METROLINK

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A24.1

Excavated Materials Management Strategy

Contents

List of Abbreviations

Acronym	Meaning
C&D	Construction & Demolition
CEMP	Construction Environmental Management Plan
DANP	Dublin Airport North Portal
DASP	Dublin Airport South Portal
DCC	Dublin City Council
D-Walls	Diaphragm Walls
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMMS	Excavated Material Management Strategy
EMR	Eastern Midlands Region
EPA	Environmental Protection Agency
EU	European Union
FCC	Fingal County Council
HGV	Heavy Goods Vehicles
RO	Railway Order
STMP	Scheme Traffic Management Plan
TBM	Tunnel Boring Machine
WMP	Waste Management Plan

1. Introduction

1.1 Background

This Excavated Material Management Strategy (EMMS) has been produced as part of the Environmental Impact Assessment Report (EIAR) of the MetroLink project (hereafter referred to as the proposed Project). It has been prepared in accordance with all relevant European and Irish waste legislation but with particular emphasis on the European Communities (Waste Directive) Regulations 2011. This document aims to summarise the nature and quantities of excavated material generated based on the Preliminary Design and summarise the management options for the excavated material.

This Excavated Material Management Strategy will be a 'live' document and be subject to updates as the proposed Project design develops. It will be provided for information once contractors have been appointed, who will then be responsible for the management of excavated material generated during the construction of the proposed Project. The contractors will develop a detailed Excavated Material Management Plan based on this Strategy document, to be followed during the construction phase of the proposed Project.

1.2 Summary of Scheme Design

The proposed Project route will be approximately 18.8km in length, running from Estuary, north of Swords, southwards to Charlemont in south Dublin City via Dublin Airport. The route starts above ground from Estuary (passing within a cutting through Swords), before entering a single bore underground section beneath Dublin Airport and emerging again to cross over the M50. From Northwood through the city to Charlemont in the south of the city the route will run through a single bore tunnel. Charlemont Station will allow for an interchange with the Luas Green Line services, with the tunnel continuing and terminating south of Ranelagh, aligned to allow a potential future tie-in connection.

The route will include 16 new stations, a Park and Ride facility at Estuary Station, a depot at Dardistown, and ancillary infrastructure. The rolling stock will comprise 64m long, high-floor trains. The proposed Project is designed for a maximum of 20,000 passengers per hour per direction. The scheme design has been divided into four sections, AZ1 - AZ4, which are described in Table 1.1.

The proposed Project has been split into four geographical areas (AZ1 to AZ4) as summarised in Table 1.1 (described from north to south) for the purposes of the EIAR assessment. Table 1.2 and Diagram 1.1 provide details of the principal project elements, including those which will generate excavated materials.

Table 1.1: Summary of Scheme Design

Ref.	Geographical Section	Description of Extent of Geographical Section
AZ1	Northern Section	Estuary Station to Dublin Airport North Portal. It includes the rail line crossing the Broadmeadow and Ward Rivers and associated flood plains on a viaduct. This section will include open, retained cut and cut-and-cover sections. This section includes the proposed Park and Ride Facility at Estuary Station.
AZ2	Airport Section	This section of the proposed Project includes Dublin Airport North Portal, the tunnel underneath Dublin Airport, Dublin Airport Station and Dublin Airport South Portal.
AZ3	Dardistown to Northwood	From south of Dublin Airport South Portal to the Northwood Portal. This section includes the proposed MetroLink Depot, the M50 Viaduct and the proposed Construction Compound and TBM launch site at Northwood.
AZ4	Northwood to Charlemont	From south of the Northwood Portal to the tunnel termination location south of Charlemont Station.

Table 1.2: Principal Project Elements

Project Elements	Outline Description
Permanent Project Elements	
Tunnels	It is proposed to construct two geographically separate, single-bore tunnels, using a Tunnel Boring Machine (TBM). Each section of tunnel will have a 8.5m inside diameter and will contain both northbound and southbound rail lines within the same tunnel. These tunnels will be located as follows: • The Airport Tunnel: running south from Dublin Airport North Portal (DANP) under Dublin Airport and surfacing south of the airport at Dublin Airport South Portal (DASP) and will be approximately 2.3km in length; and • The City Tunnel: running for 9.4 km from Northwood Portal and terminating underground south of Charlemont Station.
Cut Sections	The northern section of the alignment is characterised by a shallow excavated alignment whereby the alignment runs below the existing ground level. Part of the cut sections are open at the top, with fences along the alignment for safety and security. While other sections are "cut and cover", whereby the alignment is covered.
Tunnel Portals	The openings at the end of the tunnel are referred to as portals. They are concrete and steel structures designed to provide the commencement or termination of a tunnelled section of route and provide a transition to adjacent lengths of the route which may be in retained structures or at the surface. There are three proposed portals, which are: • DANP; • DASP; and • Northwood Portal. There will be no portal at the southern end of the proposed Project, as the southern termination and turnback would be underground.
Stations	There are three types of stations: surface stations, retained cut stations and underground stations: • Estuary Station will be built at surface level, known as a 'surface station'; • Seatown, Swords Central, Fosterstown Stations and the proposed Dardistown Station will be in retained cutting, known as 'retained cut stations'; and • Dublin Airport Station and all 10 stations along the City Tunnel will be 'underground stations'.
Intervention Shaft	An intervention shaft will be required at Albert College Park to provide adequate emergency egress from the City Tunnel and to support tunnel ventilation. Following the European Standard for safety in railway tunnels TSI 1303/2014: Technical Specification for Interoperability relating to 'safety in railway tunnels' of the rail system of the European Union, it has been recommended that the maximum spacing between emergency exits is 1,000m. As the distance between Collins Avenue and Griffith Park is 1,494m, this intervention shaft is proposed to safely support evacuation/emergency service access in the event of an incident. This shaft will also function to provide ventilation to the tunnel. The shaft will require two 23m long connection tunnels extending from the shaft, connecting to the main tunnel. At other locations, emergency access will be incorporated into the stations and portals, or intervention tunnels will be utilised at locations where there is no available space for a shaft to be constructed and located where required (see below).
Intervention Tunnels	In addition to the two main 'running' tunnels, there are three shorter, smaller diameter tunnels. These are the evacuation and ventilation tunnels (known as Intervention Tunnels): • Airport Intervention Tunnels: parallel to the Airport Tunnel, there will also be two smaller diameter tunnels; on the west side, an evacuation tunnel running northwards from DASP for about 315m, and on the east side, a ventilation tunnel connected to the main tunnel and extending about 600m from DASP underneath Dublin Airport Lands. In the event of an incident in the main tunnel, the evacuation tunnel will enable passengers to walk out to a safe location outside the Dublin Airport Lands. • Charlemont Intervention Tunnel: The City Tunnel will extend 320m south of Charlemont Station. A parallel evacuation and ventilation tunnel is required from the end of the City Tunnel back to Charlemont Station to support emergency evacuation of maintenance staff and ventilation for this section of tunnel.
Park and Ride Facility	The proposed Park and Ride Facility next to Estuary Station will include provision for up to 3,000 parking spaces.

