Estimation of Magnitude of Impact on Hydrogeology Attributes (as outlined in Table 14.8); and
- Box 5.4: Rating of Significant Environmental Impacts at EIA Stage (as outlined in Table 14.9).

The NRA Guidelines (NRA 2008a) criteria uses similar significance terminology as the EPA Guidelines (EPA 2022). However, it has intermediate steps to justify using that terminology:

- Step 1: Quantify the importance of a feature for geology (Box 4.1) and hydrogeology (Box 4.3);
- Step 2: Estimate the magnitude of the impact on the feature from the Proposed Scheme (Box 5.1, Box 5.3); and
- Step 3: Determine the significance of the impact on the feature from the matrix (Box 5.4) based on the importance of the feature and the magnitude of the impact.

Table 14.4: Criteria for rating the importance of identified geological features (Table C2 (IGI, 2013) and Box 4.1 (NRA, 2008a)).

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and / or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA) Large existing quarry or pit Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and / or soft organic soil underlying route is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage Large recent landfill site for mixed wastes Geological feature of high value on a local scale (County Geological Site) Well drained and / or highly fertility soils Moderately sized existing quarry or pit Marginally economic extractable mineral resource
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and / or soft organic soil underlying route is moderate on a local scale.	Contaminated soil on site with previous light industrial usage Small recent landfill site for mixed wastes Moderately drained and / or moderate fertility soils Small existing quarry or pit Sub-economic extractable mineral resource
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and / or soft organic soil underlying route is small on a local scale*.	Large historical and / or recent site for construction and demolition wastes Small historical and / or recent landfill site for construction and demolition wastes Poorly drained and / or low fertility soils. Uneconomically extractable mineral resource

Table 14.5: Criteria for rating the importance of identified hydrogeological features (Box 4.3 NRA, 2008a).

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by European Union (EU) legislation e.g., cSAC or SPA status
Very High	Attribute has a high quality or value on a regional or national scale	Regionally important aquifer with multiple well fields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers Locally important potable water source supplying >1000 homes Outer source protection area for regionally important water source Inner source protection area for locally important water source
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer Potable water source supplying >50 homes Outer source protection area for locally important water source
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

Table 14.6: Definition of Magnitude of Impact (Table 5.1 (NRA, 2008a)

Magnitude of Impact	Description
Imperceptible	An impact capable of measurement but without noticeable consequences
Slight	An impact that alters the character of the environment without affecting its sensitivities
Moderate	An impact that alters the character of the environment in a manner that is consistence with existing or emerging trends
Significant	An impact which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment

Profound	An impact which obliterates all previous sensitive characteristics

Table 14.7: Criteria for rating Soil and Geology Impact Significance and Magnitude at EIA stage (Table C4 (IGI,2013) and Box 5.1 (NRA, 2008a)

Magnitude of Impact	Criteria	Typical Example
Large Adverse	Results in loss of attribute	Loss of high proportion of future quarry or pit reserves Irreversible loss of high proportion of local high fertility soils Removal of entirety of geological heritage feature Requirement to excavate / remediate entire waste site Requirement to excavate and replace high proportion of peat, organic soils and / or soft mineral soils beneath alignment
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Loss of moderate proportion of future quarry or pit reserves Removal of part of geological heritage feature Irreversible loss of moderate proportion of local high fertility soils Requirement to excavate / remediate significant proportion of waste site Requirement to excavate and replace moderate proportion of peat, organic soils and / or soft mineral soils beneath alignment
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Loss of small proportion of future quarry or pit reserves Removal of small part of geological heritage feature Irreversible loss of small proportion of local high fertility soils and / or high proportion of local low fertility soils Requirement to excavate / remediate small proportion of waste site Requirement to excavate and replace small proportion of peat, organic soils and / or soft mineral soils beneath alignment
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature

Table 14.8: Criteria for rating Hydrogeological Impact Significance and Magnitude at EIA stage (Box 5.1 NRA, 2008a)

Magnitude of Impact	Criteria	Typical Example
Large Adverse	Results in loss of attribute and / or quality and integrity of attribute	Removal of large proportion of aquifer Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems Potential high risk of pollution to groundwater from routine run-off Calculated risk of serious pollution incident during operation >2% annually
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Removal of moderate proportion of aquifer Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems Potential medium risk of pollution to groundwater from routine run-off Calculated risk of serious pollution incident during operation >1% annually
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Removal of small proportion of aquifer Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems Potential low risk of pollution to groundwater from routine run-off Calculated risk of serious pollution incident during operation >0.5% annually

Magnitude of Impact	Criteria	Typical Example
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Calculated risk of serious pollution incident during operation <0.5% annually

Table 14.9: Rating of Environmental Impacts at EIA Stage (NRA, 2008a)

		Magnitude of Impact			
		Negligible	**Small**	**Moderate**	**Large**
Importance of Attribute	**Extremely High**	Imperceptible	Significant	Profound	Profound
	Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
	High	Imperceptible	Moderate / Slight	Significant / Moderate	Severe / Significant
	Medium	Imperceptible	Slight	Moderate	Significant
	Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

14.2.4.4 Mitigation Measures, Residual Impacts and Final Impact Assessment

The third element of the recommended steps builds on the outcome of the preceding two elements, by identifying mitigation measures to address potential significant or profound impacts and then assessing the significance of any residual impacts. Embedded design measures which have been incorporated into the design for the Proposed Scheme are also considered in Section 14.5.

The final impact assessment includes a description of any residual impacts. The significance of any residual impact is determined based on the same methodology and reported.

14.3 Baseline Environment

14.3.1 Introduction

This Section describes the existing conditions and important features in terms of the land, soils, geology and hydrogeology within the study area of the Proposed Scheme. A regional overview is followed by a description of site-specific baseline conditions and a CSM. Features are then identified, and their importance ranked in accordance with the NRA Guidelines (NRA 2008a).

14.3.2 Regional Overview

The regional geomorphology, topography, soils and subsoils, bedrock geology and hydrogeology are discussed in this Section for the majority of County Dublin, including the City Centre and extends north to Swords and to Bray in County Wicklow in the south of the region.

14.3.2.1 Regional Topography and Geomorphology

The topography of the region is dominated by the Wicklow Mountains to the south with undulating topography to the north, west and east with localised highs generally synonymous with outcropping rock or near surface bedrock. There is a gradual drop in elevation across the region from west to east approaching the coast.

The landscape of the Greater Dublin Area (GDA) principally reflects the erosional and depositional legacy of the last period of glaciation, which ended some 10,000 years ago following the Devensian geological period. Glacial erosion of pre-existing topographic features and deposition of thick glacial drift deposits, mainly till (boulder clay), resulted in a rather subdued post-glacial topography.

The post-glacial landscape also reflects the effects of fluvial (river) processes that have altered the topography, with the River Liffey and its tributaries dominating the region, since the ice sheet retreat. The topography of the area reflects the geomorphology, showing topographic lows moving eastwards to the sea near Dublin City, becoming steeper to the west, north and south towards the Dublin and Wicklow Mountains.

There are a large number of geomorphology features across the region including mega scale glacial lineation in the north of the region, streamlined bedrock, numerous meltwater channels, hummocky sands and gravel deposits, drumlins, eskers and glaciofluvial terraces throughout the region (Figure 14.1 in Volume 3 of this EIAR).

The post-glacial landscape also reflects the effects of fluvial (river) processes that have altered the topography, albeit only to a small extent in the region, since the ice sheet retreat. The coastline within the region is characterised by sandy beaches and rock outcrops.

The land uses in the region are mainly comprised of urban developments including but not limited to; industrial, commercial, residential and recreational. Moving away from the City Centre there are also marine, agricultural and forested areas in the region.

14.3.2.2 Regional Soils (Teagasc Classification)

Soils comprise the unconsolidated geological deposits which overlie the subsoil (i.e. the topsoil). The main soils within the region, as classified by Teagasc (Teagasc *et al.* 2017) are presented on Figure 14.2 in Volume 3 of this EIAR and have been listed in Table 14.10.

The majority of Dublin is underlain by made ground with areas of alluvial, estuarine and marine deposits present that may be associated with recent and ancient water bodies. To the north of the region, there are soils which are deep and well drained as well as poorly drained soils derived from basic parent material. To the south of the region the soil is derived from acidic material.

Table 14.10: Summary of Soil Types Within the Region

Soil Code	Description	Location
AeoUND	Aeolian undifferentiated	Coast
AlluvMin	Alluvial (min)	Along river courses and meltwater channels
AminDW	Deep well drained mineral soil (mainly acidic)	South towards Bray
AminPD	Mineral poorly drained (mainly acidic)	South towards Bray
AminPDPT	Peaty Gleys Acidic	Near Wicklow mountains
AminSP	Surface water gleys / Ground water gleys shallow	South towards Bray
AminSW	Shallow well drained mineral soil (mainly acidic)	South towards Bray
AminSRPT	Shallow rocky peaty, non-peaty mineral complexes (mainly acidic)	Near Wicklow mountains
BktPT	Blanket Peat	Near Wicklow mountains
BminDW	Deep well drained mineral soil (mainly basic)	North near Swords
BminPD	Mineral poorly drained (mainly basic)	North near Swords
BminPDPT	Peaty gleys basic parent materials basic	Near Wicklow mountains
BminSP	Surface water gleys / groundwater gleys shallow	South towards Newcastle
BminSPPT	Peaty gleys shallow	Near Wicklow mountains
BminSRPT	Lithosols peats	Near Wicklow mountains
BminSW	Renzinas / Lithosols	Dublin outskirts
Cut	Raised bog cutaway / cutover	Near Wicklow mountains
FenPT	Fenpeat	Near Wicklow mountains
Lac	Lacustrine sediments	South near Wicklow mountains
Made	Made ground	Dublin City and outskirts

Soil Code	Description	Location
MarSands	Marine sands and gravels	Coast
MarSed	Marine / estuarine sediments	Coast
Scree	Scree	Near Wicklow mountains

14.3.2.3 Regional Subsoils (GSI Quaternary Classification)

Superficial deposits (subsoil) comprise the unconsolidated geological deposits which overlie the solid geology. The subsoils within the region, as classified by the GSI Quaternary mapping (GSI 2016a) are presented on Figure 14.3 in Volume 3 of this EIAR and have been listed in Table 14.11.

During the Pleistocene epoch of the Quaternary, two glaciations covered County Dublin and County Wicklow which gave rise to the deposition of glacial till. Typically, during the ice advance, boulder clays were deposited sub-glacially as lodgement till over the eroded bedrock surface, whilst moraine granular deposits were laid down at the glacier margins.

Subsequently, with the progressive retreat of the ice sheets from the region, granular fluvio-glacial deposits were laid down in places by melt waters discharging from the front of the glacier which are generally encountered as sand and gravel lenses within the glacial till deposits. The glacial deposits can exhibit significant lateral and vertical variations in grain size distributions over short distances.

This glacial till is the predominant subsoil of the region and described as till derived from limestones. The subsoils of the region may also be comprised of made ground where major development has occurred. More recent alluvial deposits (silts and clays and sands and gravels) may be present along historic and recent watercourses.

To the east of the region, along the coast the subsoils consist of estuarine silts and clays and marine beach sands. Outcropping and sub cropping rock and till derived from granites and metamorphic rock are present to the south and west of the region where the topography rises towards the Dublin Mountains and Bray.

Table 14.11: List of Subsoils (Quaternary) Within the Region

Soil Type	Description	Location
A	Alluvium	Along river channels and meltwater channels
Ag	Alluvium (gravelly)	Along river channels and meltwater channels
As,	Alluvium (sandy)	Along river channels and meltwater channels
Asi	Alluvium (silty)	Along river channels and meltwater channels
BktPt	Blanket Peat	Near Wicklow Mountains
Cut	Cut over raised peat	Near Wicklow Mountains
AcEsk	Eskers comprised of gravels of acidic reaction	Tallaght / Ballymount
GCh	Gravels derived from chert	North-west Dublin
GLPSsS	Gravels derived from Lower Paleaozoic sandstones and shales	Howth
GLs	Gravels derived from limestones	Dublin City
GMp	Gravels derived from metamorphic rocks	South towards Bray
GGr	Gravels derived from granite	South Dublin
Rck	Bedrock outcrop or subcrop	Localised pockets within Dublin City / near Wicklow Mountains
Scree	Scree	Near Wicklow Mountains
L	Lacustrine sediments	South near Wicklow mountains
Mbs	Marine beach sands	Coast
Mesc	Esturine silts and clays	Portmarnock

Soil Type	Description	Location
TdlMr	Tidal Marsh	Bull Island
IrSTCSsS	Irish Sea Till derived from Cambrian sandstones and shales	Bray South
IrSTLPSsS	Irish Sea Till derived from Lower Paleozoic sandstones and shales	Bray South
IrSTLs	Irish Sea Till derived from limestones	South towards Bray
TCSsS	Till derived from Cambrian sandstones and shales	Bray South
TGr	Till derived from granites	South Dublin
TLPSsS	Till derived from Lower Paleozoic sandstones and shales	South Dublin
TLs	Till derived from limestones	Dublin City
TMp	Till derived from metamorphic rocks	Near Wicklow Mountains
TQz	Till derived from quartzites	South towards Bray
Ws	Windblown sands	Coast
Wsd	Windblown sands and dunes	Coast
Dam	Dam	Tallaght
Embankment	Embankment	Sandyford
Landfill	Landfill	Near Blanchardstown
Urban	Urban (made ground)	Dublin City and outskirts

14.3.2.4 Regional Bedrock Geology

The bedrock geology of the region, as classified by the GSI 1:500,000k Bedrock Geology Map (GSI 2018) are presented on Figure 14.4 in Volume 3 of this EIAR and have been listed in Table 14.12. The region is predominantly underlain by Carboniferous Limestones. The majority of the Dublin City area was a deep marine basin known as the Dublin Basin where these sedimentary rocks were deposited.

To the south of the region, stretching from Dún Laoghaire on the coast in a south to south-west direction and located beneath much of the Dublin and Wicklow Mountains, are the older Caledonian granites known as the Leinster Granite. This is a large intrusion of igneous rock which occurred during the Devonian Period mountain building event known as the Caledonian Orogeny.

The oldest rocks in the region are the Cambrian and Ordovician Metasediments which extend from Loughlinstown towards Bray with the Cambrian Bray Head Formation dominating the Bray to Greystones area and synonymous with the Quartzite of the Sugar Loaf.

The structural geology within the region is highly variable and complex. A series of parallel faults running mainly in a north-west to south-east direction are indicated in the north of the region between Blanchardstown and Dublin Airport. Additional faulting in this area is indicated in a north / north-west to south / south-east direction with associated fold axes both synclinal and anticlinal running in a north-east to south-west direction. The contact between the Lucan formation and the Leinster Granite is characterised by a west-east trending fault. The south of the region is dominated by metamorphic intrusions and north-west / south-east trending faults within the Leinster Granite. The south-eastern section of the region around Bray and Shankill is heavily faulted and folded with a number of west-east thrust faults and numerous north-west / south-east synclinal fold axis.

The depth to bedrock within the region ranges from one metre below ground level (mBGL) in the south-west of the region near Tallaght and the north-west near Blanchardstown to potentially greater than 25mBGL in the Dublin City Centre area and up to 45mBGL in Dublin Port. The bedrock level ranges from 80 metres above Ordnance Datum (mOD) towards the mountainous and inland parts of the region to approximately -40mOD near Dublin Port.

Table 14.12: Rock Formation Within the Region.