Project Elements	Outline Description
Broadmeadow and Ward River Viaduct	A 260m long viaduct is proposed between Estuary and Seatown Stations to cross the Broadmeadow and Ward Rivers and their floodplains.
Proposed Grid Connections	Grid connections will be provided via cable routes with the addition of new 110kV substations at DANP and Dardistown. (Approval for the proposed grid connections to be applied for separately but are assessed in the EIAR).
Dardistown Depot	A maintenance depot will be located at Dardistown. It will include: • Vehicle stabling; • Maintenance workshops and pits; • Automatic vehicle wash facilities; • A test track; • Sanding system for rolling stock; • The Operations Control Centre for the proposed Project; • A substation; • A mast; and • Other staff facilities and a carpark.
Operations Control Centre	The main Operations Control Centre (OCC) will be located at Dardistown Depot, and a back-up OCC will be provided at Estuary.
M50 Viaduct	A 100m long viaduct to carry the proposed Project across the M50 between the Dardistown Depot and Northwood Station.
Temporary Project Elements	
Construction Compounds	There will be 34 Construction Compounds including 20 main Construction Compounds, 14 Satellite Construction Compounds required during the Construction Phase of the proposed Project. The main Construction Compounds will be located at each of the proposed station locations, the portal locations and the Dardistown Depot Location (also covering the Dardistown Station) with satellite compounds located at other locations along the alignment. Outside of the Construction Compounds there will be works areas and sites associated with the construction of all elements of the proposed Project including an easement strip along the surface sections.
Logistics Sites	The main logistics sites will be located at Estuary, near Pinnock Hill east of the R132 Swords Bypass and north of Saint Margaret's Road at the Northwood Compound. (These areas are included within the 14 Satellite Construction Compounds).
Tunnel Boring Machine Launch Site	There will be two main tunnel boring machine (TBM) launch sites. One will be located at DASP which will serve the TBM boring the Airport Tunnel and the second will be located at the Northwood Construction Compound which will serve the TBM boring the City Tunnel.

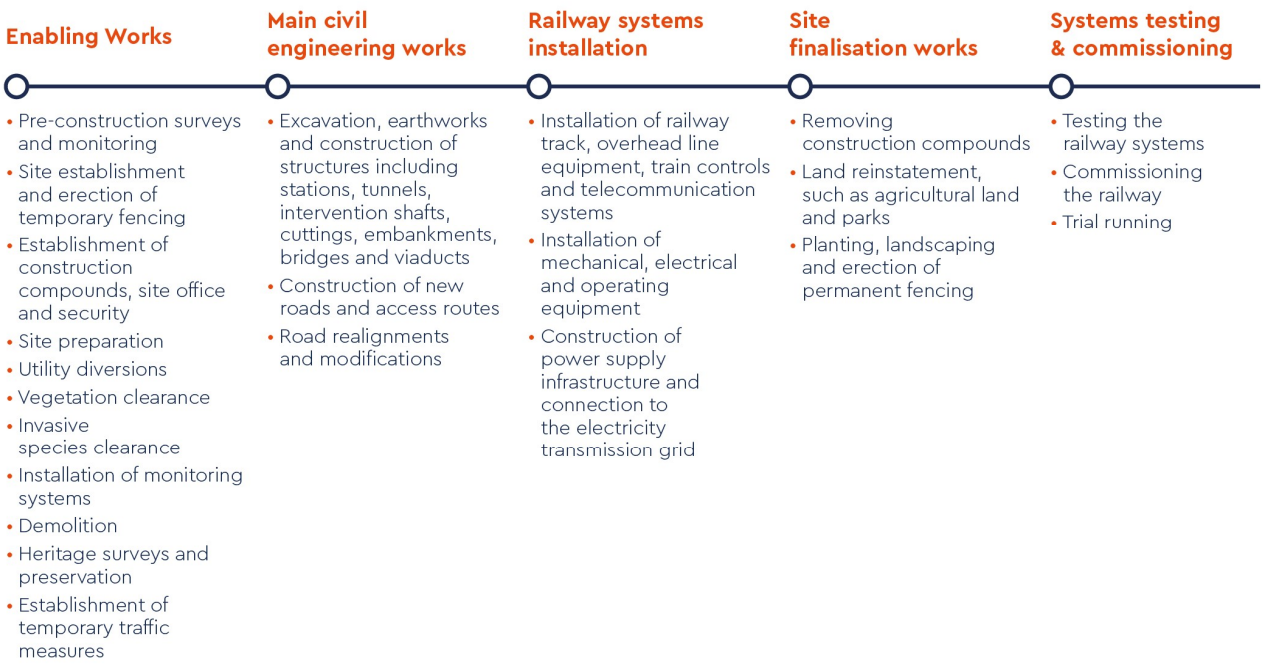

Diagram 1.1: Summary of Key Activities during the Construction Phase of the Proposed Project

1.3 Report Objectives

The overall objective of this Excavated Material Management Strategy is to provide an initial summary of the expected excavated material arisings that will be generated during the proposed Project. This Strategy highlights management options based on the waste hierarchy with the aim of minimising the amount disposed of as waste. To achieve this overall objective the Strategy includes the following elements:

- Review of relevant waste management legislation;
- Summary of geological conditions within the proposed Project;
- Identification of proposed Project elements which will generate excavated materials;
- Estimates of types and quantities of excavated material generated;
- Identification of potential options for the management of excavated material following the waste hierarchy in the order (i) prevention, (ii) reuse, (iii) recover/recycle and (iv) dispose; and
- List of potential third-party sites suitable to accept excavated materials to be reused, recovered or deposited.

This strategy should be read in conjunction with Chapter 24 (Materials & Waste Management).

It should be noted that the content of this report is based on the design available at the time of writing and the associated excavated material volume current estimates. As the design of the proposed Project develops, re-evaluation of the excavated material volume estimates and consequent appraisal of management options will be required. In addition, the potential receiving sites identified within this report are at different stages of development and the viability of each one is dependent on the timing, duration and stage of the proposed Project construction and the commercial considerations at that time. The contractors, once appointed, will be required to confirm both the excavated material volumes and management options at the time of construction.

1.4 Consultation

Consultation responses from key stakeholders, landowners and the public were reviewed and taken into account in compiling this report. The consultation responses relevant to excavated material management are provided in Table 1.3.

Table 1.3: Land, Soils and Geology, Resources and Waste Issues Raised During Consultation

Consultee	Summary of Consultation Results
Construction Industry Federation Meeting	Meeting held regarding material management. Discussion around options for management of the surplus excavated material: • Article 27 (by-product); • Article 28 (end-of-waste); • Consideration of several possible locations for material; and • Consideration of quarries for material disposal – there are a number within close proximity to the M50 Motorway.
Eastern Midlands Region Waste Management Planning Lead Authority	Following consultation with Eastern Midlands Region Waste Management Planning Lead Authority: • Significant quantity of potential spoil arising from the proposed Project; • Lack of headroom within the current domestic market; • Importance of characterisation of material as early as possible in order to identify management options; • Identification of the five likely categories into which the spoil will fall; • Highlighted the fact that non-hazardous landfills (Ballynagran, Knockharley and Drehid) also take municipal waste, which takes precedent over C&D waste; • Recently there has been a need to export non-hazardous soils due to the lack of capacity within the domestic market, likely that this will be required for this proposed Project if the current circumstances continue; and • Encourage TII to explore alternatives domestically and to adopt a Circular Economy approach.
Integrated Material Solutions	Discussing options for managing material and waste generated by the proposed Project.
Roadstone	Discussing options for managing material and waste generated by the proposed Project.
Hazardous waste facilities in Ireland	Discussing options for managing hazardous waste generated by the proposed Project. Indication that the hazardous waste generated by the proposed Project could be treated
Department of Environment, Climate and Communications	• Prevention of waste – no mention of such measures. • Opportunities to reuse material on site. • Scoping recycling/recovery of the material off-site in advance. • Measures to ensure uncontaminated/contaminated soils are segregated. Quantity of material and classification of material mentioned later in EIAR.
Department of the Environment, Climate and Communications	Provided reference to the following specific policies and guidelines: • A Resource Opportunity - Waste Management Policy in Ireland (DECLG 2012) https://www.gov.ie/en/publication/a9d98-a-resource-opportunity-waste-management-policy-in-ireland/ • Towards a Resource Efficient Ireland (EPA 2012) https://www.epa.ie/waste/nwpp/ • Construction and Demolition Web Resources & https://www.epa.ie/our-services/monitoring--assessment/circular-economy/construction--demolition/ Reference should also be made to the EU Construction and Demolition Waste Management Protocol (European Commission 2016) developed as part of the European Commission's Circular Economy Action Plan

Consultee	Summary of Consultation Results
Department of Communications, Climate Action and Environment	With respect to waste, the Local Authority should consult directly with their respective Regional Waste Management Planning Office regarding the development of the final plans.
FCC	Consideration should be given to provide the exact locations for disposal of the waste.
Waterways Ireland	Any activity either during construction or post construction that resulted in the release of any form of polluting or deleterious matter into the canal, such as fuels, oils, concrete or excess waste, litter, or construction waste, is to be fully avoided and prevented.

1.5 Definitions

For the purpose of this report, “excavated material” refers to all made ground, soil, subsoil and bedrock removed or extracted from the ground as part of construction of the proposed Project. Article 3 of the Waste Framework Directive (WFD) (EU 2008) provides definitions of the following waste terminology which have been used throughout this strategy document, and these definitions are provided in Table 1.4.

Table 1.4: Waste Framework Directive Waste Terminology and Definitions

Terminology	Definition
Waste	Any substance or object which the holder discards or intends or is required to discard.
Hazardous Waste	Waste which displays one or more of the hazardous properties listed in Annex III of Directive 2008/98/EC (EU 2008).
Waste Holder	The waste producer or the natural or legal person who is in possession of the waste.
Prevention (also referred to as minimisation)	Measures taken before a substance, material or product has become waste, that reduce: - The quantity of waste, including through the re-use of products or the extension of the life span of products; - The adverse impacts of the generated waste on the environmental and human health; or - The content of harmful substances in materials and products.
Re-use	Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.
Recovery	Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the WFD (EU 2008) sets out a non-exhaustive list of recovery operations. (Note: for the purpose of this report, recovery does not include energy recovery, as the spoil is not suitable for use as a fuel).
Recycling	Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.
Disposal	Any operation which is not recovery, even where the operation has as a secondary consequence the reclamation of substances or energy.

2. Regulatory Background

2.1 Legislation, Policy and Guidance Context

Ireland’s waste policy is governed and influenced by several European Union (EU) Directives. The development of this Excavated Material Management Strategy is consistent with, and cognisant of relevant guidance including, but not limited to:

- The Management of Waste from National Road Construction Projects (GE-ENV-01101) (TII 2017);
- Guidance on Soil and Stone By-products in the Context of Article 27 of the European Communities (Waste Directive) Regulations 2011 (EPA 2019a);
- Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities (EPA 2020)
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (DEHLG[1] 2006); and
- CIRIA Report 133, Waste Minimisation in Construction (CIRIA 1997).

The following EU, national and local policy documents are also relevant with respect to waste management policies:

- Eastern – Midlands Region Waste Management Plan 2015-2021 (EMWR 2015);
- A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2020-2025 (DCCAE 2020)
- Fingal Development Plan 2023-2029 (FCC 2022);
- Dublin City Development Plan 2022-2028 (DCC 2022);
- National Hazardous Waste Management Plan 2014-2020 (EPA 2014);
- Draft National Hazardous Waste Management Plan 2021–2027 (EPA, 2021);
- A Resource Opportunity – Waste Management Policy in Ireland (DECLG[2] 2012);
- Circular Economy Action Plan – For a Cleaner and More Competitive Europe (EC 2020);
- EU Construction & Demolition Waste Management Protocol (EC 2016); and
- Construction & Demolition Waste: Soil and Stone Recovery/Disposal Capacity (RPS on behalf of DCC 2016 2016).
- Review of Soil Waste Management in the Greater Dublin Area – Market Analysis Report (RPS on behalf of Construction Industry Federation (CIF) 2016);

In addition, the following documents and legislation are also relevant:

- The EU Waste Framework Directive (2008/98/EC) (EU 2008);
- The Waste Management Act 1996 (as amended) (GPO 2018);
- The European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) (GPO 2011); and
- Waste Classification – List of Waste and Determining if Waste is Hazardous or Non-Hazardous (EPA 2015).

The main relevant aspects of policy and legislation are summarised in the following sub-sections.

2.1.1 European Union Waste Framework Directive

The principal legislation governing waste in Ireland is the European Union Waste Framework Directive (WFD), Directive 2008/98/EC (European Union, 2008, as amended by European Union, 2018), (EU 2018) which were transposed into Irish Law in April 2011 through the European Communities (Waste Directive) Regulations 2011

[1] Now Department of Communications, Climate Action and Environment
[2] Now Department of Communications, Climate Action and Environment

(S.I. No. 126/2011) (GPO 2011). The current Directive repealed the WFD 20060/12/EC, the Hazardous Waste Directive (91/689/EEC) and the Waste Oils Directive (75/439/EEC). The WFD requires that the principles of the waste management hierarchy is enforced, comprising prevention, preparing for re-use, recycling, other recovery including energy recovery and disposal.

2.1.2 Waste Management Act

The governing legislation for waste in Ireland is the Waste Management Act, 1996 (GPO 2018), establishing a legislative basis for Producer Responsibility. A series of regulations have been made pursuant to the Waste Management Act 1996 covering waste collection, authorisation of waste facilities, trans frontier shipment of waste and specific waste streams such as packaging and farm plastics. The format and content of plans is governed by the Waste Management (Planning) Regulations 1997 (GPO 1997).

2.1.3 National Waste Management Policy

Ireland's National Waste Management Policy has a legislative basis in the EU's revised WFD. The Waste Management Policy (Department of Environment, Community and Local Government, 1998-2012) is set by the government and is detailed in a set of four policy documents produced since 1998:

- Waste Management, Changing Our Ways (DELG 1998);
- Preventing and Recycling Waste: Delivering Change (DELG 2002);
- Waste Management – Taking Stock and Moving Forward (DELG 2004); and
- A Resource Opportunity (DECLG 2012).

These policy statements provide the overall waste planning framework, supporting the regional waste management approach and other key concepts such as implementation of the waste hierarchy. The Changing Our Ways document set out targets of 50% recycling of Construction and Demolition (C&D) waste by 2003 and 85% recycling by 2013. The "Delivering Change" policy statement compliments the implementation of waste management plans and evolves from and is grounded in the Changing Our Ways document. The most recent policy document "A Resource Opportunity" sets out measures to enable progress in Ireland to become a recycling society with focus on resource efficiency and the virtual elimination of landfilling of municipal waste.