Geological Period	Formation	Description	Location
Carboniferous	Visean basinal limestone "Calp"	(Calp) Dark-grey argillaceous and cherty limestone and shale	Central and north County Dublin
	Waulsortian mudbank	Pale grey massive limestone	North-west near the N2 and N3 National Roads, Malahide and Swords
	Courceyan Limestone	Argillaceous dark-grey bioclastic limestone and subsidiary shale	North-west
	Upper Devonian -Lower Carboniferous Old Red Sandstone	Sandstone, conglomerate and siltstone	North of Swords
Caledonian Orogeny (Mountain Building Era)	Caledonian Granite	Granite, granodiorite	South near Bray
Silurian	Silurian sandstone, greywacke and shale	Mudstone, greywacke and conglomerate	South-west
Ordovician	Middle to Upper Ordovician basic volcanics	Basalt-andesite, tuff, slate and mudstone	North-west
	Lower to Middle Ordovician slate	Slate, schist and minor greywacke	South-west
	Lower to Middle Ordovician acid volcanics	Rhyolite and rhyolitic tuff	South-west
	Lower to Middle Ordovician basic volcanics	Basalt-andesite, tuff and shale	South-west
Cambrian	Cambrian Greywacke	Greywacke and Shale	Bray

14.3.2.5 Regional Aquifer Type and Classification

The aquifers of the region, as classified by the National Draft Bedrock Aquifer Map (GSI 2019b) are presented on Figure 14.5 in Volume 3 of this EIAR and have been listed in Table 14.13. The GSI (GSI 2019b) has devised a system for classifying the aquifers in Ireland based on the hydrogeological characteristics, size and productivity of the groundwater resource. The aquifer classes and sub-classes are shown in the National Draft Bedrock Aquifer Map. There are three principal types of aquifer, corresponding to whether they are major, minor or unproductive resources whereby:

- Regionally Important Aquifers are capable of supplying regionally important abstractions (e.g. large public water supplies), or excellent yields (>400 metres cubed per day (m^3/d)).
- Locally Important Aquifers are capable of supplying locally important abstractions (e.g. smaller public water supplies, group schemes), or good yields ($100m^3/d$ to $400m^3/d$); and
- Poor Aquifers are capable of supplying small abstractions (e.g. domestic supplies), or moderate to low yields ($<100m^3/d$).

The lower permeability glacial till soils which overlay the bedrock (gravelly clay / boulder clay), slow infiltration and restrict recharge to bedrock aquifers. The glacial till is not classified as an aquifer by the GSI.

Under the WFD, the regional hydrogeology has been assessed using the GSI groundwater viewer (GSI 2019b). The regional groundwater bodies (GWB) in the area are (refer to Figure 14.5 in Volume 3 of this EIAR):

- Dublin GWB;
- Swords GWB;
- Kilcullen GWB; and
- Wicklow GWB.

Table 14.13: Aquifer Types Within the Region

Aquifer Type	Location	Description	Code
Locally Important	North and centre of the region	Bedrock which is moderately productive only in local zones	(Ll)
	Bray (south-eastern extent of the region	Gravel	(Lg)
Poor Aquifer	Most of southern extent of the region	Bedrock which is generally unproductive except for local zones	(Pl)

14.3.2.6 Regional Aquifer Vulnerability

Aquifer vulnerability of a groundwater body is the term used to describe the intrinsic geological and hydrogeological characteristics which determine the ease with which a groundwater body may be contaminated by human activities.

The vulnerability is determined by the travel time and the attenuation capacity of the overlying deposits. The groundwater vulnerability is determined mainly by the permeability and thickness of the subsoils that underlay the topsoil. For example, bedrock with a thick, low permeability overburden is less vulnerable than bedrock with a thin high permeability, gravel overburden.

The GSI aquifer vulnerability classification guidelines (GSI 2019b), which are outlined in Table 14.14, demonstrate that the aquifers are most at risk in areas where subsoils are thin or absent and where karst features such as swallow holes are present. This is due to the ability of potential contaminants to reach the aquifer in a relatively short period and with little or no contaminant attenuation due to the thin or absent overburden. The regional groundwater vulnerability varies significantly across the region, ranging from Rock at Surface (X) to Low (L) vulnerability.

Table 14.14: Aquifer Vulnerability

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High Permeability (Sand / Gravel)	Moderate Permeability (e.g. Sandy Subsoil)	Low Permeability (e.g. Clayey Subsoil, Clay, Peat)	Sand / Gravel Aquifers Only)	(<30m Radius)
Rock at or close to surface (X)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Extreme (E)	0m – 3.0m	0m – 3.0m	0m – 3.0m	0m – 3.0m	Not applicable
High (H)	>3.0m	3.0m – 10.0m	3.0m – 5.0m	>3.0m	Not applicable
Moderate (M)	Not applicable	>10.0m	5.0m – 10.0m	Not applicable	Not applicable
Low (L)	Not applicable	Not applicable	>10.0m	Not applicable	Not applicable

14.3.2.7 Regional Recharge

Recharge is the amount of rainfall that replenishes the aquifer. It is a function of the effective rainfall, the permeability and thickness of the subsoil and the aquifer characteristics. The annual groundwater recharge across the region ranges from approximately 1mm/yr (millimetre per year) to 600mm/yr (as shown in Figure 14.6 in Volume 3 of this EIAR).

14.3.2.8 Regional Groundwater Abstractions

Groundwater resources describe any large spring, well or boreholes which are used as a groundwater abstraction source by domestic, agricultural, commercial, industrial, local authority or group water scheme users.

The GSI keeps a record of groundwater wells drilled (GSI 2019b). However, the record does not state which wells are currently used for abstraction.

In addition to these abstractions, both Dublin City Council (DCC) and Fingal County Council (FCC) also maintains a database of groundwater and surface water abstractions. However, this data is not available to the public. The EPA have also launched a register of water abstractions, whereby people who abstract 25m^3 (cubic metres) of water or more per day are required to register their water abstraction. However, this data is not available to the public.

Source Protection Zones (SPZ) reports have been produced by the GSI (GSI 2019b) in conjunction with the EPA for groundwater sources, particularly public water supplies, group water schemes or important industrial supplies. The reports aim to guide development planning and regulation to provide protection to groundwater sources. To date no SPZ reports have been produced with regard to any sites within the study area.

Groundwater is not used extensively for residential or industrial purposes in the area. The majority of potable water used within the region is abstracted elsewhere and piped to the region, and therefore groundwater abstraction is not considered further in this Chapter.

14.3.2.9 Groundwater Quality and Levels

Based on professional experience and previous ground investigations in the area, groundwater levels are generally within 5m of the surface in Dublin City and are closer to the surface near rivers and streams. Historical groundwater monitoring is available from a monitoring borehole at the GSI Beggar's Bush Office, Dublin 4 (monitored from 1990 to 2000). Groundwater level monitoring has commenced at Beggar's Bush since August 2018 with the data available online (GSI 2019e). Beggar's Bush lies approximately 2 kilometers (km) south-east of the City Centre. There is an inactive EPA monitoring borehole located in Goatstown, Dublin 14 which is approximately 6km south of the City Centre (monitored from 1997 to 2006). The results from both monitoring points show that the groundwater levels have a seasonal range over their entire monitoring record of 0.55m and 0.27m respectively.

The hydro-chemical analyses of groundwater within the Dublin GWB is available at the EPA Ryewater monitoring stations at Carton House, near Maynooth, County Kildare. The limestone groundwater quality is very hard water (350 milligrams per litre (mg/l) to 480mg/l of Calcium carbonate ($CaCO_3$)), with a high alkalinity (300mg/l to 350mg/l ($CaCO_3$)) and conductivities (550 micro siemens per centimetre (µS/cm) to 900µS/cm). The pH is relatively neutral ranging from 6.5 to 7.5.

Further to the south where the region is underlain by granites of the Maulin Formation, the groundwater is softer and less mineralised with hardness values of 100mg/l ($CaCO_3$) to 150mg/l ($CaCO_3$), alkalinity of <50mg/l ($CaCO_3$) and conductivity values of 300µS/cm to 500µS/cm and a lower pH range of 6 to 7.

14.3.2.10 Regional Hydro-Ecology Designated Sites

Designated protected sites within Ireland compiled by the National Parks and Wildlife Service (NPWS) such as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) could be groundwater dependent habitats and therefore an impact on the hydrogeology could be an impact on a designated site. Further information regarding the designated sites within the region are provided in Chapter 12 (Biodiversity). Only the hydrogeology related impacts on groundwater dependant designated sites are assessed within this Chapter.

14.3.2.11 Regional Geological Heritage

The basic designation for wildlife is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. The GSI is compiling a list of geological / geomorphological sites in need of protection through NHA designation. These sites will be compiled from the existing database of County Geological Sites (CGS) (GSI 2019c), as listed in Table 14.15.

Table 14.15: Designated Sites Within the Region.

Designation Code	Designated Site
CGS, SPA	North Bull Island
CGS	Glasnevin Cemetery
CGS	Phoenix Park
CGS	River Poddle
CGS	Greenhills Esker
CGS	Dodder Terraces
CGS	Belgard Quarry
CGS	Killiney Bay
CGS	Enniskerry Delta
CGS	GPO (General Post Office)
CGS	Museum Building, Trinity College Dublin
CGS	Oscar Wilde Statue
CGS	51 St. Stephens Green
CGS	Dublin City Walls
CGS	Temple Bar Street Well
CGS	Guinness Wells
CGS	Kippure
CGS	Lucan Esker
CGS	Liffey Valley Centre road sections
CGS	N4 Lucan cutting
CGS	Ballinascorney Quarry
CGS	Newcastle Buried channel
CGS	Carrickgollogan
CGS	Ballycorus
CGS	Killiney Hill
CGS	White Rock, Killiney
CGS	Ballybetagh Bog
CGS	Dalkey Island
CGS	Killiney Bay
CGS	The Scalp
CGS	Three Rock Mountain
CGS	Blackrock Breccia
CGS	Dalkey Hill
CGS	Murphystone Quarry
CGS	Enniskerry Delta
CGS	Glencullen River
CGS, pNHA	River Dargle Valley
CGS, SAC	Bray Head

14.3.3 Site Specific Environment

The following Section discusses the site-specific conditions (refer to Figure 14.7 to Figure 14.15 in Volume 3 of this EIAR) within the study area for the Proposed Scheme as defined in Section 14.2.1. Where applicable the importance of the attributes for which the impact of the Proposed Scheme is to be assessed are reported in this Section.

14.3.3.1 Current and Historic Land Use

The current and historic land use is discussed in order to give context to any potential changes to land, soils, geology and hydrogeology that has the potential to influence the importance of a feature and the magnitude of any impacts. The current land use is based on current aerial imagery and mapping available from Ordnance Survey Ireland (OSI) (OSI 2019), Google (Google 2019), Bing (Bing 2019) and the Corine Land Cover maps (EPA 2018). The historic land use is based on the following OSI (OSI 2019) historic aerial imagery and historic maps:

- OSI 6-inch mapping produced between 1837 and 1842;
- OSI 25-inch mapping produced between 1888 and 1913;
- OSI 6-inch Cassini mapping produced between 1830 and 1930s;
- OSI 1995 aerial photography;
- OSI 2000 aerial photography; and
- OSI 2005 aerial photography.

14.3.3.1.1 N3 Blanchardstown Junction to Snugborough Road

The Corine Land Cover 2018 classifies the land use of the study area between the N3 Blanchardstown Junction to Snugborough Road as a discontinuous urban fabric, with sections being described as industrial-commercial units and green urban areas. The green urban areas include the Tolka Valley Park and Millennium Park located within the study area and the industrial and commercial units area include for the Blanchardstown Shopping Centre. The N3 itself is classified as road and rail network.

Historically, the OSI 6-inch mapping shows agricultural land with a small number of scattered developments. Three gravel pits are located on the eastern bank of the River Tolka and to the north of Snugborough Road. Another gravel pit is located beneath the current footprint of the Snugborough Road bridge over the N3.

The OSI 25-inch mapping shows no notable increase in development within the study area, however the 6-inch Cassini shows a small increase in development including the Coolmine Cottages to the north of the N3 Junction 3.

It should be noted that the 1995 OSI aerial photography is in black and white and of poor resolution. Significant urban development is recorded in the study area with large housing estates located to the north-west of the R121 (Blanchardstown Road South) and to the north-east of the River Tolka. The construction of the Blanchardstown Centre is also evident. The N3 has also been constructed and a significant alteration of the Navan Road.

The 2000 OSI aerial photography shows an increase in residential development to the north and west of the N3 Junction 3 as well as the constructed Blanchardstown Centre.

The 2005 OSI aerial photography imagery shows further residential development to the north and west of the N3 Junction 3.

The 2019 Google Maps aerial imagery shows no notable change in land use from the OSI 2005 aerial photography.

14.3.3.1.2 Snugborough Road to N3 / M50 Junction

The Corine Land Cover 2018 classifies the land use of the study area between Snugborough Road and the N3 / M50 Junction as predominantly discontinuous urban fabric. Green urban areas include the Tolka Valley Park and the N3 itself is classified as road and rail network.

Historically, the OSI 6-inch mapping shows agricultural land with scattered developments mostly in the vicinity of Blanchardstown Village. Four gravel pits are located in the River Tolka Valley Park on the northern bank of the River Tolka and south of Waterville Road. A corn mill was located on the northern bank of the River Tolka at the Mill Road. A worsted mill was located on the northern bank of the Royal Canal on the Old Navan Road. A quarry was located at Ashleigh Green and another quarry was located under the footprint of the N3 / M50 Junction roundabout.

The OSI 25-inch mapping shows an increase in residential development around Blanchardstown Village and an increase in industrial development around the Royal Canal. The Midland Great Western Railway runs parallel with the Royal Canal west of the N3 / M50 Junction. A corn mill was located on the northern bank of the River Tolka at the Mill Road. A Margarine factory was located on the northern bank of the Royal Canal at the Old Navan Road. Disused gravel pits were located on the northern side of the River Tolka at the eastbound N3 slip road and beneath the current footprint of the N3. A gravel pit was located on the northern bank of the River Tolka south of Waterville Road. A quarry was located beneath the footprint of the N3.

The 1995 OSI aerial photography shows significant urban development is recorded in the study area south of the N3. The construction of the M50 is also evident.

The 2000 OSI aerial photography shows an increase in residential development to the south of the N3. A construction site is evident in the land around Tory Square. Connolly Hospital occupies a significant area of land to the north of the N3. The construction of the M50 north and southbound is completed.

The 2005 OSI aerial photography imagery shows further development to the north of the N3 north of Waterville Road and within the grounds of Connolly Hospital.

The 2019 Google Maps aerial imagery shows an increase in road infrastructure around the N3 / M50 Junction. Landscaping of Waterville Park is completed with the installation of a pond.

14.3.3.1.3 N3 / M50 Junction (Junction 6) to Navan Road / Ashtown Road Junction

The Corine Land Cover 2018 classifies the land use to the south of the Navan Road between the N3 / M50 Junction (Junction 6) and the Navan Road / Ashtown Road Junction as predominately discontinuous urban fabric with a large area north of Deerpark Drive classified as green urban areas. The area to the north of the Navan Road is classified as land principally occupied by agriculture with significant areas of natural vegetation

Historically, the OSI 6-inch mapping shows agricultural land with scattered developments. A quarry was located west of Phoenix Park Avenue. An oil mill was located on Mill Lane.

The OSI 25-inch mapping shows very little increase in residential development in the study area with notable development in commercial and industrial uses. South of the Navan Road the land use changed from agricultural land to the Phoenix Park Club Racecourse. The Ashtown Oil Mills are located at Mill Lane. The Midland Great Western Railway runs along the bank of the Royal Canal which is within the study area between the N3 / M50 Junction (Junction 6) and the Navan Road / Ashtown Road Junction.

The 6-inch Cassini mapping shows further industrial development west of Mill Lane with a Polish factory and Ashtown Tin Box Manufactory. A burial ground was located on River Road east of the M50.

The 1995 OSI aerial photography shows significant urban development is recorded in the study area south of the N3 / M50 Junction. The construction of the M50 is also evident.

The 2000 OSI aerial photography shows an increase in residential development to the south of the N3 between the N3 / M50 Junction and Castleknock Manor and industrial and commercial development west of Ashtown Road. The Phoenix Racecourse buildings have been demolished and the land within the study area returned to grassland.

The 2005 OSI aerial photography imagery shows some further development in the study area the most notable of which being the construction site west of Castleknock Road on the site of the former Phoenix Racecourse.

The 2019 Google Maps aerial imagery shows an increase in road infrastructure around the N3 / M50 Junction and the increase in development west of Castleknock Road.

14.3.3.1.4 Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

The Corine Land Cover 2018 classifies the land use in the study area between Navan Road / Ashtown Road Junction and Navan Road / Old Cabra Road as predominately discontinuous urban fabric. The area to the south of Blackhorse Avenue is classified as green urban areas.

Historically, the OSI 6-inch mapping shows agricultural land with scattered dwellings.

The OSI 25-inch mapping shows a slight increase in mixed development throughout the study area. A graveyard was located on the Navan Road at St Joseph's School for Deaf Boys and a military cemetery was located south of Slemish Road

The 6-inch Cassini mapping shows further development particularly between Baggot Road and the Navan Road / Old Cabra Road Junction. The military cemetery is still evident south of Slemish Road.

The 1995 OSI aerial photography shows significant urban development is recorded in the study area. Undeveloped areas include Phoenix Park and Pope John-Paul Park as well as a number of sports grounds.

The 2000 OSI aerial photography shows an increase in residential development east of Kinvara Avenue and commercial development west of Dunard Road

The 2005 OSI aerial photography imagery shows some no notable further development in the study area compared to the 2000 OSI aerial photography.

The 2019 Google Maps aerial imagery no notable further development in the study area compared to the 2005 OSI aerial photography.

14.3.3.1.5 Navan Road / Old Cabra Road Junction to Ellis Quay

The Corine Land Cover 2018 classifies the land use in the study area between Navan Road / Old Cabra Road Junction and the railway line as predominately discontinuous urban fabric. The land use between the railway line and Ellis Quay is predominately continuous urban fabric with an area of green urban fabric to the east at Technical University Dublin (TUD) Grangegorman.

Historically, the OSI 6-inch mapping shows agricultural land with scattered dwellings between the Navan Road / Old Cabra Road Junction and the North Circular Road. Between the North Circular Road and Brunswick Street North there is an increase in the density of development and between Brunswick Street North and Ellis Quay the area comprises predominantly urban development.

The OSI 25-inch mapping shows a significant increase in urban development in the study area, particularly to the south of the Old Cabra Road between North Circular Road and Brunswick Street. The Amiens Street & North Wall Branch railway line transects the Proposed Scheme east of the Navan Road / Old Cabra Road Junction. A tramway transects the Proposed Scheme at North Circular Road. A sawmill was located on Brunswick Street North. A Scavenging Depot and Destructor and a Malt House were located on Stanley Street. A tramway ran from the Scavenging Depot and Destructor on Stanley Street, along North Brunswick Street, Georges Lane and down Queen Street and onto Ellis Quay. A tramway also ran along Ellis Quay. A graveyard was located south of Kings Street North and another west of Ard Ri Place. A cattle market and abattoir were located on the North Circular Road

The 6-inch Cassini mapping shows significant development between the Navan Road / Old Cabra Road Junction and the North Circular Road. The cattle market and abattoir identified on North Circular Road in the OSI 25-inch mapping are also identified on the Cassini mapping.

The 1995 OSI aerial photography shows an increase in residential development south of the Old Cabra Road Junction and in the place of the cattle market off North Circular Road.

The 2000 OSI aerial photography shows some no notable further development in the study area compared to the 2000 OSI aerial photography.

The 2005 OSI aerial photography imagery shows some no notable further development in the study area compared to the 2000 OSI aerial photography.

The 2019 Google Maps aerial imagery no notable further development in the study area compared to the 2005 OSI aerial photography.

14.3.3.2 Geomorphology and Topography

The geomorphology and topography is discussed in order to give context to any potential changes to land, soils, geology, and hydrogeology that could influence the importance of a feature and the magnitude of any impacts. The geomorphology (GSI 2016a) and the topography are shown on Figure 14.7 in Volume 3 of this EIAR.

14.3.3.2.1 N3 Blanchardstown Junction (Junction 3) to Snugborough Road

The Proposed Scheme will begin at the N3 Blanchardstown Junction (Junction 3) and Blanchardstown Shopping Centre which according to the OSI 10m contours is at an elevation between 50mOD to 60mOD and gradually falls to approximately 50mOD at Snugborough Road.

The GSI Quaternary Geomorphology map shows a number of glacial features including a glaciofluvial terrace underlying the Proposed Scheme under the N3 Blanchardstown immediately north and south of Junction 3. A historic meltwater channel which underlies the River Tolka in the north-east of the study area. Hummocky sands and gravels will intersect the Proposed Scheme at the Junction of Blanchardstown Road South and Blakestown Way to the west of Blanchardstown Shopping Centre.

14.3.3.2.2 Snugborough Road to N3 / M50 Junction (Junction 6)

This Section of the Proposed Scheme will remain at a consistent level between 50mOD and 60mOD from Snugborough Road to the N3 / M50 Junction, the topography does fall sharply to the east of the Study Area to 40mOD into the River Tolka Valley.

The GSI Quaternary Geomorphology map shows a number of glacial features in this Section of the Proposed Scheme which includes a glaciofluvial terrace which will intersect the Proposed Scheme at Junction 2 of the N3 and extends east and west into the Study area underlying the River Tolka Valley Park and the green urban area north-east of Main street in Blanchardstown. A historic meltwater channel underlying the River Tolka will intersect the Proposed Scheme at two locations along the N3 in this Section. A localized pocket of hummocky sands and gravels is recorded underlying the N3 at Talbot Court south of the N3 / M50 Junction within the Study Area.

14.3.3.2.3 N3 / M50 Junction (Junction 6) to Navan Road / Ashtown Road Junction

This Section of the Proposed Scheme will remain at a consistent level of 50mOD from N3 / M50 Junction to the Navan Road / Ashtown Road Junction.

The GSI Quaternary Geomorphology map includes the following features, a glaciofluvial terrace which is present within the Study Area to the east of the N3 / M50 Junction underlying New River Road to River Road. A historic meltwater channel lies to the north-east of the Study Area underlying the River Tolka.

14.3.3.2.4 Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

The Proposed Scheme will gradually fall from 50mOD at the Navan Road / Ashtown Road Junction to 30mOD the Navan Road / Old Cabra Road Junction.

The GSI Quaternary Geomorphology map shows no glacial features along this Section of the Proposed Scheme.

14.3.3.2.5 Navan Road / Old Cabra Road Junction to Ellis Quay

This Section of the Proposed Scheme will gradually fall from 30mOD at the Navan Road / Old Cabra Road to 10mOD at Ellis Quay.

The GSI Quaternary Geomorphology map indicates that the Proposed Scheme will intersect a deposit of glaciofluvial terrace gravels along the R805 between King Street North and Blackhall Court.

14.3.3.3 Soils (Teagasc Soil Classification)

The majority of the soils expected to be encountered within the study area are made ground comprising varying forms of hard standing materials including road pavements and footpaths. However, there are topsoil and other soils present within the study area for which there are a number of classifications on the Teagasc Soil Map (Teagasc *et al.* 2017). The main soils within the study area, as classified by Teagasc (Teagasc *et al.* 2017) are presented on Figure 14.8 in Volume 3 of this EIAR and are listed in Table 14.16 along with their importance with respect to drainage and fertility, as determined by Box 4.1 in the NRA Guidelines (NRA 2008a). Where these soils are important features with respect to possible soft soils or contamination their importance is detailed in Section 14.3.3.8 and Section 14.3.3.9.

14.3.3.3.1 N3 Blanchardstown Junction (Junction 3) to Snugborough Road

The underlying soils within the study area from the N3 Blanchardstown Junction to Snugborough Road are predominantly classified as made ground with the exception of topsoil (BminDW and BminPD) which intersect the Proposed Scheme from the N3 Blanchardstown exit to the Blanchardstown Shopping Centre. There are also pockets of topsoil composed of BminSW and alluvial deposits which are located along the alignment of the River Tolka in the north-east of this study area.

14.3.3.3.2 Snugborough Road to N3 / M50 Junction (Junction 6)

This Section of the Proposed Scheme is predominantly composed of made ground to the south of the Proposed Scheme with the exception of topsoil (AlluvMIN, BminDW and BminSW) along and either side of the alignment of the River Tolka and localized pockets of topsoil (BminSW) to the south-west of Junction 6. To the north of the Proposed Scheme, the study area predominantly comprises topsoil (BminSW) with localized pockets of topsoil (AlluvMIN and BminDW) south-east of Junction 2 and north-west of Junction 6.

14.3.3.3.3 N3 / M50 Junction (Junction 6) to Navan Road / Ashtown Road Junction

The southern area of this Section is composed of predominantly made ground with localized deposits of topsoil (BminDW and BminPD) at Russell Park east of Phoenix Avenue. To the north of the Proposed Scheme between the junction of Phoenix Park Avenue and the Navan Road there is a concentration of topsoil (BminPD, BminDW). A small deposit of BminSW is recorded east of Junction 6 along the boundary of the study area. There is a pocket of alluvial deposits (AlluvMIN) to the north of the N3 / M50 Junction within the study area which is associated with the alignment of the River Tolka.

14.3.3.3.4 Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

This Section is generally composed of made ground. There are localised deposits of topsoil (BminPD, BminDW) to the south of the Proposed Scheme on the northern edge of the Phoenix Park. There is a pocket of alluvial deposits (AlluvMIN) to the north of the Proposed Scheme west of Nephin Road within the study area. This is associated with the Bradoge watercourse to the south-east, the River Tolka to the north and the Viceregal watercourse to the south-west (Sweeney C.L, 2017).

14.3.3.3.5 Navan Road / Old Cabra Road Junction to Ellis Quay

This Section of the study area is composed of made ground. There is a pocket of alluvial deposits (AlluvMIN) to the east of the Proposed Scheme at Ellis Quay underlying Croppies Arce Memorial Park. These deposits are associated with the River Liffey.

Table 14.16: Soils Within the Study Area

Soil Type	Notes / Description	Location	Importance	Justification for Importance Rating
Made Ground – Made	Associated with urban development	Widespread	Low	Poorly drained and / or low fertility soils
Alluvium – AlluvMIN	Typically found along current and historic watercourses	Along the River Tolka and at Pope John Paul Park.	Medium	Moderately drained and / or moderate fertility soils
Topsoil – BminSW	Shallow well drained (Mainly basic)	North of N3 junction 3, north of the River Tolka between N3 junction 2 and M50 Roundabout and around the M50 roundabout.	High	Well drained and / or high fertility soils
Topsoil – BminDW	Deep well drained (Mainly basic)	Between N3 junction 3 and junction 2, along the northern side of the Navan Road and around Phoenix Park.	High	Well drained and / or high fertility soils
Topsoil – BminPD	Poorly drained (Mainly Basic)	North-east of N3 junction 3, along the northern side of the Navan Road, south of Navan road along the border of Phoenix Park	Low	Poorly drained and / or low fertility soils

14.3.3.4 Subsoil Deposits (GSI Quaternary Classification)

Superficial deposits (subsoil) comprise the unconsolidated geological deposits which overlie the solid geology. The subsoils within the study area, as classified by the GSI Quaternary mapping (GSI 2016a) are presented on Figure 14.9 in Volume 3 of this EIAR and are listed in Table 14.17 along with their importance with respect to feature quality and significance as determined by Box 4.1 of the NRA Guidelines (NRA 2008a). Where these subsoils are important features with respect to possible soft soils or contamination, their importance is detailed in Section 14.3.3.8 and Section 14.3.3.9.

The main subsoils encountered within the study area are predominately glacial tills. Additionally, there are areas of made ground (Urban), alluvial deposits, gravels and shallow bedrock as discussed below.

14.3.3.4.1 N3 Blanchardstown Junction (Junction 3) to Snugborough Road

The GSI quaternary subsoils map show this Section of the study area is predominantly underlain by till derived from limestone. Gravels derived from limestones intersect the Proposed Scheme west of Blanchardstown Shopping Centre on Blanchardstown Road South adjacent to Whitestown Grove to the Junction of Blanchardstown Road South and Blakestown Way. There are pockets of gravels derived from limestone, alluvial deposits and bedrock subcrop / outcrop which underlie the Proposed Scheme at Junction 3 and to the north-east of Junction 3 along the alignment of the River Tolka.

14.3.3.4.2 Snugborough Road to N3 / M50 Junction (Junction 6)

The GSI quaternary subsoils map show that the southern area of this Section is predominantly underlain by till derived from limestone with small pockets of gravels derived from limestones at St. Brigid's Church Blanchardstown and at Talbot Court south of the N3 / M50 Junction. To the north, the River Tolka is underlain by alluvium and bedrock subcrop and outcrop deposits, which intersect the Proposed Scheme along the N3 immediately after Junction 2 of the N3 and to the west of the Junction of the N3 and Mill Road.

14.3.3.4.3 N3 / M50 Junction (Junction 6) to Navan Road / Ashtown Road Junction

The GSI quaternary subsoils map show this Section is predominantly underlain by till derived from limestone. A pocket of gravels derived from limestones intersect the Proposed Scheme on the eastern side of the N3 / M50 Junction. There are alluvial deposits and bedrock subcrop / outcrop along the alignment of the River Tolka. There are small pockets of bedrock subcrop and outcrop which intersect the Proposed Scheme to the east of New River Road and are present south of the Proposed Scheme east of Russell Park within the study area.

14.3.3.4.4 Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

The GSI quaternary subsoils map shows this Section is mainly underlain by till derived from limestones. There is a large pocket of alluvium which intersect the Proposed Scheme west of Nephin Road, Cabra.

14.3.3.4.5 Navan Road / Old Cabra Road Junction to Ellis Quay

The GSI quaternary subsoils map show this Section is mainly underlain by till derived from limestones. Gravels derived from limestone are recorded along King Street North and the deposit is running in an east – west direction. A pocket of alluvium intercepts the Proposed Scheme at Hendricks Street to Ellis Quay and also the area underlying Croppies Arce Memorial Park. Urban fill is recorded from Kings Street North to the River Liffey.

Table 14.17: Subsoils Within the Study Area

Subsoil Type	Description	Location	Importance	Justification for Importance Rating
Made Ground - Urban	Associated with urban development	Between Blackhall Court and Hendrick Street and south of Benburb Street towards the River Liffey.	Low	Low value on a local scale
Alluvium - A	Typically found along current and historic watercourses	Along the River Tolka, around Pope John Paul Park and east of Henrick Place towards Ellis Quay.	Low	Low value on a local scale
Glacial gravels - GLs	Gravels derived from limestones	Between N3 junction 2 and Abbotstown, south of Blanchardstown village, west and north-east of the M50 roundabout and around King Street North.	Low	Low value on a local scale
Glacial till - TLs	Till derived from limestones	Widespread	Low	Low value on a local scale
Rock - Rck	Bedrock outcrop or subcrop	North-west of N3 junction 3, north of the River Tolka between Blanchardstown Shopping Centre and Snugborough Road, along the River Tolka north of the River Tolka Bridge as far as Castleknock and south of the Navan Road at Ashtown.	Low	Low value on a local scale

14.3.3.5 Bedrock Geology

The bedrock geology of the study area, as classified by the GSI 1:100,000k Bedrock Geology Map (GSI 2018) are presented on Figure 14.10 in Volume 3 of this EIAR and have been listed in Table 14.18 along with their importance with respect to feature quality and significance as determined by Box 4.1 in the NRA Guidelines (NRA 2008a). Where the bedrock is an important feature with respect to economic geology its importance is detailed in Section 14.3.3.10.

14.3.3.5.1 N3 Blanchardstown Junction to Snugborough Road

The 1:100,000 GSI bedrock geology map of the area indicates that the underlying bedrock along the Proposed Scheme comprises the Lucan Formation (locally known as Calp Limestone).

There is one location within this subsection of the study area where the Tober Colleen Formation intersects the Proposed Scheme. This occurs to the north-east of Blanchardstown shopping Centre.

There are two north-east to south-west trending faults along this subsection. The first fault occurs north-west Junction 2 of the N3 within the study area. The second fault occurs further south and intercepts the Proposed Scheme within Blanchardstown Shopping Centre.

14.3.3.5.2 Snugborough Road to N3 / M50 Junction (Junction 6)

The Lucan Formation underlies the study area from Junction 2 to Mill Road / N3 Junction. The Tober Collen Formation underlies the remainder of this subsection to Junction 6.

There is a north-east to south-west trending anticline fold structure which intersects the Proposed Scheme adjacent to Talbot Court south of the Navan Road. There is also a north-east to south-west trending fault which intersects the Proposed Scheme at the N3-M50 Junction within the study area.

14.3.3.5.3 N3 / M50 Junction (Junction 6) to Navan Road / Ashtown Road Junction

Within this subsection, the study area is underlain by the Tober Colleen Formation from Junction 6 to the junction of the Navan Road and Morgan's Place. The Lucan Formation underlies the remainder of the study area.

14.3.3.5.4 Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

The study area from the Navan Road (R147) to Navan Road (R147) / Old Cabra Road Junction is underlain by the Lucan Formation.

14.3.3.5.5 Navan Road / Old Cabra Road Junction to Ellis Quay

This subsection of the Proposed Scheme is underlain by the Lucan Formation.

Table 14.18: Rock Formations Within the Study Area

Formation	Description	Location	Importance	Justification for Importance Rating
Lucan	(Calp) Dark Limestone and shale -Carboniferous	Widespread	Low	Low value on a local scale
Tober Colleen Formation	Calcareous shale, limestone conglomerate - Carboniferous	Between N3 junction 2 and junction 3 and along the N3 north of Blanchardstown Village to Circle K Ashtown on the Navan Road.	Low	Low value on a local scale

14.3.3.6 Ground Investigation

A summary of the ground conditions encountered by historical ground investigations adjacent to the Proposed Scheme and the scheme specific ground investigation (listed in Section 14.2.3.2) are presented in Table 14.19 to Table 14.23.