2.1.4 EU Construction & Demolition Waste Management Protocol

The European Commission introduced non-binding guidelines for the recycling and re-use of construction and demolition (C&D) waste in late 2016, with the overall aim to increase confidence in the C&D waste management process and trust in the quality of C&D waste recycled materials. These guidelines are a part of the European Commission's drive towards a Circular Economy where the value of products and materials is maintained for as long as possible through reuse, with disposal of material and consumption of new resources being minimised. It aims to achieve this through:

a) Improved waste identification, source separation and collection;

b) Improved waste logistics;

c) Improved waste processing;

d) Quality management;

e) Appropriate policy and framework conditions.

This document, while not binding, provides an outline of the best practice for the management of C&D waste and is a useful guide on how to best manage waste from a construction project such as the proposed Project.

2.2 Legislative Exemptions

The Waste Framework Directive (EU 2008) sets out the exclusions from the scope of the Directive which includes the following under Article 2(1)(c):

'uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated.'

Materials from the proposed Project which fall within this provision are therefore not subject to the requirements of EU and National waste legislation.

Article 27 of the European Communities (Waste Directive) Regulations 2011 allows an economic operator to decide, under certain circumstances, that material is a by-product and not a waste. The following conditions must be met in this case:

- Further use of the substance or object is certain;
- The substance or object can be used directly without any further processing other than normal industrial practice;
- The substance or object is produced as an integral part of a production; and
- Further use is lawful in that the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

Note the requirement for the further use of the material to be certain means that the intended end-use must be known at the time the material is produced. Material stock-piled in the hope that a market will be found for it sometime in the future is a waste rather than a by-product.

Classification of material as a by-product means that the material is approved for a use that is not regulated by waste management legislation, and therefore is not required to be managed as per that legislation. For such construction projects, excavated soil and stone can be categorised under this exemption provided the material adheres to the conditions stipulated under Article 27. The economic operator and destination for the material must adhere to EPA and Local Authority requirements and an EPA authorisation for this exemption to be availed of.

2.3 End of Waste

End of waste status is defined under Article 28 of the European Communities (Waste Directive) Regulations (GPO 2011), which sets out the grounds by which a material which is recovered or recycled from waste can be deemed to be no longer a waste. Certain specified waste shall cease to be a waste when it has undergone a recovery, including recycling and complies with criteria to be developed in accordance with the following conditions:

- The substance or object is commonly used for specific purposes;
- A market or demand exists for such a substance or object;
- The substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and

- The use of the substance or object will not lead to overall adverse environmental or human health impacts.
- The end of waste criteria are the requirements which must be fulfilled by a material derived from waste, and that ensure the material quality such that it will not be discarded and the use of which is not detrimental to human health and the environment (Joint Research Centre 2009).

2.4 Eastern-Midlands Region Waste Management Plan

The proposed Project falls within the Eastern-Midlands Region (EMR). A Waste Management Plant for the region was published in 2015, compiled by Dublin City Council on behalf of all local authorities in the EMR (EMWR 2015). It commits to a large and varied number of waste management policies and objectives for the region. The plan contains several policies and objectives aimed at generally improving waste management in the region. These include:

- Policy A.1 which calls for the region to 'Take measures to ensure the best overall outcome by applying the waste hierarchy to the management of waste streams' (EMWR 2015, p.212).
- Policy A.3 which sets out the need to 'Contribute to the improvement of management performance across all waste streams through the implementation of policy actions and monitor progress towards national targets' (EMWR 2015, p.213).
- Strategic Objective A states that 'The region will implement EU and national waste and related environmental policy, legislation, guidance and codes of practice to improve management of material resources and wastes' (EMWR 2015, p.212).
- Strategic Objective G states that the region is to 'Apply the relevant environmental and planning legislation to waste activities in order to protect the environment, in particular European sites, and human health against adverse impacts of waste generated' (EMWR 2015, p.225).

2.5 National Waste Policy 2020-2025

This document, titled A National Plan for a Circular Economy, was published in 2020. Its objective is to shift focus from waste disposal and treatment to keep materials and products in use for longer, to prevent waste and promote reuse and to support the use of recycled over virgin materials. It states that over the coming years, the Construction and demolition sector needs to:

- Promote waste prevention in the first instance;
- Follow best available techniques;
- Expand the range and use of recycled products;
- Create a market demand for recycled products and segregating more material on-site to allow for recycling; and
- Meet the target of preparing for reuse, recycling and other material recovery (incl. beneficial backfilling operations using waste as a substitute) of 70% by weight of C&D non-hazardous waste (excluding natural soils & stone).

There is a need to plan for C&D waste management at the earliest possible stage in a construction project, ideally at concept stage.

The Circular Economy, Waste Management (Amendment) and Minerals Development (Amendment) Bill 2022, which passed All Stages in the Houses of the Oireachtas in July 2022 builds on the government's commitment to achieving a circular economy as set out above in the action plan.

2.6 County Development Plans

The proposed Project will be located in the Local Authority areas of Fingal and Dublin City. The County Development Plans for these Local Authority areas are discussed in further detail below.

2.6.1 Fingal Development Plan

The draft Fingal Development Plan 2023-2029 (FCC 2022) discusses waste management in Chapter 11 (Infrastructure & Utilities), in which 15 waste management objectives are outlined. The most relevant to the proposed Project are:

- Objective Policy IUP20: 'Support the implementation of existing waste management policy and promote education and awareness on all issues associated with waste management, both at industry and community level, including the promotion of waste reduction by encouraging reuse, recycling and recovery of waste. Fingal County Council will continue to promote and support the objectives of the Eastern and Midlands Region Waste Management Plan 2015–2021, or such plans as may be updated.' (FCC 2022, Section 11.6); and
- Objective Policy CAP25: 'Have regard to existing Best Practice Guidance on Waste Management Plans for Construction and Demolition Projects as well as any future updates to these Guidelines in order to ensure the consistent application of planning requirements.' (FCC 2022, Section 5.4.4).

2.6.2 Dublin City Development Plan

The Dublin City Development Plan 2022-2028 (DCC 2022) outlines four waste-specific policies and five objectives. Of these the most relevant to the proposed Project are:

- Policy SI27: 'To support the principles of the circular economy, good waste management and the implementation of best practice in relation to waste management in order for Dublin City and the Region to become self-sufficient in terms of resource and waste management and to provide a waste management infrastructure that supports this objective.' (DCC 2022, Section 9.5.5); and
- Objective SIO16: 'To support the implementation of the Eastern-Midlands Regional Waste Management Plan 2015–2021 and any subsequent plans in order to facilitate the transition from a waste management economy towards a circular economy.' (DCC 2022, Section 9.5.5).

3. Nature and Quantities of Excavated Material Arisings

3.1 Geology

Information on the local geology has been compiled from available published geological information and previous and recent ground investigations. Sources of information include the following:

- General Soil Map of Ireland (An Foras Talúntais 1980);
- Irish Soil Information System online map (Teagasc 2021);
- Historic Mine Sites – Inventory and Risk Classification (EPA and GSI 2009);
- Geological Survey of Ireland online geology viewer (GSI 2021);
- Geotechnical Desk Study, City Centre and Airport (Haswell 2002).
- 1:500,000 scale – Quaternary Geological Map of Ireland (GSI 2017);
- 1:1,000,000 scale – Bedrock Geology of Ireland (GSI 2014);
- Dublin Metro North, Technical Note 023, Desk Study Review B0307000-010/GEO.360/002/1 (Jacobs 2008);
- Environmental Impact Statement – Metro North (RPA 2008);
- Environmental Protection Agency Interactive Map (EPA 2019b);
- Metro North Depot, Dardistown, Dublin, Factual Report on Ground Investigation (Soil Mechanics 2011)
- Dublin Light Railway, Sandyford to Ballymun Line Tunnel Link Between St Stephen's Green and Broadstone, Factual Report Volumes 1 and 2 (Wimtec 2000);
- Mater & Children's Hospital Ground Investigation (Phase II) – Main Site, Ground Investigation Report (IGSL 2002a);
- Site Investigation Works for the Proposed Dublin Light Rail Track, Draft Ground Investigation Report (Factual) (IGSL 2002b);
- Dublin Metro North Ground Investigation, Factual Ground Investigation Report (Volume 1) (IGSL 2007);
- Northern Cross Route Phase 2, Site Investigation Data Volume 1 (DCC 1992); and
- Dublin Metro North Alignments Study, Geotechnical Interpretive Report (Section 1 to 6) (Parsons Brinckerhoff 2007).