The data presented in the tables are indicative and strata depth and presence will vary by location. The historical ground investigation data was carried out for purposes and projects other than this EIAR. Therefore, although the historical ground investigation data provides useful indication of ground conditions, the quality of the data cannot be verified.

Table 14.19: Summary of Ground Conditions Expected to be Encountered from N3 Blanchardstown to Snugborough Road

Strata	General Extent/Location	Top of Strata (mBGL)	Thickness of Strata (m)
Topsoil	Green areas – including parks, large estates and golf courses	0.00	0.2 to 0.4
Made Ground	Found at some locations	0.0 to 0.2	0.55 to 3.2
Glacial Till (Brown and Black Boulder Clay with lenses of fluvioglacial sands and gravels)	Widespread	0.6 to 3.2	Not proven

Strata	General Extent/Location	Top of Strata (mBGL)	Thickness of Strata (m)
Bedrock	Widespread	5.0 to 6.3	N/A

Table 14.20: Summary of Ground Conditions Expected to be Encountered from Snugborough Road to N3 / M50 Junction (Junction 6)

Strata	General Extent/Location	Top of Strata (mBGL)	Thickness of Strata (m)
Topsoil	Green areas – including parks, large estates and golf courses	0.0	0.1 to 0.5
Made Ground	Found in some locations	0 to 0.2	0.2 to 2.0
Alluvium	River Tolka	3.4	1.6
Glacial Till (Brown and Black Boulder Clay with lenses of fluvioglacial sands and gravels)	Widespread	0.5 to 3.0	2.2 to 29.4
Bedrock	Widespread	0.3 to 4.3	N/A

Table 14.21: Summary of Ground Conditions Expected to be Encountered from N3 / M50 Junction (Junction 6) to Navan Road / Ashtown Road Junction

Strata	General Extent/Location	Top of Strata (mBGL)	Thickness of Strata (m)
Topsoil	Green areas – including parks, large estates and golf courses	0.00	0.1 to 0.7
Made Ground	Widespread	0.1 to 0.2	0.5 to 4.9
Glacial Till (Brown and Black Boulder Clay with lenses of fluvioglacial sands and gravels)	Widespread	0.2 to 2.0	3.5 to 9.2
Bedrock	Widespread	8.5 to 10.6	N/A

Table 14.22: Summary of Ground Conditions Expected to be Encountered from Navan Road / Ashtown Road Junction to Navan Road Old / Cabra Road Junction

Strata	General Extent/Location	Top of Strata (mBGL)	Thickness of Strata (m)
Glacial Till (Brown Boulder Clay with lenses of fluvioglacial sands and gravels)	Widespread	0.0	3.4 to 6.9
Glacial Till ((Brown and Black Boulder Clay with lenses of fluvioglacial sands and gravels)	Widespread	3.4 to 69	0.0 to 1.5
Bedrock	Widespread	3.35 to 8.00	N/A

Table 14.23: Summary of Ground Conditions Expected to be Encountered from Navan Road Old / Cabra Road Junction to Ellis Quay

Strata	General Extent/Location	Top of Strata (mBGL)	Thickness of Strata (m)
Topsoil	Green areas – including parks, large estates and golf courses	0.0	0.3 to 0.6
Made Ground	Widespread	0.0 to 0.6	0.3 to 6.5
Alluvium	Near watercourses	0.4 to 2.5	0.5 to 1.0
Sands and Gravels	Near watercourses	0.5 to 4.0	6.1 to 16.0
Glacial Till ((Brown and Black Boulder Clay with lenses of fluvioglacial sands and gravels)	Widespread	0.3 to 4.0	not proven
Bedrock	Widespread	9.1 to 13.8	N/A

14.3.3.7 Karst

Karst is a type of geological feature characterised by caves, caverns and other types of underground drainage resulting from the dissolution of the underlying bedrock. This typically occurs in areas of high rainfall with soluble rock.

There are no karst features identified within the study area in the GSI karst database (GSI 2019b). Consequently, the risk of karst is deemed negligible due to the geology of the region not being known to contain karst features and will not be further assessed.

14.3.3.8 Soft and / or Unstable Ground

Soft soils consist of peat, fine grained alluvium or very soft cohesive material. Their presence within the study area could result in an impact if they require excavation and are therefore considered important features. Various sources of information were consulted in establishing these areas within the study area namely:

- Teagasc soil map (Teagasc et. al 2017);
- GSI Quaternary Map (GSI 2016a);
- Ground investigation data;
- Scheme walkover survey; and
- GSI Landslide Events (GSI, 2017)

The GSI database (GSI 2017) shows no recorded landslide events within the study area and therefore unstable ground is not considered further in this assessment.

The soft soils identified within the study area are detailed in Table 14.24 along with their importance as determined by Box 4.1 of the NRA Guidelines (NRA 2008a).

Table 14.24: Soft Soils Within the Study Area

Feature	Description	Location	Importance	Justification for Importance Rating
Alluvium - AlluvMIN (soils) / A (subsoils)	Typically found along current and historic watercourses	Along the River Tolka, around Pope John Paul Park and east of Henrick Place towards Ellis Quay.	Low	Volume of soft soil underlying the study area is small and of a local scale.

14.3.3.9 Contaminated Land

Considering the location of the Proposed Scheme in the urban environment, there are likely to be some sources of contamination within the made ground throughout the study area. Therefore, the assessment of contaminated land is focused on the footprint and directly on either side of the Proposed Scheme unless there is likely to be a pathway connecting the possible source of contamination to the footprint of the Proposed Scheme.

Various sources of information were consulted in assessing the Proposed Scheme for locations of potential contaminated land:

- CORINE land cover mapping (EPA 2018);
- Teagasc soil map (Teagasc et al. 2017);
- EPA (EPA 2019);
- OSI mapping (OSI 2019);
- The design information as listed in Section 14.2.3.3
- The scheme specific ground investigations carried out to inform the Proposed Scheme and this EIAR as listed in Table 14.3. These provide useful verification for the data already compiled relating to the baseline environment; and
- Local authority archives and databases as listed in Table 14.1.

The known potential sources of contamination relevant to the Proposed Scheme identified within the study area are detailed in Table 14.25 along with their importance as determined by Box 4.1 of the NRA Guidelines (NRA 2008a).

Soil analysis was carried out on samples retrieved during the scheme specific ground investigation at depths ranging from 0.5 to 4.5m BGL.

The main findings of the soil analysis carried out along the Proposed Scheme are as follows (and summarised in Table 14.26):

- Asbestos was not detected in any of the recorded results during the scheme specific GI carried out by GII.
- Based on the samples recovered during the project specific ground investigation, there was no evidence of elevated contaminants within the shallow sediments. All the samples were classified as Inert.

Table 14.25: Summary of Potential Sources of Contaminated Land Adjacent to the Proposed Scheme

Feature	Description	Location	Importance	Justification for Importance Rating
Gravel Pits	Gravel Pits (6-inch OSI Mapping) Gravel Pit (25-inch Mapping) Disused Gravel Pits (25-inch Mapping)	River Tolka Valley Park north of Snugborough Road (3 No.), Snugborough Road bridge (1 No.) and River Tolka Valley Park south of Waterville Road (4 No.) South of Waterville Road (1 No.) Eastbound N3 slip road (1 No.) and beneath the current footprint of the N3 (1 No.)	Medium	Medium value on a local scale
Corn Mill	Industrial (6-inch OSI Mapping and 25-inch Mapping)	Mill Road	Medium	Medium value on a local scale
Worsted Mill	Industrial (6-inch OSI Mapping)	Old Navan Road	Medium	Medium value on a local scale
Margarine Factory	Industrial (25-inch Mapping)	Old Navan Road	Medium	Medium value on a local scale
Quarry	Quarry (6-inch OSI Mapping)	Ashleigh Green	Medium	Medium value on a local scale
Quarry	Quarry (6-inch OSI Mapping and 25-inch Mapping)	N3 / M50 Junction roundabout	Medium	Medium value on a local scale
Quarry	Quarry (6-inch OSI Mapping and 25-inch Mapping)	West of Phoenix Park Avenue	Medium	Medium value on a local scale
Oil Mill	Industrial (6-inch OSI Mapping and 25-inch Mapping)	Mill Lane	Medium	Medium value on a local scale
Tin Box Factory	Industrial (Cassini Mapping)	Mill Lane	Medium	Medium value on a local scale
Polish factory	Industrial (Cassini Mapping)	Mill Lane	Medium	Medium value on a local scale
Midland Great Western Railway	Railway (25-inch Mapping)	Old Navan Road	Medium	Medium value on a local scale
Amiens Street & North Wall Branch railway line	Railway (25-inch Mapping)	East of the Navan Road / Old Cabra Road Junction	Medium	Medium value on a local scale
Tramway	Tramway (25-inch Mapping)	North Circular Road	Medium	Medium value on a local scale
Tramway	Tramway (25-inch Mapping)	Stanley Street to Ellis Quay	Medium	Medium value on a local scale
Tramway	Tramway (25-inch Mapping)	Ellis Quay	Medium	Medium value on a local scale
Burial Ground	Graveyard (Cassini Mapping)	River Road	Medium	Medium value on a local scale
Graveyard	Graveyard (25-inch Mapping)	Navan Road at St Joseph's School for Deaf Boys	Medium	Medium value on a local scale
Graveyard	Graveyard (25-inch Mapping)	Kings Street North	Medium	Medium value on a local scale

Feature	Description	Location	Importance	Justification for Importance Rating
Graveyard	Graveyard (25-inch Mapping)	Ard Ri Place	Medium	Medium value on a local scale
Military Cemetery	Graveyard (25-inch Mapping and Cassini Mapping)	Slemish Road	Medium	Medium value on a local scale
Scavenging Depot and Destructor	Industrial (25-inch Mapping)	Stanley Street	Medium	Medium value on a local scale
Malt House	Industrial (25-inch Mapping)	Stanley Street	Medium	Medium value on a local scale
Cattle Market	Agricultural (25-inch Mapping and Cassini Mapping)	North Circular Road	Medium	Medium value on a local scale
Abattoir	Agricultural (25-inch Mapping and Cassini Mapping)	North Circular Road	Medium	Medium value on a local scale
Historic Landfill	Historic Landfill Map Data provided by Dublin City Council	Blanchardstown, within footprint of M50 Junction	Medium	Medium value on a local scale
Historic Landfill	Historic Landfill Map Data provided by Dublin City Council	Blanchardstown Hospital	Medium	Medium value on a local scale
Historic Landfill	Historic Landfill Map Data provided by Dublin City Council	Tolka River Park	Medium	Medium value on a local scale
Petrol Station	Various petrol stations along the Proposed Scheme	South of Snugborough Road, east of Navan Road Parkway, south-west of Pope John Paul Park and Old Cabra junction.	Medium	Medium value on a local scale

A summary of the facilities within the study area along with their importance as determined by the NRA Guidelines Box 4.1 (NRA 2008a) is presented in Table 14.26.

Table 14.26: List of EPA Licensed Facilities Within the Study Area

Name	Description	Location	Importance	Justification for Importance Rating
Diageo Ireland	Licensed IPPC Facility	Victoria Quay - 130m south-west of the Proposed Scheme	Medium	Light industrial usage

14.3.3.10 Mineral / Aggregate Resources

Considering the location of the Proposed Scheme in the urban environment there are unlikely to be many opportunities to extract mineral or aggregate resources, however the following datasets were consulted in order to assess the impact of the Proposed Scheme on the economic geology of the study area:

- GSI: aggregate potential mapping (GSI 2016b, 2016c);
- GSI: mineral localities (GSI 2014); and
- GSI: active quarries (GSI 2019d).

No active pits, mines or quarries were identified within the study area. There are two non-metallic mineral locations within the study area.

The crushed rock aggregate potential is predominately of moderate potential. The granular aggregate potential is highly variable and discussed below. A summary of the aggregate resources identified in the study area (refer to Figure 14.11 and Figure 14.12 in Volume 3 of this EIAR) are outlined in Table 14.27.

14.3.3.10.1 N3 Blanchardstown Junction to Snugborough Road

There is a range of very low to high granular aggregate potential within this Section of the study area. There is very low to low potential aggregate potential associated with the Alluvium deposits along the alignment of the

River Tolka to the north of the Proposed Scheme. The gravels north and south of junction 3 on the N3 and the gravels at the junction of Blanchardstown Road South and Blakestown Way are classified as low granular aggregate potential. There are also high potential granular deposits to the north of the Proposed Scheme within the study area at Riverside Court to the west of Snugborough Road.

The GSI aggregate potential mapping shows the crushed rock aggregate potential along this Section of the study area ranges from moderate to high. The study area is predominantly underlain by moderate to high crushed rock aggregate potential. High to very high aggregate potential is recorded along the north bank of the River Tolka within the River Tolka Valley Park. There is another small pocket lying to the west of Grove Road in the south of the study area. These areas of high potential are present where the bedrock is shallow or where there are hummocky sands and gravels present.

14.3.3.10.2 Snugborough Road to N3 / M50 Junction

There is a range of very low to high granular aggregate potential within this Section of the study area. There is very low to low potential aggregate potential associated with the alluvium deposits along the alignment of the River Tolka and the gravels underlying the N3 at Talbot Court south of the N3 / M50 Junction. There is a pocket of moderate granular potential to the south of Blanchardstown main street, some of this pocket lies within this Section of the study area. There is a granular deposit with high potential and small pockets of moderate potential within the River Tolka Valley Park which intersects the Proposed Scheme east of River Tolka and continues until the river crosses back over the Proposed Scheme to the north of the study area.

The GSI aggregate potential mapping shows the crushed rock aggregate potential along this Section of the study area ranges from moderate to very high. This Section of the study area is predominantly underlain by high to very high crushed rock aggregate potential due to the presence of bedrock outcrop along the River Tolka. The remainder of the study area is underlain by moderate crushed rock aggregate potential.

14.3.3.10.3 N3 / M50 Junction to Navan Road / Ashtown Road Junction

There is a range of very low to high granular potential within this Section of the study area. There is a pocket of very low to low potential aggregate potential at the N3 / M50 roundabout and another pocket east of the Navan Road / Ashtown Road Junction. There is a pocket of moderate to high granular aggregate potential to the north of the N3 / M50 junction roundabout, this pocket underlies the New River Road and continues until River Road to the north of the study area.

The GSI aggregate potential mapping shows the crushed rock aggregate potential along this Section of the study area ranges from moderate to very high. This Section of the study area is predominantly underlain by moderate crushed rock aggregate potential aside from small pockets of high to very high potential underlying the N3 / M50 Junction in the west of the study area, along the alignment of the River Tolka and to the west of the Navan Road / Ashtown Junction where they intersect the Proposed Scheme west of the Navan Road / Phoenix Park Avenue junction and west of the Navan Road / Castleknock Road junction.

14.3.3.10.4 Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

There is a range of very low to high granular aggregate potential within this Section of the study area. There is a pocket of very low granular aggregate potential overlying the Alluvium deposits to the west of Nephin Road. There is a pocket of low granular aggregate potential within the study area which the Proposed Scheme intersects at the Navan Road / Ashtown Road junction. There is a pocket of high granular potential within the study area which intersects the Proposed Scheme east of the junction of the Navan Road and Baggot Road and terminates west of the Navan Road / Nephin Road junction.

The GSI aggregate potential mapping shows the crushed rock aggregate potential along this Section of the study area ranges from low to moderate. This Section of the study area is predominantly underlain by moderate crushed rock potential. The reminder of the study area from Nephin Road east, the crushed rock aggregate potential is classified as low.

14.3.3.10.5 Navan Road / Old Cabra Road Junction to Ellis Quay

There is both very low and high granular potential within this Section of the study area which is concentrated along Kings Street North to the River Liffey. There is very low granular aggregate potential overlying the Alluvium deposits at Ellis Quay. There are also two high potential granular deposits at King Street North and Hendrick Street.

The GSI aggregate potential mapping shows the crushed rock aggregate potential along this Section of the study area ranges from low to moderate. This Section of the study area is predominantly underlain by low crushed rock potential with the exception south of Ellis quay along the River Liffey where the potential is classified as moderate.