Five phases of ground investigations have been undertaken specifically for the proposed Project and summarised in the following reports:

- MetroLink Phase 1 Ground Investigation, Factual Report (Causeway 2019);
- MetroLink Phase 2 Ground Investigation, Factual Report (Causeway 2020a);
- MetroLink Phase 3 Ground Investigation, Factual Report (Causeway 2020b);
- MetroLink Phase 4 Ground Investigation, Factual Report (Causeway 2020c); and
- MetroLink Phase 5 Ground Investigation, Factual Report (Causeway 2021).
- The following scheme specific assessments and reports have also been completed.
- MetroLink, Ground Investigation Report (Jacobs IDOM 2021a);
- MetroLink, Geotechnical Design Report (Jacobs IDOM 2021b); and
- Land Contamination Interpretive Report (Jacobs IDOM 2021c).

3.1.1 Soils and Subsoils

The information in this section is based on Chapter 20 (Soils & Geology) of the EIAR for the proposed Project.

The General Soil Map of Ireland (An Foras Talúntais 1980) shows the footprint of the proposed Project outside urban areas is underlain by Grey Brown Podzolics, a mainly dry mineral soil comprising associated Gleys. Urban soils are the Teagasc classification referring to areas of soils within an urban area without any further classification, and which may include different soil types. Made ground is defined as soil/superficial geology with observed anthropogenic influence.

The Quaternary Geological Map of Ireland (GSI 2017) and GSI online maps (GSI 2021) suggest the subsoils primarily consist of till derived from limestone along with areas of alluvium and limestone derived gravels. The till is generally low permeability and cohesive apart from subordinate (although locally extensive) granular horizons, with high strength and low compressibility (Parsons Brinkerhoff 2007). Within Dublin these deposits are colloquially known as the black and brown boulder clays; the brown boulder clays are thought to be a weathered version of the underlying black boulder clay and typically have thicknesses of up to 4m.

A further breakdown on the soils and subsoils within the scheme is provided in the following sub-sections, which have been split as per the scheme summary in Table 1.1.

AZ1 Northern Section: Estuary to Dublin Airport North Portal

The principal soil group along the northern extent of the proposed Project is the Elton association (Teagasc 2021), a fine loamy drift with limestones to depths >0.8m, categorised with moderate drainage potential, comprising six soil series (Elton, Dunboyne, Howardstown, Straffan, Kilrush and Rathowen). Smaller soil groups in the northern section include: Crosstown association (a fine loamy drift with siliceous stones with depths from 0.4-0.8m); River alluvium association (comprising various textures of alluvium to depths >0.8m, mainly within the vicinity of Broad Meadow Water); Marine alluvium association (comprising various textures of alluvium to depths >0.8m, located in the vicinity of Malahide Estuary); Tidal Marsh (to the east, adjacent to Malahide Estuary); and Urban Soils with an undefined composition (within Swords and the boundary of Dublin Airport).

Geological mapping (GSI 2017, GSI 2021) indicates that the underlying subsoils along this section mainly comprise till derived from limestones (generally described as ‘tightly packed, unsorted, unbedded, glacial deposits possessing many different particle sizes with commonly sharp, angular to sub-angular clasts’). Areas of alluvium and gravels derived from limestones are indicated adjacent to the Broad Meadow River near Estuary, adjacent to Fosterstown and adjacent to the airport tunnel north portal. Lacustrine sediments are also indicated at the Pinnockhill roundabout.

Made ground is present in numerous exploratory locations and is primarily associated with the locations of road alignments and previous development within the urbanised area of Swords and Fosterstown. Where encountered, made ground was recorded at depths of around 0-1.2m below ground level (mbgl), with the exception of five locations where made ground was recorded at depths of up to 4.6 mbgl. Encountered made ground was generally described as sandy gravelly clay with gravel and/or cobbles, which has been interpreted mainly as reworked natural ground. In some locations, inclusions of brick, pottery, concrete, metal, plastic and/or wood were found, no obvious unusual discolouration, oil sheens or odours were noted.

Ground investigation information indicates superficial deposit thicknesses of between around 2m up to in excess of 30m. Thicknesses are generally lower towards the north, at Estuary and the northern extent of Swords with greater depths towards the south and the approach to the airport tunnel north portal, with a maximum depth just to the south of Fosterstown Station.

AZ2 Airport Section

Urban soils with an undefined composition are indicated directly below the footprint of Dublin Airport (Teagasc 2021). Outside the footprint of the airport, soils include the Elton association (fine loamy drift with limestones, classified with moderate drainage, to depths >0.8m) and the Straffan association (a fine loamy drift with limestones with poor drainage to depths 0.4-0.8m).

Geological maps indicate that the underlying subsoils within the footprint of the airport comprise till with an area of bedrock outcrop/subcrop present beneath the location of the airport terminal car park (GSI 2021). Ground investigation information suggests that made ground is present within the area of the terminal buildings, particularly at the location of a former quarry which coincides with the Dublin Airport Station location . Cohesive till with occasional granular layers is present within the remainder of AZ2.

Superficial deposit thickness varies from being less than 4m thick below the airport terminal buildings to up to around 30m thick towards the northern and southern extents of this section.

Ground investigations encountered made ground in the majority of the exploratory locations in AZ2. It was recorded at depths of up to 2.70 mbgl and generally described as tarmac, concrete, sandy gravel or sandy gravelly clay. Pieces of rebar and red brick were recorded in the vicinity of the airport buildings. No obvious unusual discolouration, oil sheens or odours were noted with the exception of possible domestic waste/putrescible material within one location (ABH12). The area of the greatest depths of made ground (2.70 mbgl) is within an area marked as a former quarry on historical mapping, which is also the proposed location of Dublin Airport station.

AZ3 Dardistown to Northwood

The principal soil group in AZ3 is the Elton Association, comprising a fine loamy drift with limestones to depths of >0.8m. The Elton Association is comprised of six soil series (Elton, Dunboyne, Howardstown, Straffan, Kilrush and Rathowen) and has a moderate drainage potential. The areas around the M50, the R108 and Silloge Park Public Golf Course are classified as urban soil with an undefined composition. Geological maps indicate that the subsoils predominantly comprise till with an area of alluvium present just to the south of the M50 (GSI 2021) associated with the Santry River.

Made ground was encountered at the ground surface throughout AZ3, primarily towards the northern and southern extents as well as at the embankments adjacent to the M50. Where encountered, it was recorded up to a maximum depth of 2.5 mbgl and described as sandy gravelly clay or sandy gravel, with anthropogenic materials such as brick, plastic, metal and pottery noted in some locations. The area of the greatest depths of made ground (2.50mbgl) is located in the central reservation of the R108 road, which is also adjacent to the proposed location of Northwood station No other obvious unusual discolouration, oil sheens or odours were noted within the GI information.