Table 14.27: GSI Aggregate Potential for the Study Area

GSI Aggregate Potential Type	Potential	Location	Importance	Justification for Importance Rating
Crushed rock aggregate potential	Low potential	Junction of the R147 (Cabra Road) with the Old Cabra Road (R805) to Ellis Quay.	Low	Uneconomically extractable mineral resource
Crushed rock aggregate potential	Moderate potential	South of the N3 between junction 3 and junction 2, north and south of the River Tolka Bridge, east of M50 roundabout, between M50 roundabout and Ashtown,	Medium	Sub-economic extractable mineral resource
Crushed rock aggregate potential	High potential	Around N3 junction, north of N3 junction 2, around Blanchardstown Village, along the N3 between junction 2 and the M50 roundabout and around Ashtown and between Ashtown Road Junction and Old Cabra Road junction.	Medium	Extractable mineral resource
Crushed rock aggregate potential	Very High potential	North-east of Blanchardstown Shopping Centre, along the River Tolka east of Mill Road Bridge until the M50 Roundabout, at the northern section of the M50 roundabout and south of the Old Navan Road at Ashtown.	High	Marginally extractable mineral resource
Granular aggregate potential	Very Low potential	Along the River Tolka north-east of N3, east and west of the M50 roundabout, south of Pope John Paul Park, east of Ellis Quay along the banks of the River Liffey.	Low	Uneconomically extractable mineral resource
Granular aggregate potential	Low potential	Around N3 Junction 3, along the River Tolka south of N3 Junction 2, west of M50 roundabout, north-east of M50 roundabout, east of M50 roundabout and around Ashtown.	Low	Uneconomically extractable mineral resource
Granular aggregate potential	Moderate potential	North-east of Blanchardstown Shopping Centre, north-east of N3 junction 2, south of Blanchardstown Village and north-east of M50 roundabout.	Medium	Sub-economic extractable mineral resource
Granular aggregate potential	High potential	North-east of N3 at Junction 3, east of N3 Junction 2 as far as James Connolly Memorial Hospital, north-east of the M50 roundabout, by the Navan Road between Saint Vincent's centre and Pope John Paul Park, east of R805 Blackhall Place around George's Court and north-east of Benburb Street / Blackhall Place junction.	Medium	Extractable mineral resource

14.3.3.11 Geological Heritage Areas

The Geological Heritage Areas (2019c) within the study area are presented on Figure 14.10 and detailed in Table 14.28 along with their importance as determined by the NRA Guidelines Box 4.1 (NRA 2008a).

Table 14.28: Geological Heritage Areas

Name (Code)	Description	Location	Importance	Justification for Importance Rating
Phoenix Park (DC009)	This site forms an extensive, 707-hectare natural landscape within the confines of Dublin	Phoenix Park	High	Geological feature of high value on a local scale (County Geological Site)

Name (Code)	Description	Location	Importance	Justification for Importance Rating
	City. Recommended for Geological NHA			

14.3.3.12 Aquifer Type and Classification

The GSI Bedrock Aquifer mapping (GSI 2019b) for the study area (Figure 14.13 in Volume 3 of this EIAR) indicates that there are two aquifer type within the study area as summarized in Table 14.29 along with their importance, as determined by Box 4.3 of the NRA Guidelines (NRA 2008a).

The GSI Gravel Aquifer mapping (GSI 2019b) show there are no gravel aquifers within the study area.

Table 14.29: Aquifer Types Within the Study Area

Aquifer Type	Description	Location	Importance	Justification for Importance Rating
Locally Important Aquifer (LI)	Bedrock which is moderately productive only in local zones	Widespread	Medium	Locally important aquifer which supplies the local area
Poor Aquifer (Pl)	Bedrock which is generally unproductive except for local zones	Between N3 junction 2 and junction 3 and along the N3 north of Blanchardstown Village to Circle K Ashtown on the Navan Road.	Low	Low yielding aquifer

14.3.3.13 Groundwater Vulnerability

Groundwater vulnerability (GSI 2019b) within the study area ranges from ‘extreme’ where bedrock is close to or at the surface to ‘low’ vulnerability in areas where thick subsoil deposit is present as shown on Figure 14.14 in Volume 3 of this EIAR.

14.3.3.13.1 N3 Blanchardstown Junction to Snugborough Road

The GSI groundwater vulnerability mapping shows the groundwater vulnerability along this Section of the study area ranges from moderate to Extreme to X (rock at surface). High Groundwater Vulnerability is present from the Blanchardstown N3 exit to Blanchardstown Shopping Centre. From Blanchardstown Shopping Centre to Snugborough Road the Groundwater Vulnerability is predominantly classified as high with areas of Extreme to X (rock at surface) present to the north of the Proposed Scheme along the River Tolka Valley Park.

14.3.3.13.2 Snugborough Road to N3 / M50 Junction (Junction 6)

This Section is underlain predominantly by High Groundwater Vulnerability. There is an area Extreme to X (rock at surface) along the banks of the River Tolka and areas where there is outcropping bedrock / subcrop as described in 14.3.3.5 .

14.3.3.13.3 N3 / M50 Junction (Junction 6) to Navan Road / Ashtown Road Junction

This Section is underlain predominantly by High Groundwater Vulnerability. There are localized pockets of Extreme to X (rock at surface) groundwater vulnerability within the study area. These Extreme to X (rock at surface) groundwater vulnerabilities can be seen underlying the N3 / M50 Junction, to the north of the study area along the banks of the River Tolka and in small pockets within the Ashtown Area where there is bedrock outcrops as described in Section 14.3.3.5.

14.3.3.13.4 Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

From Navan Road / Ashtown Road Junction to the Navan Road / Old Cabra Road Junction, this sub-section is recorded as having moderate groundwater vulnerability. South of the Navan Road / Nephin Road Junction the study area is classified as low vulnerability.

14.3.3.13.5 Navan Road / Old Cabra Road Junction to Ellis Quay

From the Navan Road / Old Cabra Road Junction to the City Centre the Groundwater Vulnerability is classified as Low vulnerability. South of Ellis Quay on the south side of the River Liffey there is a section of the study area described as having moderate groundwater vulnerability.

14.3.3.14 Groundwater Recharge

The rate of groundwater recharge corresponds to the soil type as shown in Figure 14.8 and Figure 14.15 in Volume 3 of this EIAR. The study area predominately has an annual recharge range of 51 millimetres (mm) to 100mm in urban areas. Where there is topsoil or alluvium present instead of made ground the annual recharge is typically 1mm to 50mm.

14.3.3.15 Hydro-Ecology

Groundwater dependent habitats within the study area that have the status of SPA, SAC, NHA or proposed pNHA (NPWS 2019) are listed in Table 14.30.

Table 14.30: Groundwater Dependent Habitats Within the Study Area

Designated Site	Description	Location	Importance	Justification for Importance Rating
Ex situ alluvial woodland	Potentially Annex 1 habitat running along the River Tolka	North-west of the M50 Roundabout.	Very High	Very high value on a local scale

14.3.4 Summary of Features of Importance

The importance ranking of the features, based on Box 4.1 of the NRA Guidelines (NRA 2008a), established for the baseline conditions is summarised below.

Features with an importance ranking of low are not considered further as they will not result in a significant impact according to Box 5.4 of the NRA Guidelines (NRA 2008a) and are summarised in Table 14.31 for completeness. Features with an importance ranking of medium or higher are summarised in Table 14.32 and the impact of the Proposed Scheme on these features will be assessed in Section 14.4.

Table 14.31: Summary of Land, Soils, Geology and Hydrogeology Features with Low Importance Within the Study Area

Category	Feature	Description	Location	Importance	Justification
Soil Fertility	Made Ground - Made	Associated with urban development	Widespread	Low	Poorly drained and / or low fertility soils
Soil Fertility	Topsoil - BminPD	Poorly drained (M mainly basic)	North-east of N3 junction 3, along the northern side of the Navan Road, south of Navan road along the border of Phoenix Park	Low	Poorly drained and / or low fertility soils
Subsoils quality and significance	Made Ground - Urban	Associated with urban development	Between Blackhall Court and Hendrick Street and south of Benburb Street towards the River Liffey.	Low	Low value on a local scale
Subsoils quality and significance	Alluvium - A	Typically found along current and historic watercourses	Along the River Tolka, around Pope John Paul Park and east of Henrick Place towards Ellis Quay.	Low	Low value on a local scale
Subsoils quality and significance	Glacial gravels - GLs	Gravels derived from limestones	Between N3 junction 2 and Abbotstown, south of Blanchardstown village, west and north-east of the M50 roundabout and around King Street North.	Low	Low value on a local scale
Subsoils quality and significance	Glacial till - TLs	Till derived from limestones	Widespread	Low	Low value on a local scale
Subsoils quality and significance	Rock - Rck	Bedrock outcrop or subcrop	North-west of N3 junction 3, north of the River Tolka between Blanchardstown Shopping Centre and Snugborough Road, along the River Tolka north of the River Tolka Bridge as far as Castleknock and south of the Navan Road at Ashtown.	Low	Low value on a local scale
Bedrock quality and significance	Lucan	(Calp) Dark limestone and shale - Carboniferous	Widespread	Low	Low value on a local scale
Bedrock quality and significance	Tober Colleen Formation	Calcareous shale, limestone conglomerate - Carboniferous	Between N3 junction 2 and junction 3 and along the N3 north of Blanchardstown Village to Circle K Ashtown on the Navan Road.	Low	Low value on a local scale
Soft Soils	Alluvium - AlluvMIN (soils) / A (subsoils)	Typically found along current and historic watercourses	Along the River Tolka, around Pope John Paul Park and east of Henrick Place towards Ellis Quay.	Low	Volume of soft soil underlying the route is small and of a local scale.

Category	Feature	Description	Location	Importance	Justification
Economic Geology	Crushed rock aggregate potential	Low potential	Junction of the R147 (Cabra Road) with the Old Cabra Road (R805) to Ellis Quay.	Low	Uneconomically extractable mineral resource
Economic Geology	Granular aggregate potential	Very low potential	Along the River Tolka north-east of N3, east and west of the M50 roundabout, south of Pope John Paul Park, east of Ellis Quay along the banks of the River Liffey.	Low	Uneconomically extractable mineral resource
Economic Geology	Granular aggregate potential	Low potential	Around N3 Junction 3, along the River Tolka south of N3 Junction 2, west of M50 roundabout, north-east of M50 roundabout, east of M50 roundabout and around Ashtown.	Low	Uneconomically extractable mineral resource
Aquifer	Poor Aquifer (Pl)	Bedrock which is generally unproductive except for local zones	Between N3 junction 2 and junction 3 and along the N3 north of Blanchardstown Village to Circle K Ashtown on the Navan Road.	Low	Low yielding aquifer

Table 14.32: Summary of Soils, Geology and Hydrogeology Features with Medium to Extremely High Importance Within the Study Area

Category	Feature	Description	Location	Importance	Justification
Soil Fertility	Alluvium – AlluvMIN	Typically found along current and historic watercourses	Along the River Tolka and at Pope John Paul Park.	Medium	Moderately drained and / or moderate fertility soils
Soil Fertility	Topsoil – BminSW	Shallow well drained (mainly basic)	North of N3 junction 3, north of the River Tolka between N3 junction 2 and M50 Roundabout and around the M50 roundabout.	High	Well drained and / or high fertility soils
Soil Fertility	Topsoil – BminDW	Deep well drained (mainly basic)	Between N3 junction 3 and junction 2, along the northern side of the Navan Road and around Phoenix Park.	High	Well drained and / or high fertility soils
Potential Sources of Contamination	Gravel Pits	Gravel Pits (6-inch OSI Mapping) Gravel Pit (25-inch Mapping) Disused Gravel Pits (25-inch Mapping)	Eastbound N3 slip road (1 No.) and beneath the current footprint of the N3 (1 No.)	Medium	Medium value on a local scale

Category	Feature	Description	Location	Importance	Justification
Potential Sources of Contamination	Historical Corn Mill	6-inch OSI Mapping and 25-inch Mapping	Mill Road	Medium	Medium value on a local scale
Potential Sources of Contamination	Historical Worsted Mill	6-inch OSI Mapping	Old Navan Road	Medium	Medium value on a local scale
Potential Sources of Contamination	Historical Margarine Factory	25-inch Mapping	Old Navan Road	Medium	Medium value on a local scale
Potential Sources of Contamination	Historical Quarry	6-inch OSI Mapping	Ashleigh Green	Medium	Medium value on a local scale
Potential Sources of Contamination	Historical Quarry	6-inch OSI Mapping and 25-inch Mapping	N3 / M50 Junction roundabout	Medium	Medium value on a local scale
Potential Sources of Contamination	Historical Quarry	6-inch OSI Mapping and 25-inch Mapping	West of Phoenix Park Avenue	Medium	Medium value on a local scale
Potential Sources of Contamination	Historical Oil Mill	6-inch OSI Mapping and 25-inch Mapping	Mill Lane	Medium	Medium value on a local scale
Potential Sources of Contamination	Historical Tin Box Factory	Cassini Mapping	Mill Lane	Medium	Medium value on a local scale
Potential Sources of Contamination	Polish Factory	Cassini Mapping	Mill Lane	Medium	Medium value on a local scale
Potential Sources of Contamination	Midland Great Western Railway	25-inch Mapping	Old Navan Road	Medium	Medium value on a local scale
Potential Sources of Contamination	Amiens Street & North Wall Branch railway line	25-inch Mapping	East of the Navan Road / Old Cabra Road Junction	Medium	Medium value on a local scale
Potential Sources of Contamination	Tramway	25-inch Mapping	North Circular Road	Medium	Medium value on a local scale
Potential Sources of Contamination	Tramway	25-inch Mapping	Stanley Street to Ellis Quay	Medium	Medium value on a local scale
Potential Sources of Contamination	Tramway	25-inch Mapping	Ellis Quay	Medium	Medium value on a local scale
Potential Sources of Contamination	Burial Ground	Cassini Mapping	River Road	Medium	Medium value on a local scale
Potential Sources of Contamination	Graveyard	25-inch Mapping	Navan Road at St Joseph's School for Deaf Boys	Medium	Medium value on a local scale
Potential Sources of Contamination	Graveyard	25-inch Mapping	King Street North	Medium	Medium value on a local scale
Potential Sources of Contamination	Graveyard	25-inch Mapping	Ard Ri Place	Medium	Medium value on a local scale

Category	Feature	Description	Location	Importance	Justification
Potential Sources of Contamination	Military Cemetery	25-inch Mapping	Slemish Road	Medium	Medium value on a local scale
Potential Sources of Contamination	Sawmill	25-inch Mapping	Brunswick Street North	Medium	Medium value on a local scale
Potential Sources of Contamination	Scavenging Depot and Destructor	25-inch Mapping	Stanley Street	Medium	Medium value on a local scale
Potential Sources of Contamination	Malt House	25-inch Mapping	Slemish Road	Medium	Medium value on a local scale
Potential Sources of Contamination	Cattle Market	25-inch Mapping and Cassini Mapping	North Circular Road	Medium	Medium value on a local scale
Potential Sources of Contamination	Abattoir	25-inch Mapping and Cassini Mapping	North Circular Road	Medium	Medium value on a local scale
Potential Sources of Contamination	Historic Landfill	Historic Landfill Map Data provided by Dublin City Council	Blanchardstown, within footprint of M50 Junction	Medium	Medium value on a local scale
Potential Sources of Contamination	Historic Landfill	Historic Landfill Map Data provided by Dublin City Council	Blanchardstown Hospital	Medium	Medium value on a local scale
Potential Sources of Contamination	Historic Landfill	Historic Landfill Map Data provided by Dublin City Council	Tolka River Park	Medium	Medium value on a local scale
Potential Sources of Contamination	Petrol Station	Various petrol stations along the route	South of Snugborough Road, east of Navan Road Parkway, south-west of Pope John Paul Park and Old Cabra junction.	Medium	Medium value on a local scale
Industry	Diageo Ireland	Licensed IPPC Facility	Victoria Quay – 130m south-west of the Proposed Scheme	Medium	Light industrial usage
Economic Geology	Crushed rock aggregate potential	Moderate potential	South of the N3 between junction 3 and junction 2, north and south of the River Tolka Bridge, east of M50 roundabout, between M50 roundabout and Ashtown,	Medium	Sub-economic extractable mineral resource
Economic Geology	Crushed rock aggregate potential	High potential	Around N3 junction, north of N3 junction 2, around Blanchardstown Village, along the N3 between junction 2 and the M50 roundabout and around Ashtown and between Ashtown Road Junction and Old Cabra Road junction.	Medium	Extractable mineral resource
Economic Geology	Crushed rock aggregate potential	Very high potential	North-east of Blanchardstown Shopping Centre, along the River Tolka east of Mill Road Bridge until the M50 Roundabout, at the northern section of the M50 roundabout and south of the Old Navan Road at Ashtown	High	Marginally extractable mineral resource
Economic Geology	Granular aggregate potential	Moderate potential	North-east of Blanchardstown Shopping Centre, north-east of N3 junction 2, south of Blanchardstown Village and north-east of M50 roundabout.	Medium	Sub-economic extractable mineral resource

Category	Feature	Description	Location	Importance	Justification
Economic Geology	Granular aggregate potential	High potential	North-east of N3 at Junction 3, east of N3 Junction 2 as far as James Connolly Memorial Hospital, north-east of the M50 roundabout, by the Navan Road between Saint Vincent's centre and Pope John Paul Park, east of R805 Blackhall Place around George's Court and north-east of Benburb Street / Blackhall Place junction.	Medium	Extractable mineral resource
Aquifer	Locally Important Aquifer (LI)	Bedrock which is moderately productive only in local zones	Widespread	Medium	Locally important aquifer which supplies the local area
County geological site	Phoenix Park (DC009)	This site forms an extensive, 707-hectare natural landscape within the confines of Dublin City. Recommended for Geological NHA	Phoenix Park	High	Geological feature of high value on a local scale (County Geological Site)
Groundwater dependant habitat	Ex situ alluvial woodland	Potentially Annex 1 habitat running along the River Tolka	North-west of the M50 Roundabout.	Very High	Very high value on a local scale

14.3.5 Conceptual Site Model

A tabulated Conceptual Site Model (CSM) was developed based on all publicly available data available along with project specific data that was provided.