AZ4 Northwood to Charlemont

The whole of the Study Area in AZ4 is underlain by urban soils with an undefined composition, associated with the urbanisation of the Dublin City area. An area around the Tolka River, approximately 100m to the west of the proposed Griffiths Park Station is classified as River alluvium, comprising 12 soil series (Boyne, Finisk, Aherlow, Clohamon, Suir, Kilgory, Lyre, Vicarstown, Feale, Camoge, Cornafulla and Kilcullen) with depths of >0.8m.

Geological maps indicated that most of the subsoils comprise till, with alluvial sediments present within the vicinity of the River Tolka and River Liffey. ‘Urban’ ground is indicated within the central area of Dublin, between Mater and Charlemont Stations.

GI records indicate that cohesive till predominates towards the north with isolated pockets/lenses of granular material (sand and gravel) present; these granular horizons are more prevalent towards the south of AZ4 and

within the vicinity of the River Liffey. The thickness of the superficial deposits is typically 10m to 30m, with greater thicknesses generally present towards the north of AZ4.

Made ground was encountered in most of the GI exploratory holes in AZ4 to depths typically up to 2 mbgl, with local variations and a maximum recorded depth of 7 mbgl in the vicinity of Charlemont Station. Made ground was generally described as sandy gravelly clay with cobbles and/or boulders and anthropogenic material in many locations (typically comprising bricks and rubble). Hydrocarbon or bitumen odours were noted within the areas of the proposed stations at Collins Avenue, Tara and O'Connell Street.

3.1.2 Bedrock Geology

Geological maps (GSI 2014, GSI 2021) indicate that the bedrock geology comprises Carboniferous Tournasian limestone, and Viséan limestone and calcareous mudstone. The heavily faulted older Tournasian rocks are primarily present towards the north and include the Tober Colleen and Malahide formations, and the Waulsortian Limestones. The Viséan limestone and calcareous mudstone of the Lucan Formation are primarily present south of the M50. The distribution of geological units within each scheme section is summarised in Table 3.1; more detailed descriptions of the geological formations are included in the following sub-sections.

Table 3.1: Summary of Geological Units and Project Sections

Location	Formation(s)	Description
AZ1 Estuary to Dublin Airport North Portal	Malahide Formation	Argillaceous bioclastic limestone, shale. Present throughout this route section. A north west – south east fault is indicated near the north of Swords and a south west – north east trending anticlinal axis in the Fosterstown area.
	Waulsortian Limestone	Massive crudely bedded or massive lime-mudstone. Recorded in one GI location (RC205)
AZ2 Airport	Malahide Formation	Argillaceous bioclastic limestone, shale. Indicated from the north portal to the Dublin Airport terminal buildings. Boundary with the adjacent Waulsortian Limestone marked by a fault.
	Waulsortian Limestone	Massive crudely bedded or massive lime-mudstone. Present within the Dublin Airport terminal building area and proposed Dublin Airport station. Present near ground surface at proposed Dublin Airport station.
	Tober Colleen Formation	Calcareous mudstone, limestone conglomerate. Stratigraphic boundary with the Waulsortian Limestone present at the southern edge of the Dublin Airport terminal buildings and extends beyond the southern boundary of AZ2.
AZ3 Dardistown to Northwood	Tober Colleen Formation	Calcareous mudstone, limestone conglomerate. Present within the northernmost extent of this section between the southern airport portal and the M50.
	Lucan Formation	Dark limestone and shale (also known as the Calp Limestone) Stratigraphic boundary with the Tober Colleen Formation just to the north of the M50, to the southern extent of this section.
AZ4 Northwood to Charlemont	Lucan Formation	Dark limestone and shale (also known as the Calp Limestone). Present throughout this section.

Malahide Formation

The Carboniferous Malahide Formation comprises argillaceous bioclastic (fossiliferous) limestone with interbedded shale; the lower part of this formation is composed of calcareous shales, siltstones and sandstones with occasional thin limestones at the base. Thicknesses of the Malahide formation are recorded from 300m to more than 1200m (GSI 2021, RPA 2008).

Waulsortian Limestones

The Carboniferous Waulsortian Limestone is a predominantly pale grey, crudely bedded or massive lime-mudstone, biomicritic in nature with distinctive stromatolites and generally formed mounds or reefs. The Waulsortian Limestones are generally dolomitised and have a typical thickness ranging 300-500m (GSI 2021, RPA 2008).

Tober Colleen Formation

The Tober Colleen Formation is generally described as dark-grey calcareous, commonly bioturbated mudstone and subordinate thin argillaceous micritic limestones. The lower levels of this formation can include reef derived debris and large slumped reef blocks. The thickness of Tober Colleen Formation is recorded to range from 50-250m (GSI 2021, RPA 2008).

Lucan Formation

The Lucan (Calp) Formation refers to various units of basinal limestone and shale formed from carbonate sediment deposits. The Lucan Formation consists of muddy limestone beds inter-bedded with calcareous shale beds. The limestone beds are dark grey to black, fine grained, occasionally cherty and are classified as strong to very strong. The limestone hosts some limited fossils, such as corals and brachiopods, locally. The shale beds are less substantial and dark grey to black in appearance. These are typically moderately strong and more susceptible to weathering than the limestones. The bedrock surface is highly irregular with incised drainage channels including a large pre-glacial channel north of the River Liffey (GSI 2020, RPA 2008, Parsons Brinkerhoff 2007).

3.2 Construction Activities Generating Excavated Materials

The first phase of construction works involves the diversion of utilities and other advance works including archaeological excavations, temporary removal of statues and other heritage items. Other advance enabling works include the establishment of construction compounds and site office locations. Demolition activities will be carried out in highly localised areas along with remediation of contaminated land, as required, after the removal of buildings and structures.

Following these works, excavation and construction of the main earthworks and structures, including stations, tunnels, intervention shafts, cuttings, embankments, bridges and viaducts will be carried out. The proposed Project will also require construction of new roads and access routes and motorway modifications.

Excavated materials from the tunnelling and other excavation activities are expected to be generated over a four-year period, with peak production of spoil occurring approximately two years after commencement of the works. Excavated material will be generated from different sources as the works progress including at grade stations and grade alignment, cuttings, bored tunnels, depot construction, cut and cover tunnels and station box construction. These sources of excavated material are detailed below.

3.2.1 At Grade Stations and Grade Alignment

At grade sections are confined to parts of AZ1 and AZ3, the only at grade station will be Estuary. The construction of at grade stations and alignment will mainly generate topsoil stripped as part of site preparation works and shallow subsoil (such as glacial till and made ground) arising from excavation to achieve formation level along the alignment and stations. The majority of at grade sections are through agricultural or greenfield areas, however made ground may be encountered within built up areas such as Swords and at Dardistown Depot.

3.2.2 Retained Cut Stations

A cutting section is proposed from just north of Seatown Station to Fosterstown Station in AZ1 which will require a topsoil strip as well as mechanical excavation of subsoils. Three stations (Seatown, Swords and Fosterstown) all in AZ1, and the future Dardistown station in AZ3, are to be constructed along the cut section of the alignment using retained cut methods. Cut and cover consists of firstly installing a rigid retaining wall into the ground, in this case diaphragm walls. The roof slab will be installed with openings to allow for excavation below it. With bottom-up construction the ground will be excavated between the retaining walls with temporary propping or anchoring to the walls being installed as required. Once the excavation has reached the required depth, a steel reinforced concrete base slab will be cast, followed by the side walls. Finally, the roof slab is completed and the ground above the roof slab is backfilled and the surface reinstated.