The Proposed Scheme is predominantly underlain by made ground over alluvium over glacial till over limestone bedrock. The relevant sub-sections of the Proposed Scheme are presented in Table 14.33 to Table 14.37 along with the fill height (average and maximum) cut height (average and maximum) and the soils and geology at each earthwork area.

Table 14.33: Conceptual Site Model - Blanchardstown Junction to Snugborough Road

Subsection	Length (m)	Dominant Earthworks Type	Cut (m)		Fill (m)		Ground Conditions	Average Thickness of Made Ground (m)	Additional Notes
			Max	Avg	Max	Avg			
Blanchardstown Road South to Blanchardstown Road North (ChB0 to ChB0+895)	895	Cut	2.5	1.6	0	0	According to R5-CP01 the stratigraphy consists of a 0.2m thick layer of topsoil over a 3.2m thick layer of Made Ground (MG) over 1.6m thick layer of boulder clay (BC) over Limestone. Based on the soil descriptions MG is likely to be reworked BC. Inferred Road pavement and foundation on possible reworked or natural BC	3.2 (Based on a single drillhole)	This Section mainly involves localised pavement reconstruction and at grade widening works. Upgrade of roundabout to signalised junction. CUT: To facilitate the new construction, widening works (approx. 5m in width) on SW bound lane ChB0+450 to ChB0+600 (160m in length).
Retaining Wall (RW01)	270	Structure	No Cut / Fill due to existence of structure				Based on desk study information area is underlain by BC and Glacial Gravel (GG). Inferred Road pavement and foundation on possible reworked or natural BC or GG.	1	Spread foot cantilever reinforced concrete wall approximately 270m in length and maximum 3m in height.
Blakestown Way to Bus Interchange Area (ChE0 to ChE0+380)	380	Cut	1.8	1	0	0	Based on desk study information area is underlain by BC and Glacial Gravel (GG). Inferred Road pavement and foundation on possible reworked or natural BC or GG.	1	This Section mainly involves localised pavement reconstruction and at grade widening works. CUT: To facilitate new construction, widening works (varying in width up to 9.5m) on slip road travelling from Blanchardstown Road South, towards the Bus Interchange area ChE0+100 to ChE0+190 (90m in length.
Bus Interchange Area (ChF0 to ChF350)	350	Fill	0	0	0.5	0.3	Based on desk study information area is underlain by BC. Inferred Road pavement and foundation on possible reworked or natural BC.	0.5	Localised pavement reconstruction and at grade widening works into adjacent carparks. FILL To facilitate construction, widening works (approx. 18m in width) at new Bus Interchange area into northern carpark ChF0+20 To ChF0+220 (200m in length).
Mulhuddart Interchange	218	At Grade	0	0	0	0	Based on desk study information area is underlain by BC and GG. Inferred Road pavement and foundation on possible reworked or natural BC or GG.	0.5	This Section mainly involves localised pavement reconstruction and at grade widening works.
Mulhuddart to Crown plaza (ChA0 Ch0+180)	180	Cut	1.4	1	0	0	Based on desk study information area is underlain by BC. Inferred Road pavement and foundation on possible reworked or natural BC. Inferred Road pavement and foundation on possible reworked or natural BC	0.5	This Section mainly involves localised pavement reconstruction and at grade widening works. CUT To facilitate construction of a new bus lane, 2-way

Subsection	Length (m)	Dominant Earthworks Type	Cut (m)		Fill (m)		Ground Conditions	Average Thickness of Made Ground (m)	Additional Notes
			Max	Avg	Max	Avg			
									cycle track and footpath connection to Blanchardstown Road South, widening works (approx.6.5m) over a length of approx. 120m.
Crown Plaza to Liberty Insurance Junction (ChA0+180 to ChA580)	400	Fill	0	0	1	0.5	According to R5-TP01 the stratigraphy consists of a 1.3m thick layer of (MG) over BC. Based on the soil descriptions MG is possible to be reworked BC. Inferred Road pavement and foundation on possible reworked or natural BC.	1.3	This Section mainly involves localised pavement reconstruction and at grade widening works. FILL To facilitate construction, widening works (approx. 6m in width) from ChA0+200 to Ch0+280 (80m in length) into adjacent carparks.
Liberty Insurance Junction to Snugborough Junction (ChA0+580 to ChA0+750)	170	Cut	1.2	0.6	0	0	Based on the project specific GI, R5-RC01 and R5-TP02 the stratigraphy consists of 2.00m MG over GG over mudstone bedrock, Based on desk study information area is underlain by BC. Inferred Road pavement and foundation on possible reworked or natural BC.	0.5	This Section mainly involves localised pavement reconstruction and at grade widening works. Upgrade of Liberty Insurance roundabout to signalised junction. Cut To facilitate construction, widening works (approx. 9.0m wide) on SE bound lane from ChA0+630 to ChA0+750 (120m in length).

Table 14.34: Conceptual Site Model - Snugborough Road to N3 / M50 Junction (Junction 6)

Subsection	Length (m)	Dominant Earthworks Type	Cut (m)		Fill (m)		Ground Conditions	Average Thickness of Made Ground (m)	Additional Notes
			Max	Avg	Max	Avg			
N3 (ChA0+910 to ChA1+800)	890	Fill	0	0	2.5	1	Based on the project specific GI (R05-TP05, A & B, R05-CP/RC03, R05-RC04) the thickness of MG is recorded up to 4.0m BGL. Based on the soil description MG is likely to be reworked BC. Rockhead elevation is highly variable. Inferred Road pavement and foundation on possible reworked or natural BC or rock (Limestone).	1	This Section mainly involves localised pavement reconstruction and at grade widening works. FILL To facilitate construction, widening works (approx. 2.5m in width) on N3 diverge lane over River Tolka from ChA1+090 to ChA1+150 (60m in length). Widening works (approx. 5.2m width) of inbound lane at Mill Road underbridge from ChA1+500 to ChA1+600 (100m in length), localised regrading works will be undertaken to facilitate widened structure.
River Tolka Bridge	13	Structure	No Cut / Fill due to existence of structure				Based on the project specific GI (R5-CP05), soft greyish brown clay is recorded to a depth of 3.45m BGL, underlain by a thick layer of Glacial	3.45	Sheet piling will be installed on the land side of the existing gabion baskets to protect the River Tolka from the works. Foundations for the bridge widening (BR01) will be

Subsection	Length (m)	Dominant Earthworks Type	Cut (m)		Fill (m)		Ground Conditions	Average Thickness of Made Ground (m)	Additional Notes
			Max	Avg	Max	Avg			
							Gravel and BC. Based on the soil description, this is possibly MG created from reworked BC. Rockhead elevation was not encountered in this location. Inferred Road pavement and foundation on possible reworked or natural BC or rock (Limestone).		constructed piled foundations subject to detailed design and confirmation of ground conditions.
Retaining Wall RW07A	100	Structure	No Cut / Fill due to existence of structure				Based on the project specific GI (R05-TP05, A & B, R05-CP/RC03, R05-RC04) the thickness of MG is recorded up to 1.6m BGL. Rockhead was recorded at 0.70m BGL. Road pavement and foundation on possible reworked or natural BC or rock (Limestone).	4.0	Spread foot cantilever wall approximately 100m in length. and 1.5m in height.
Retaining Wall RW07B	250	Structure	No Cut / Fill due to existence of structure				Based on the project specific GI (R05-TP05, A & B, R05-CP/RC03, R05-RC04) the thickness of MG is recorded up to 1.6m BGL. Rockhead was recorded at 0.70m BGL. Based on the soil description MG is likely to be reworked BC. Rockhead elevation is highly variable. Inferred Road pavement and foundation on possible reworked or natural BC or rock (Limestone).	4.0	Spread foot cantilever wall approximately 250m in length and maximum 3.0m in height and includes ramp and stair access.
Mill Road Bridge	14	Structure	No Cut / Fill due to existence of structure				Based on the project specific GI (R05-TP05, A & B, R05-CP/RC03, R05-RC04) the thickness of MG is recorded up to 4.0m BGL. Based on the soil description MG is likely to be reworked BC. Rockhead elevation is highly variable. Inferred Road pavement and foundation on possible reworked or natural BC or rock (Limestone).	4.0	Widening will be completed to both ends of the bridge (BR02), with the abutment walls, foundations and bridge decks being extended, widening the existing structure Excavation is proposed for foundation construction of abutments. The area will be excavated to formation level for the pedestrian ramps (RW07-A and RW07-B). The walls will then be constructed with the areas backfilled to finished level as the walls are being constructed
Mill Road Bridge Pedestrian Ramps (Ch1+620)	N/A	Cut	1.7	1	0	0	Based on the project specific GI (R05-TP05, A & B, R05-CP/RC03, R05-RC04) the thickness of MG is recorded up to 4.0m BGL. Based on the soil description MG is likely to be reworked BC. Rockhead elevation is highly variable. Inferred Road pavement and foundation on possible reworked or natural BC or rock (Limestone).	1	The area will be excavated to formation level for the pedestrian ramps (RW07-A and RW07-B). The walls will then be constructed with the areas backfilled to finished level as the walls are being constructed
River Road Over Bridge (ChA1+800 to ChA2+200)	400	Fill	0	0	1	0.5	Based on the project-specific GI , R05-TP07, A, B and C, R05-CP04 and R05-RC05. According to them MG extends up to 2.00m BGL overlying BC It is noted that all TPs were completed at shallow depth due to obstructions. The nature of MG varied from likely reworked BC to granular	1.7	This Section mainly involves localised pavement reconstruction and at grade widening works.

Subsection	Length (m)	Dominant Earthworks Type	Cut (m)		Fill (m)		Ground Conditions	Average Thickness of Made Ground (m)	Additional Notes
			Max	Avg	Max	Avg			
							material. Rockhead level varied between 2.40m BGL and at 4.30m BGL and was described as Limestone.		
River Road to M50 Roundabout (ChA2+200 to ChA2+400)	200	Fill	0	0	1.3	0.7	Based on the project-specific GI , R05-TP07, A, B and C, R05-CP04 and R05-RC05. According to them MG extends up to 2.00m BGL overlying BC It is noted that all TPs were completed at shallow depth due to obstructions. The nature of MG varied from likely reworked BC to granular material. Rockhead level varied between 2.40m BGL and at 4.30m BGL and was described as Limestone.	1.7	This Section mainly involves localised pavement reconstruction and at grade widening works. Existing median narrowed with new retaining solution ChA2+320 to ChA2+200 (120m in length) FILL To facilitate construction, widening works (approx. 4.5m wide) of inbound lane towards M50 Roundabout ChA2+220 to Ch2+340 (120m in length).
Retaining Wall RW09	90	Structure	No Cut / Fill due to existence of structure				Based on the project specific GI, R05-TP07, A, B and C, R05-RC07 and R05-RC05. According to them MG extends up to 2.00m BGL. It is noted that all TPs were completed at shallow depth due to obstructions. The nature of MG varied from likely reworked BC to granular material. Rockhead level was highly variable ranging from 4.30mBGL to 10.60m BGL.	1.65	Spread foot cantilever wall approximately 90m in length and maximum 4m in height
M50 Roundabout to Auburn Junction (ChA2+560 to ChA2+880)	320	Cut	2.2	1.4	0	0	Based on the project specific GI R05-TP08, R05-TP09 and R05-RC06, according to them MG extends up to 2.00m BGL overlying BC. Rockhead was encountered at 9.60m BGL. Inferred Road pavement and foundation on possible reworked or natural BC.	1	This Section mainly involves localised pavement reconstruction and at grade widening works. CUT New 5.2m wide bus lane construction travelling inbound from M50 Roundabout to Auburn Junction - To facilitate construction approx. 80m length of cut is required through existing embankment.

Table 14.35: Conceptual Site Model - N3 / M50 Junction (Junction 6) to Navan Road / Ashtown Road Junction

Subsection	Length (m)	Dominant Earthworks Type	Cut (m)		Fill (m)		Ground Conditions	Average Thickness of Made Ground (m)	Additional Notes
			Max	Avg	Max	Avg			
Auburn Junction to Navan Parkway (ChA2880 to ChA3600)	720	Cut	2	1.3	0	0	Based on the project specific GI R05-TP08, R05-TP09 and R05-RC06, according to them MG extends up to 2.00m BGL overlying BC. Rockhead was encountered at 9.60m BGL. Inferred Road pavement and foundation on possible reworked or natural BC.	1	This Section mainly involves localised pavement reconstruction and at grade widening works. Upgrades at Auburn Junction. CUT To facilitate construction, widening works (approx. 4m width) on outbound lane from ChA2+910 to Ch3+030 (120m in length).
Retaining Wall RW03	100	Structure	No Cut / Fill due to existence of structure				According to available R5-TP08A, the thickness of MG is 0.6m overlain by 0.2m of topsoil. The MG is underlain by BC. R5-TP09 was terminated at 1.20m BGL due to encountering a service. The thickness of the MG is at least 1.0m, underneath 0.2m of topsoil. Based on the soil descriptions MG is likely to be reworked BC. Inferred Road pavement and foundation on possible reworked or natural BC or GG.	1.0	Soil nail wall.
Navan Parkway (ChA3600 to ChA4150)	550	Fill	0	0	1.6	1.2	According to R5-CP03 the stratigraphy consists of a 0.1m thick layer of topsoil over a 3.9m thick layer of MG over 3.5m thick layer of possible GG over Limestone. Based on the soil descriptions MG is likely to be reworked BC. Inferred Road pavement and foundation on possible reworked or natural BC or GG.	3.9	This Section mainly involves localised pavement reconstruction and at grade widening works. FILL To facilitate construction, widening works (approx. 3m wide) of outbound merge lane from ChA3+760 to ChA3+820 (60m in length).
Navan Parkway to Ashtown Junction (ChA4150 to ChA4850)	700	At Grade	0	0	0	0	Based on desk study information area is underlain by BC. Inferred Road pavement and foundation on possible reworked or natural BC.	1	This Section mainly involves localised pavement reconstruction and at grade widening works. Ashtown roundabout upgraded to a signalised junction

Table 14.36: Conceptual Site Model - Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

Subsection	Length (m)	Dominant Earthworks Type	Cut (m)		Fill (m)		Ground Conditions	Average Thickness of Made Ground (m)	Additional Notes
			Max	Avg	Max	Avg			
Ashtown Junction to Baggot Road / Kinvara Road (ChA4850 to ChA5890)	1,040	At grade	0	0	0	0	Based on desk study information area is underlain by BC. Inferred Road pavement and foundation on possible reworked or natural BC.	1	Localised pavement reconstruction/ widening works and minor junction modification works
Baggot Road / Kinvara Road to Nephin Road (ChA5890 to ChA6630)	740	At grade	0	0	0	0	Based on desk study information area is primarily underlain by BC. A localised area underlain by alluvial deposits also shown close to Nephin Road. If these deposits were encountered during construction it is expected that they were excavated and removed. Inferred Road pavement and foundation on possible reworked or natural BC.	1	Localised pavement reconstruction / widening works and minor junction modification works
Nephin Road to Old Cabra Road Junction (ChA6630 to ChA7370)	740	At grade	0	0	0	0	Based on desk study information area is underlain by BC. Inferred Road pavement and foundation on possible reworked or natural BC.	1	Localised pavement reconstruction / widening works and minor junction modification works

Table 14.37: Conceptual Site Model - Navan Road / Old Cabra Road Junction to Ellis Quay

Subsection	Length (m)	Dominant Earthworks Type	Cut (m)		Fill (m)		Ground Conditions	Average Thickness of Made Ground (m)	Additional Notes
			Max	Avg	Max	Avg			
Old Cabra Road Junction to North Circular Road (ChA7370 to Ch8190)	820	At grade	0	0	0	0	Based on desk study information area is underlain by BC. Inferred Road pavement and foundation on possible reworked or natural BC.	1	Upgrades at Old Cabra Road Junction Localised pavement reconstruction / widening works.
North Circular Road to Brunswick Street North (ChA8190 to ChA9100)	910	At grade	0	0	0	0	Based on desk study information area is underlain by BC. Inferred Road pavement and foundation on possible reworked or natural BC.	1.5	Localised pavement reconstruction / widening works. Junction upgrade at Aughrim Street
Brunswick Street North to Ellis Quay ChA9100 to ChA9462)	362	At grade	0	0	0	0	Based on desk study information area is underlain by BC. Inferred Road pavement and foundation on possible reworked or natural BC.	2	Localised pavement reconstruction / widening works.