3.2.3 Depot Construction

The proposed depot is located in Dardistown North and will occupy an area of approximately 19.5ha. Prior to the construction of the depot platform, it will be necessary to strip topsoil and remove any material unsuitable for depot construction. Results from ground investigations and trial pits conducted at the depot site indicate that there is construction and demolition (C&D) and household type waste buried at this location. This waste will be excavated and taken off site for disposal by a permitted contractor to a licensed facility.

There may be a requirement to import suitable material from other parts of the works to provide the level area for the depot. It is proposed to primarily use the material excavated during construction of the airport tunnel southern portal and the material from the airport tunnels.

Typically, the material will be brought to site in tip trucks and dumped where it is to be used. It will then be spread out with either a bulldozer or mechanical excavator and levelled using a road grader. It will then be compacted using a roller. Hard and soft landscaping will be placed following completion of the main works.

3.2.4 Bored Tunnels

There will be two sections of single-bore tunnel along the alignment of the proposed Project, totalling approximately 11.8 km. Both sections will be in a single bore will have an outside diameter of 9.5m containing both north and south tracks.

In AZ2 approximately 2.4 km of tunnel will be bored (likely to be from south to north) beneath Dublin Airport. This will be followed by boring of approximately 9.4 km of tunnel from a temporary launch site at Northwood Station south to Charlemont Station.

The bored tunnel sections will be constructed using dual mode earth pressure balance (EPB) and slurry Tunnel Boring Machines (TBMs) tailored to the specific ground that they will encounter, boring a tunnel with a diameter of 9.5m. Excavation is by a rotating cutting head equipped with disks and picks cutting the boring face into chips or by excavating soil. The revolution speed and rate of tunnel advance is, in part, dependent on the size of the tunnel bore and the geological strata being excavated. The spoil will be removed to the surface by conveyor belt.

Depending on the type of operational mode selected for the TBM as it tunnels through the various types of ground, these additives will either be a bentonite slurry (Slurry TBM mode) or a foam conditioner (Earth Pressure Balance (EPB) TBM mode). The worst-case scenario from a waste perspective will be the Slurry TBM mode as that option will generate more waste than the EPB TBM mode option.

A Slurry TBM utilises a mix of bentonite and water in order to ensure the correct pressure across the cutting head. The excavated material which is brought to the surface during tunnelling will therefore contain bentonite as well as the excavated soil and stone material. The bentonite is reused within the tunnelling operations. Any bentonite which is no longer required will require separate disposal as a non-hazardous waste. In the case of the EPB TBM,

the foam conditioner additive can be left mixed within the excavated material as it is highly biodegradable and will breakdown by 95% within 28 days, requiring no separate disposal. It may be necessary to keep the material on site to allow this degradation process to occur before removal of the material from site.

3.2.5 Cut and Cover Tunnels

Sections of cut and cover tunnel will be constructed in areas along the Swords Road and across the R132 at Fosterstown, in section AZ1. Cut and cover consists of firstly installing a rigid retaining wall into the ground, in this case diaphragm walls. With bottom-up construction the ground will be excavated between these retaining walls with temporary propping or anchoring to the walls being installed as required. Once the excavation has reached the required depth, a steel reinforced concrete base slab will be cast, followed by the side walls and the roof slab. The ground above the roof slab will then be backfilled and the surface reinstated.

3.2.6 Station Box Construction

A total of 11 station boxes and one intervention shaft will be constructed below ground as follows:

- Dublin Airport;
- Northwood;
- Ballymun;
- Collins Avenue;
- Albert College Intervention Shaft;
- Griffith Park;
- Glasnevin;
- Mater;
- O'Connell Street;
- Tara;
- St Stephen's Green; and
- Charlemont.

Most of the stations will be of a similar size (approximately 112m long and 25m wide). The exception is Glasnevin as this will be an interchange station with existing Irish Rail. All the underground stations will be at a depth of between 30m and 36m.

A top-down method of excavation will be used to construct the stations meaning the permanent underground structure is constructed in stages as the excavation between the temporary retaining walls proceeds to depth. Construction involves installation of vertical retaining walls in the ground as diaphragm walls with toes into bedrock. On reaching bedrock, the excavation will continue with shotcrete and bolts applied to the side walls of the excavation as the box is deepened.

Following the completion of the d-wall activities and foundation works, piling platforms, bentonite and d-wall plant are removed and the roof slab is cast in sections, leaving openings to facilitate top-down excavation. Bulk excavation of rock will be achieved using splitting, impact hammer or drill and blast methods. On reaching the bottom of the excavation, the base slab will be cast and then the internal structure cast from the bottom up. These processes will be dependent on whether station construction occurs before or after the TBM has arrived. Finally, the roof slab is completed and the ground above the station reinstated.

3.3 Excavated Materials Quantities

It is predicted that approximately 3,025,588 m^3 of excavated materials will be generated during the construction phase of the proposed Project based on the reference design and the vertical alignment determined for both the tunnelling and surface works. Table 3.2 provides the predicted quantities of excavated material likely to be generated from the proposed Project.

Table 3.2: Predicted Quantities of Excavated Material Generated by Location (m^3) (February 2021)

Section	Estimate of Excavated Material Quantities (m^3)			
	Soil	Mixed	Rock	Total
Start of route to Seatown Station	108,790	-	2,941	111,731
Seatown Station to Malahide Roundabout	102,896	-	13,250	116,146
Malahide Roundabout to Pinnockhill Roundabout	121,625	-	3,821	125,446
Pinnockhill Roundabout to North Portal	161,590	-	4,055	165,645
Central Section Surface Works	281,818	-	7,950	289,768
Dardistown Station	incl above	-	incl above	-
Dardistown Depot	280,677	-	-	280,677
Bridges, Viaducts	6,404	-	-	6,404
Northwood Station	48,522	1,500	26,521	76,543
Ballymun Station	48,372	1,500	27,157	77,029
Collins Avenue Station	37,806	1,500	37,201	76,507
Griffith Park Station	33,011	1,500	55,137	89,648
Glasnevin Station	120,682	1,500	18,448	140,630
Mater Station	58,724	1,500	24,310	84,534
O'Connell Street Station	98,506	1,500	20,966	120,972
Tara Station	11,107	1,500	60,343	72,950
St Stephen's Green Station	19,600	1,500	65,763	86,863
Charlemont Station	36,151	1,500	47,944	85,595
Dublin Airport Station	6,530	1,500	67,730	75,760
TBM Tunnels	204,121	138,802	473,561	816,484
Northwood Portal	12,597	-	10,800	23,397
Dublin Airport North Portal	11,353	-	139	11,492
Dublin Airport South Portal	40,743	-	-	40,743
Albert College Park Shaft	17,031	-	4,607	21,638
South of Charlemont Shaft	2,530	-	879	3,409
Park & Ride	24,530	-	1,047	25,577
Total Excavated Material	1,895,716	155,302	974,570	3,025,588
Backfill Required (Dardistown Depot), plus assumed material kept on site for bunds, landscaping etc. at Park & Ride				**99,931**
Total Surplus Excavated Material				**2,925,657**

Table 3.2 above summarises the predicted excavated material quantities. It is predicted that 89.6% of the 3 million m^3 would be classified under Article 27 which is approximately 2.7 million m^3 (4,887,488 tonnes); and 10.4% would be classified as waste which is approximately 310,137m^3 (558,571 tonnes). However, with approximately 99,931m^3 (176,876 tonnes) being used for backfilling and landscaping purposes on the proposed Project, this leaves a remaining 210,386m^3 (378,695 tonnes) that would be managed as a waste.