14.3.5.1 Environment Type

The environment across the study area has been categorized in accordance with the IGI Guidelines. It has been classified as:

Type A environment which corresponds to a passive geological / hydrogeological environment – examples include areas of thick low permeability subsoils, areas underlain by poor aquifers, recharge areas, historically stable geological environments.

14.4 Potential Impacts

This section presents potential impacts that may occur due to the Proposed Scheme, in the absence of mitigation. This informs the need for mitigation or monitoring to be proposed (refer to Section 14.5). Predicted 'residual' impacts taking into account any proposed mitigation is presented in Section 14.6.

14.4.1 Characteristics of the Proposed Scheme

A detailed description of the Proposed Scheme and construction activities are provided in Chapter 4 (Proposed Project Description) and Chapter 5 (Construction).

This section outlines the key design features, characteristics and construction activities of the Proposed Scheme of relevance to land, soils, geology and hydrogeology.

A Construction Environmental Management Plan (CEMP) is provided in Appendix A5.1 in Volume 4 of this EIAR.

14.4.1.1 N3 Blanchardstown Junction to Snugborough Road

- The main construction activities along this section includes carriageway widening works and the enhancement of cycle paths and footpaths and upgrading the roundabouts at Blakestown and Blanchardstown Shopping Centre to signalised junctions.
- The carriageway will be widened to facilitate new bus laybys.
- One spreadfoot cantilever Retaining Wall (RW01) is to be constructed on this Section. RW01 is approximately 270m in length and maximum 3m in height will be constructed at Blanchardstown Road.
- Seven minor retaining walls less than 1.5m of retained height will be constructed in this Section.
- Within the Blanchardstown Shopping Centre, a new public transport bus interchange is proposed, between the primary shopping centre and the northern retail outlets, with strong pedestrian connections to and from both. The bus interchange will provide six new covered waiting areas, with seating adjacent to the bus stops, accessed from a central pedestrian area. Roof canopies of two heights will provide shelter for external circulation. The canopies comprise of a concrete clad steel frame supported on circular columns.
- Approximately 400m of slip roads along this Section will also require verge treatments and a new road layout.

14.4.1.2 Snugborough Road to N3 / M50 Junction (Junction 6)

- The main construction activities along this Section includes approximately 850m of carriageway widening works. Widening works at the central reservation and in the verges are required, along with boundary treatment works The existing River Tolka Bridge (BR01) will be widened at this Section to facilitate the carriageway widening. Sheet piling will be installed on the land side of the existing gabion baskets to protect River Tolka from the works and to retain the existing bank during excavation works for the bridge foundations. Foundations for the bridge widening will be constructed on piled foundations depending on

detailed design and confirmation of ground conditions which currently demonstrate potential for differential settlements.

- One spreadfoot cantilever Retaining Wall (RW09), will be constructed on the Old Navan Road towards the M50 Roundabout. RW09 is approximately 90m in length and maximum 4m in height and is located adjacent to the Castleknock health and leisure centre.
- Five minor retaining walls less than 1.5m of retained height will be constructed in this Section.
- A Variable Message Sign (VMS) designated Portal Gantry and four Sign Gantries will also be constructed along the N3 dual carriageway.
- The Mill Road Bridge (BR02) structure will be widened at the N3 and Mill Road intersection to facilitate the new lane layout. The widening will be completed to both ends of the bridges, with the abutment walls, foundations and bridge decks being extended widening the existing structure. The construction activities at this section will also comprise construction of new pedestrian ramp and steps access (RW07-A and RW07-B) between N3 and Mill Road. The pedestrian ramps include principal retaining walls.
- The main construction activity located at the N3 / M50 junction will be road marking modifications to facilitate bus lanes and bus priority signals.
- Between the Old Navan Road and the M50 roundabout includes 40m of carriageway widening works and realignment of footpaths. Works in the verges are expected as a result of realignment works on the footpaths.

14.4.1.3 N3 / M50 Junction (Junction 6) to Navan Road / Ashtown Road Junction

- The main construction activities along this Section includes carriageway widening works on the primary route and construction of a cycle track. Works in the verges are expected as a result of realignment works on the footpaths and cycle paths and some wall removal.
- A soil nail wall (RW03) will be constructed at this Section, close to Auburn Avenue. RW03 is approximately 100m in length and maximum 4m in height.
- One minor retaining wall less than 1.5m of retained height will be constructed at this section.
- Three overhead sign Gantries will be modified along this section.
- The central reservation between Phoenix Park Avenue and the Ashtown Roundabout will be removed.
- The Ashtown Road Roundabout is to have its layout converted to accommodate a four-armed signalised junction.

14.4.1.4 Navan Road / Ashtown Road Junction to Navan Road / Old Cabra Road Junction

- The main construction activities along this Section includes boundary treatment works, widening works, and construction of new footpaths and cycle tracks.
- All junctions will be modified to include enhanced pedestrian and cyclist facilities.
- The Old Cabra Road junction will be improved, including removal of traffic islands and the introduction of new lanes.
- One minor retaining wall less than 1.5m of retained height will be constructed at this section.

14.4.1.5 Navan Road / Old Cabra Road Junction to Ellis Quay

- The main construction activity along this Section will be the construction of new cycle tracks and footpaths.

- No new boundary treatment or carriageway widening will be undertaken between Aughrim Street and Ellis Quay. This is a heavily urbanised area with house and shop entrances along the extent, and as such, outputs have been reduced.

- Revised parking arrangements and loading bays are to be introduced along Manor Street / Stoneybatter. A new loading bay will be introduced along the northern side of King Street North.

- There are some localised sections that are not attached to the main CBC. The primary works for these areas are verge works, sign installation and the provision of a new road layout.

- As part of these works, bus priority signals and relevant signage will be installed at the Cabra Road / North Circular Road junction.

14.4.1.6 Operational Phase

The impact assessment for the Operational Phase has been outlined in terms of impact analysis of the Proposed Scheme on the local environment from a land, soils, geology and hydrogeology perspective. This is outlined in the following sections.

14.4.2 'Do Nothing' Scenario

In the Do Nothing scenario the Proposed Scheme would not be implemented and there would be no resulting impacts on the land, soils, geology and hydrogeology along the route of the Proposed Scheme. The impact would therefore be neutral.

14.4.3 Construction Phase

The potential land, soils, geology and hydrogeology impacts during the Construction Phase for the relevant construction activities described in Section 14.4.1 are presented in this section, along with their impact significance. These potential impacts also relate and interact with other environmental factors which are described within the EIAR. Specific interactions are outlined in Section 14.1.

The Proposed Scheme will have the following potential impacts on the land soils geology and hydrogeology as discussed below and summarised in Table 14.38:

- Loss or damage of topsoil;
- Excavation of potentially contaminated ground;
- Loss of future quarry or pit reserve;
- Loss or damage of proportion of Geological Heritage Area;
- Loss or damage of proportion of aquifer;
- Change to groundwater regime; and
- Loss or damage of a groundwater dependent habitat.

Though the magnitude of the impact may vary depending on the scale of activities and location of the Proposed Scheme relative to the impacted important feature, in order to ensure a robust assessment, only the maximum magnitude or "worst case" of the impact of the Proposed Scheme is considered.

14.4.3.1 Loss and Damage of Topsoil

Topsoil is a non-renewable source which if removed or damaged can result in a permanent irreversible negative impact. The potential ways in which this can occur as a result of the Proposed Scheme are as follows:

- There is the potential for materials on site to be spilled resulting in the pollution of the topsoil. For example, raw or uncured concrete and grouts, washed down water from exposed aggregate surfaces, cast-in-place concrete from concrete trucks, fuels, lubricants and hydraulic fluids for

equipment used on the development site, bitumen and sealants used for waterproofing concrete surfaces can all potentially impact on soils and groundwater during Construction Phase.

- These excavated soil materials will be stockpiled using appropriate methods to minimise the impacts of weathering. Materials that are stockpiled incorrectly can be exposed to erosion and weathering which reduces the quality of the resource.

- Excavations (including piling) in areas of contaminated ground the construction works may mobilise pollution contained in the soils into the nearby topsoil.

- Permanent damage of topsoil through waterlogging, sealing, washout of fines and erosion. This would be due to the trafficking of plant, regrading of slopes, laying of hardstanding surfaces and storage of materials in areas not intended to be paved as part of the Proposed Scheme.

- Excavation and disposal of topsoil instead of its reuse or reinstatement.

Topsoil will be encountered in numerous areas across the Proposed Scheme as discussed in Section 14.3.3.3. Where topsoil is stripped to accommodate the works outlined above, all of the above impacts are likely to occur at these locations.

The magnitude of these impacts of Proposed Scheme on the topsoil is small adverse as it results in a permanent irreversible loss of a small proportion of locally high fertility topsoil and / or a high proportion of locally low fertility topsoils within the study area. As the topsoil is of high importance the resulting significance of this permanent small adverse impact is slight.

14.4.3.2 Excavation of Potentially Contaminated Ground

The excavation of made ground results in the production of excess material that requires placement elsewhere in the Proposed Scheme or removal off-site and or the mobilisation of possible contaminants. The entirety of the Proposed Scheme will encounter made ground as discussed in Section 14.3.3.1 and Section 14.3.3.3 of this Chapter.

Exposure of locations of contamination and excavation of contaminated soil may potentially lead to a risk to the surrounding environment or underlying soil if not dealt with in an appropriate manner in accordance with the Environmental Protection Agency guidance on Land Contamination. The underlying soil could be impacted from the exposure of previous buried hazardous material, in an unlicensed dumping site for example.

Potential sources of contamination relevant to the Proposed Scheme identified within the study area are detailed in Table 14.25 and include stockpiles of gravel pits, historical industries (corn mill, worsted mill, margarine factory, tin box factory, polish factory, scavenging depot and destructor, malt house), quarries, railways, tramways, burial grounds, cattle mart and abattoir.

The magnitude of this impact is small adverse as it results in the excavation of a small proportion contaminated land. As the potential contaminated ground is of medium importance the resulting significance of the permanent small adverse impact is slight.

14.4.3.3 Loss of Future Quarry or Pit Reserve

The sterilisation of land through development or the excavation of soil and rock during construction can diminish future quarry and pit reserves which have been shown to have been utilised in the past in the area such as the quarries at the River Tolka Valley Park, Ashleigh Green, N3 / M50 Junction roundabout and west of Phoenix Park Avenue. This can result in a permanent irreversible loss of the in-situ characteristics of the land, soils and geology area.

The magnitude of this impact is negligible as it results in an insufficient permanent irreversible change on a local scale to affect the integrity of the land and soils as a potential future quarry or pit reserve above the Do Nothing scenario. As the aggregate potential is of medium to high importance the resulting significance of this negligible impact is imperceptible and will not be considered further.

14.4.3.4 Loss or Damage of Proportion of Geological Heritage Area

The sealing, contamination or excavation of soil and rock during construction can diminish the value of geological heritage areas. This can result in a permanent irreversible loss of the in-situ characteristics of the land, soils, geology and hydrogeology of the area. As noted in Table 14.28, there is one County Geological Sites present with the study area of the Proposed Scheme.

While there are some proposed minor verge works, sign installation and a new road layout planned at the Ashtown Gate in the vicinity of Phoenix Park, there are no major works such as boundary treatment or carriageway widening at this location. Therefore, the magnitude of this impact is negligible as it results in an insufficient permanent irreversible change on a local scale to affect the integrity of the county geological site and therefore will not be considered further.

14.4.3.5 Loss or Damage of Proportion of Aquifer

The removal of a proportion of an aquifer can reduce its ability to provide baseflow to groundwater dependant habitats and or water supplies and results in an irreversible loss of the in-situ characteristics of the land, soils, geology and hydrogeology. Likewise, the mobilisation of contaminants into the aquifer either through accidental spillage or disturbance of contaminated ground during excavation will reduce the quality of the groundwater within the aquifer.

The underlying limestone bedrock is defined as a locally important aquifer, where there is anticipated to be minimal excavation into the limestone rock as part of the Proposed Scheme. The magnitude of this impact is negligible as it results in no measurable change which may affect the integrity of the underlying aquifer. As the aquifer is a locally important aquifer of medium importance the resulting significance of this negligible impact is imperceptible and will not be considered further.

In addition to the above impact, potential pollutants from routine run-off during construction or mobilisation of pollution from the disturbance of contaminated ground during construction activities (particularly excavations) would have the potential to alter the groundwater quality temporarily in the study area. The magnitude of this impact is moderate adverse as it results in a temporary potential medium risk of pollution to groundwater. As the aquifer is a locally important aquifer of medium importance the resulting significant of this temporary moderate adverse impact is moderate.

14.4.3.6 Change to Groundwater Regime

Localised pumping of excavations is expected to be required as part of the construction phase at structures and deep trenches in order to allow works to be carried out in dry excavations. This could lead to a temporary change in the groundwater levels and flow within the locally important aquifer underlying the Proposed Scheme.

Since the pumping is expected to be limited, localised and temporary, the magnitude of this impact is considered negligible. As the importance of the locally important aquifer is medium, the resulting significance is imperceptible and therefore will not be considered further.

14.4.3.7 Loss or Damage of a Groundwater Dependent Habitat.

Localised pumping of excavations is expected to be required as part of the construction phase at structures and deep trenches in order to allow works to be carried out in dry excavations. This could lead to a temporary change in the groundwater levels and base flow to groundwater dependant habitats.

An ex-situ alluvial woodland located along the River Tolka has been identified by Project Biodiversity Specialist as potentially containing groundwater dependant Annex 1 Alluvial Woodland [91E0*]. Any drawdown from the excavation is expected to be limited, localised, not extending into the boundary of the habitat, and temporary. There is a risk of pollutants entering the groundwater as a result of spillages or accidents where mitigation measures are not implemented. Therefore, the magnitude of this impact is considered small adverse. As the importance of the ex-situ alluvial woodland is very high the resulting significance of the impact is moderate.

Table 14.38: Summary of Predicted Construction Phase Impacts

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Magnitude	Significance
Loss or damage of topsoil									
Alluvium	AlluvMIN	Along the River Tolka and at Pope John Paul Park.	Medium	Loss or damage of fertile soil	Negative	Permanent	Local	Small adverse	Slight
Topsoil	BminSW	North of N3 junction 3, north of the River Tolka between N3 junction 2 and M50 Roundabout and around the M50 roundabout.	High	Loss or damage of fertile soil	Negative	Permanent	Local	Small adverse	Slight
Topsoil	BminDW	Between N3 junction 3 and junction 2, along the northern side of the Navan Road.	High	Loss or damage of fertile soil	Negative	Permanent	Local	Small adverse	Slight
Excavation of potentially contaminated ground									
Potential Contaminated Land	Gravel Pits	Eastbound N3 slip road (1 No.) and beneath the current footprint of the N3 (1 No.)	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Historical Corn Mill	Mill Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Sources of Contamination	Historical Worsted Mill	Old Navan Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Historical Margarine Factory	Old Navan Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Historical Quarry	Ashleigh Green	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Magnitude	Significance
Potential Sources of Contamination	Historical Quarry	N3 / M50 Junction roundabout	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Historical Quarry	West of Phoenix Park Avenue	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Historical Oil Mill	Mill Lane	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Sources of Contamination	Historical Tin Box Factory	Mill Lane	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Polish Factory	Mill Lane	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Midland Great Western Railway	Old Navan Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Sources of Contamination	Amiens Street & North Wall Branch railway line	East of the Navan Road / Old Cabra Road Junction	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Tramway	North Circular Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Tramway	Stanley Street to Ellis Quay	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Sources of Contamination	Tramway	Ellis Quay	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Burial Ground	River Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Graveyard	Navan Road at St Joseph's School for Deaf Boys	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Sources of Contamination	Graveyard	Kings Street North	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Magnitude	Significance
Potential Contaminated Land	Graveyard	Ard Ri Place	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Military Cemetery	Slemish Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Sawmill	Brunswick Street	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Sources of Contamination	Scavenging Depot and Destructor	Stanley Street	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Malt House	Slemish Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Contaminated Land	Cattle Market	North Circular Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Sources of Contamination	Abattoir	North Circular Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Potential Sources of Contamination	Petrol Station	Blanchardstown, within footprint of M50 Junction	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Historic Landfill	Blanchardstown, within footprint of M50 Junction	Blanchardstown Hospital	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Historic Landfill	Blanchardstown Hospital	Tolka River Park	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Historic Landfill	Tolka River Park	South of Snugborough Road, east of Navan Road Parkway, south-west of Pope John Paul Park and Old Cabra junction.	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Magnitude	Significance
Licensed Facilities	Diageo Ireland	Victoria Quay – 130m south-west of the Proposed Scheme	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight
Loss of future quarry or pit reserve									
Crushed rock aggregate potential	Moderate potential	South of the N3 between junction 3 and junction 2, north and south of the River Tolka Bridge, east of M50 roundabout, between M50 roundabout and Ashtown,	Medium	Loss of future quarry or pit reserve	Negative	Permanent	Local	Negligible	Imperceptible
Crushed rock aggregate potential	High potential	Around N3 junction, north of N3 junction 2, around Blanchardstown Village, along the N3 between junction 2 and the M50 roundabout and around Ashtown and between Ashtown Road Junction and Old Cabra Road junction.	Medium	Loss of future quarry or pit reserve	Negative	Permanent	Local	Negligible	Imperceptible
Crushed rock aggregate potential	Very High potential	North-east of Blanchardstown Shopping Centre, along the River Tolka east of Mill Road Bridge until the M50 Roundabout, at the northern section of the M50 roundabout and south of the Old	High	Loss of future quarry or pit reserve	Negative	Permanent	Local	Negligible	Imperceptible

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Magnitude	Significance
		Navan Road at Ashtown							
Granular aggregate potential	Moderate potential	North-east of Blanchardstown Shopping Centre, north-east of N3 junction 2, south of Blanchardstown Village and north-east of M50 roundabout.	Medium	Loss of future quarry or pit reserve	Negative	Permanent	Local	Negligible	Imperceptible
Granular aggregate potential	High potential	North-east of N3 at Junction 3, east of N3 Junction 2 as far as James Connolly Memorial Hospital, north-east of the M50 roundabout, by the Navan Road between Saint Vincent's centre and Pope John Paul Park, east of R805 Blackhall Place around George's Court and north-east of Benburb Street / Blackhall Place junction.	Medium	Loss of future quarry or pit reserve	Negative	Permanent	Local	Negligible	Imperceptible
Loss or Damage of Proportion of Geological Heritage Area									
Phoenix Park (DC009)	This site forms an extensive, 707-hectare natural landscape within the confines of Dublin City. Recommended for Geological NHA	Phoenix Park	High	Loss or damage of proportion of Geological Heritage Area	Negative	Permanent	Local	Negligible	Imperceptible
Loss or Damage of Proportion of Aquifer									

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Magnitude	Significance
Locally Important Aquifer (LI)	Bedrock which is moderately productive only in local zones	Widespread	Medium	Loss or damage of proportion of aquifer through excavation.	Negative	Permanent	Local	Negligible	Imperceptible
Locally Important Aquifer (LI)	Bedrock which is moderately productive only in local zones	Widespread	Medium	Loss or damage of proportion of aquifer through pollution.	Negative	Temporary	Local	Moderate Adverse	Moderate
Change to Groundwater Regime									
Locally Important Aquifer (LI)	Bedrock which is moderately productive only in local zones	Widespread	Medium	Change to groundwater regime	Negative	Temporary	Local	Negligible	Imperceptible
Loss or Damage of a Groundwater Dependant Habitat.									
Groundwater dependant habitat	Ex situ alluvial woodland	North-west of the M50 Roundabout.	Very High	Loss or damage to proportion of habitat	Negative	Temporary	Local	Small adverse	Moderate

14.4.4 Operational Phase

14.4.4.1 Contamination

The Operational Phase has the potential to lead to occasional accidental leakage of oil, petrol or diesel, allowing contamination of the surrounding environment. While the likelihood of an accidental spillage may increase in comparison to the Do Nothing Scenario, the magnitude of the impact is negligible.

Therefore, the significance of the impact will be Imperceptible on land, soils, geology and hydrogeology.

14.5 Mitigation and Monitoring Measures

The following sections outline the mitigation and monitoring measures associated with the impacts identified in Section 14.4 for both the Construction and the Operational Phases of the Proposed Scheme. A summary of the pre-mitigation and post-mitigation impacts is contained in Table 14.38.

14.5.1 Construction Phase

14.5.1.1 Loss or Damage of Topsoil

Excavated topsoils will be stockpiled by the appointed contractor using appropriate methods to minimise the effects of weathering. Care will be taken in reworking this material to minimise dust generation, groundwater infiltration and generation of runoff.

All topsoil or subsoil shall be assessed for re-use within the Proposed Scheme by the appointed contractor ensuring the appropriate handling, processing and segregation of the material. Where practical the removal of topsoil from the Proposed Scheme will be avoided. All earthworks will be undertaken in accordance with TII Specification for Road Works (SPW) Series 600 Earthworks (TII, 2013) and project-specific earthworks specifications ensuring that all excavated material and imported material is classified using the same methodology to allow maximum opportunity for the reuse of materials on site.

The impact of the production of excess material for removal offsite is discussed in Chapter 18 (Waste & Resources).

14.5.1.2 Excavation of Potentially Contaminated Ground

The appointed contractor will ensure that excavations shall be kept to a minimum, using shoring or trench boxes where appropriate. For more extensive excavations, a temporary works designer shall be appointed by the appointed contractor to design excavation support measures in accordance with all relevant guidelines that minimises the excavation of contaminated ground.

The appointed contractor will be responsible for regular testing of excavated soils to monitor the suitability of the soil for reuse.

Samples of ground suspected of contamination will be tested for contamination by the appointed contractor during the ground investigation and ground excavated from these areas will be disposed of to a suitably licensed or permitted sites in accordance with the current Irish waste management legislation.

Any dewatering in areas of contaminated ground shall be designed by the appointed contractor to minimise the mobilisation of contaminants into the surrounding environment.

14.5.1.3 Pollution of Soil and Groundwater

Good construction management practices, as outlined in the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors (Masters-Williams *et al*., 2001) will be employed by the appointed contractor to minimise the risk of transmission of hazardous materials as well as pollution of

adjacent watercourses and groundwater. The construction management of the site will take account of these recommendations to minimise as far as possible the risk of soil, groundwater and surface water contamination.

Measures to be implemented to minimise the risk of spills and contamination of soils and waters include:

- Employing only competent and experienced workforce, and site-specific training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures;
- Ensure that all areas where liquids (including fuel) are stored, or cleaning is carried out, are in designated impermeable areas that are isolated from the surrounding area and within a secondary containment system, e.g., by a roll-over bund, raised kerb, ramps or stepped access;
- The location of any fuel storage facilities shall be considered in the design of the Construction Compound. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded;
- Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) during the entire Construction Phase;
- Potential pollutants to be adequately secured against vandalism;
- Provision of proper containment of potential pollutants according to codes of best practice;
- Thorough control during the entire Construction Phase to ensure that any spillage is identified at early stage and subsequently effectively contained and managed; and
- Spill kit to be provided and to be kept close to the storage area. Staff to be trained on how to use spill kits correctly.

An Environmental Incident Response Plan will be implemented by the appointed contractor, which will identify the actions to be taken in the event of a pollution incident. It will address such aspects as containment measures, emergency discharge routes, a list of appropriate equipment and clean-up materials and notification procedures to inform the relevant environmental protection authority. Refer to Appendix A5.1 CEMP in Volume 4 of this EIAR.

Sediment control methods are outlined in the Surface Water Management Plan in Appendix A5.1 CEMP in Volume 4 of this EIAR, and these will be implemented by the appointed contractor.

The CEMP also addresses good construction management practices that will be employed to prevent the risk of pollution of the existing land, soils, geology and hydrogeology during construction.

14.5.2 Operational Phase

With the implementation of the proposed design, no additional mitigation measures for land, soils, geology and hydrogeology are considered necessary for the operation of the Proposed Scheme.

In the Operational Phase the infrastructure will be maintained by the local authority and will be subject to their management procedures to ensure that the correct measures are taken in the event of any accidental spillages and this will reduce the potential for any impact.

14.6 Residual Impacts

14.6.1 Construction Phase

With the efficacious implementation of the above mitigation measures, there will be no significant residual impacts on land, soils, geology or hydrogeology as a result of the construction of the Proposed Scheme.

Table 14.39: Summary of Predicted Construction Phase Impacts Following the Implementation of Mitigation and Monitoring Measures

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation Magnitude	Post-mitigation Significance
Loss or damage of topsoil											
Alluvium	AlluvMIN	Along the River Tolka and at Pope John Paul Park.	Medium	Loss or damage of fertile soil	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Topsoil	BminSW	North of N3 junction 3, north of the River Tolka between N3 junction 2 and M50 Roundabout and around the M50 roundabout.	High	Loss or damage of fertile soil	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Topsoil	BminDW	Between N3 junction 3 and junction 2, along the northern side of the Navan Road.	High	Loss or damage of fertile soil	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Excavation of potentially contaminated ground											
Potential Contaminated Land	Gravel Pits	Eastbound N3 slip road (1 No.) and beneath the current footprint of the N3 (1 No.)	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Historical Corn Mill	Mill Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation Magnitude	Post-mitigation Significance
Potential Sources of Contamination	Historical Worsted Mill	Old Navan Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Historical Margarine Factory	Old Navan Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Historical Quarry	Ashleigh Green	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Sources of Contamination	Historical Quarry	N3 / M50 Junction roundabout	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Historical Quarry	West of Phoenix Park Avenue	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Historical Oil Mill	Mill Lane	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Sources of Contamination	Historical Tin Box Factory	Mill Lane	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Historical Margarine Factory	Mill Lane	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Historical Quarry	Mill Lane	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Polish Factory	Mill Lane	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Midland Great Western Railway	Old Navan Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Sources of Contamination	Amiens Street & North Wall Branch railway line	East of the Navan Road / Old Cabra Road Junction	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation Magnitude	Post-mitigation Significance
Potential Contaminated Land	Tramway	North Circular Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Tramway	Stanley Street to Ellis Quay	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Sources of Contamination	Tramway	Ellis Quay	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Burial Ground	River Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Graveyard	Navan Road at St Joseph's School for Deaf Boys	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Sources of Contamination	Graveyard	Kings Street North	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Graveyard	Ard Ri Place	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Military Cemetery	Slemish Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Sawmill	Brunswick Street	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Scavenging Depot and Destructor	Stanley Street	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Malt House	Slemish Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Contaminated Land	Cattle Market	North Circular Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation Magnitude	Post-mitigation Significance
Potential Sources of Contamination	Abattoir	North Circular Road	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Potential Sources of Contamination	Petrol Station	Blanchardstown, within footprint of M50 Junction	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Historic Landfill	Blanchardstown, within footprint of M50 Junction	Blanchardstown Hospital	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Historic Landfill	Blanchardstown Hospital	Tolka River Park	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Historic Landfill	Tolka River Park	South of Snugborough Road, east of Navan Road Parkway, south-west of Pope John Paul Park and Old Cabra junction.	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Licensed Facilities	Diageo Ireland	Victoria Quay – 130m south-west of the Proposed Scheme	Medium	Excavation of contaminated ground	Negative	Permanent	Local	Small adverse	Slight	Negligible	Imperceptible
Loss of future quarry or pit reserve											
Crushed rock aggregate potential	Moderate potential	South of the N3 between junction 3 and junction 2, north and south of the River Tolka Bridge, east of M50	Medium	Loss of future quarry or pit reserve	Negative	Permanent	Local	Negligible	Imperceptible	Negligible	Imperceptible

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation Magnitude	Post-mitigation Significance
		roundabout, between M50 roundabout and Ashtown,									
Crushed rock aggregate potential	High potential	Around N3 junction, north of N3 junction 2, around Blanchardstown Village, along the N3 between junction 2 and the M50 roundabout and around Ashtown and between Ashtown Road Junction and Old Cabra Road junction.	Medium	Loss of future quarry or pit reserve	Negative	Permanent	Local	Negligible	Imperceptible	Negligible	Imperceptible
Crushed rock aggregate potential	Very High potential	North-east of Blanchardstown Shopping Centre, along the River Tolka east of Mill Road Bridge until the M50 Roundabout, at the northern section of the M50 roundabout and south of the Old Navan Road at Ashtown	High	Loss of future quarry or pit reserve	Negative	Permanent	Local	Negligible	Imperceptible	Negligible	Imperceptible
Granular aggregate potential	Moderate potential	North-east of Blanchardstown Shopping Centre, north-	Medium	Loss of future quarry or pit reserve	Negative	Permanent	Local	Negligible	Imperceptible	Negligible	Imperceptible

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation Magnitude	Post-mitigation Significance
		east of N3 junction 2, south of Blanchardstown Village and north-east of M50 roundabout.									
Granular aggregate potential	High potential	North-east of N3 at Junction 3, east of N3 Junction 2 as far as James Connolly Memorial Hospital, north-east of the M50 roundabout, by the Navan Road between Saint Vincent's centre and Pope John Paul Park, east of R805 Blackhall Place around George's Court and north-east of Benburb Street / Blackhall Place junction.	Medium	Loss of future quarry or pit reserve	Negative	Permanent	Local	Negligible	Imperceptible	Negligible	Imperceptible
Loss or Damage of Proportion of Geological Heritage Area											
Phoenix Park (DC009)	This site forms an extensive, 707-hectare natural landscape within the confines of	Phoenix Park	High	Loss or damage of proportion of Geological Heritage Area	Negative	Permanent	Local	Negligible	Imperceptible	Negligible	Imperceptible

Feature	Description	Location	Importance	Impact	Quality	Duration	Scale	Pre-mitigation Magnitude	Pre-mitigation Significance	Post-mitigation Magnitude	Post-mitigation Significance
	Dublin City. Recommended for Geological NHA										
Loss or Damage of Proportion of Aquifer											
Locally Important Aquifer (LI)	Bedrock which is moderately productive only in local zones	Widespread	Medium	Loss or damage of proportion of aquifer through excavation.	Negative	Permanent	Local	Negligible	Imperceptible	Negligible	Imperceptible
Locally Important Aquifer (LI)	Bedrock which is moderately productive only in local zones	Widespread	Medium	Loss or damage of proportion of aquifer through pollution.	Negative	Temporary	Local	Moderate Adverse	Moderate	Negligible	Imperceptible
Change to Groundwater Regime											
Locally Important Aquifer (LI)	Bedrock which is moderately productive only in local zones	Widespread	Medium	Change to groundwater regime	Negative	Temporary	Local	Negligible	Imperceptible	Negligible	Imperceptible
Loss or Damage of a Groundwater Dependant Habitat.											
Groundwater dependant habitat	Ex situ alluvial woodland		Very High	Loss or damage to proportion of habitat	Negative	Permanent	Local	Small adverse	Moderate	Negligible	Imperceptible

14.6.2 Operational Phase

No significant residual impacts on land, soils, geology and hydrogeology as a result of the operation of the Proposed Scheme.

No significant residual impacts have been identified either in the Construction or Operational Phases of the Proposed Scheme, whilst meeting the scheme objectives set out in Chapter 1 (Introduction)

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