Table 3.3 provides a summary of the predicted quantities of excavated materials classified under Article 27, the quantity of excavated material to be reused onsite and those materials that are classified as inert, non-hazardous and hazardous. It has been predicted that approximately 94,775m^3 (170,595 tonnes) of the excavated material would be considered contaminated (this equates to 3% of the overall total of excavated material).

Table 3.3: Summary of Predicted Quantities of Excavated Materials, Article 27 Compliant and Non-Compliant Material and Classification of Article 27 Non-Compliant Material from the proposed Project

Excavated Materials		Volume (m^3)	Tonnage
Total excavated material volume		3,025,588	5,446,058
Excavated material to be reused on site		99,931	179,876
Total surplus excavated material		2,925,657	5,266,183
Material for re-use as a by-product (Article 27)		2,715,271	4,887,488
Classification of A27 non-compliant surplus as waste	Hazardous	94,775	170,595
	Non-hazardous	155,481	279,866
	Increased Inert	49,093	88,367
	Inert	10,968	19,742
*There is a requirement for 99,931m^3 of material for backfill on the Project. This has been taken from the figures above.			

Table 3.2 and Table 3.3 above summarise the predicted excavated material quantities and identify that approximately 100,000 m^3 will be used for backfilling, bunding and landscaping purposes. It is predicted that some of the remaining surplus of approximately 2.9 million m^3 will be suitable for categorisation as a by-product, reducing the amount of this surplus excavated material that would be classified as a waste. It is predicted that approximately 90% (approximately 2.7 million m^3) of the 2.9 million m^3 would be classified as a by-product under Article 27 and 10% (approximately 210,400 m^3) would be classified as waste. However, the worst-case scenario will be that all of this surplus excavated material would become a waste and will therefore need to be managed in compliance with all relevant waste legislation.

It has been predicted that of the 2.9 million m^3 surplus excavated material, approximately 94,775m^3 (170,595 tonnes) of this excavated material will be considered contaminated (this equates to 2% of the overall total of excavated material).

If a bentonite slurry is used for the TBMs, the excavated material which is brought to the surface during tunnelling will contain bentonite as well as the excavated soil and stone material. Any bentonite which is no longer required after tunnelling activities are completed will require separate disposal as a non-hazardous waste.

The amount of excavated material containing bentonite that is predicted to be generated is approximately 52,450 tonnes. This takes into account losses into the ground and soil during the boring process. On completion of all tunnelling works, this excavated material containing bentonite would be classified as non-hazardous and require disposal at an appropriately licensed waste facility.

4. Excavated Materials Management Options

4.1 Introduction

The overall approach to spoil management for the proposed Project is in accordance with the Eastern-Midlands Region Waste Management Plan for 2015-2021(EMWR 2015), refer to Section 2.3 for further details) as well as the County Council Development Plans (refer to Section 2.4). These development plans require implementation

of EU policy and national waste and environmental policy including the application of the Waste Hierarchy (Diagram 4.1) to reduce quantities of waste produced and the associated impacts.

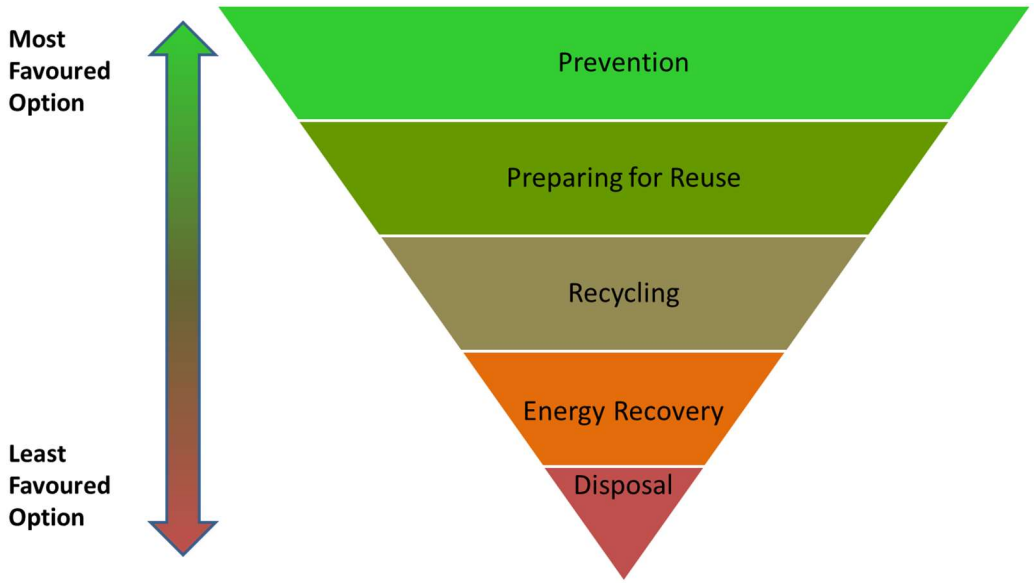

Diagram 4.1: Waste Hierarchy

The ways in which the Waste Hierarchy as well as relevant best practice, guidance, policy and legislation are to be applied to the proposed Project are summarised in further detail under the following sub-headings.

4.2 Prevention or Minimisation

Minimisation of the generation of excavated material during construction of the proposed Project as well as management of any excavated material generated has been considered during the design process to date as detailed below.

4.2.1 Alignment

The vertical alignment through the surface sections of the works has been considered in some detail to minimise the quantity of excavated material generated from open excavations within the constraints of the topography and existing infrastructure such as the M50 motorway (M50) and the R132.

4.2.2 Tunnels

Single bore tunnels were chosen in preference to twin bore tunnels for the design of the proposed Project. This has resulted in a significant reduction in the excavated materials arising from the tunnels.

4.2.3 Underground Stations

Considerable design effort has gone into optimising the station sizes, to reduce the size of back of house ventilation, plant, emergency escape areas and public areas. This has reduced the volume of excavated material to be generated by the proposed Project.

4.2.4 Waste Management Plan

An outline Construction Environmental Management Plan (CEMP) has been prepared (Appendix A5.1 of the EIAR). The Environmental Manager appointed by the contractor will be responsible for preparing, maintaining and implementing the outline CEMP and ensuring compliance with it during the construction phase of the proposed Project. The outline CEMP will include a Construction and Demolition Waste Management Plan (C&D WMP) which will be drafted in accordance with the Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (EPA 2021a) and will include:

- Roles and responsibilities with regards to waste management;
- An analysis of the likely waste arisings/surplus materials;
- Specific waste management objectives for the proposed Project such as;
  - Separation of reusable materials from materials suitable for recycling/ recovery;
  - Segregation of contamination and clean materials;
- Methods for recycling/reuse/prevention of waste;
- Material handling procedures including:
  - Identification and segregation of potentially contaminated soils;
  - Characterisation of contamination.
- Procedures for keeping records of all waste and materials which are removed from the proposed Project; and
- Requirements for education of the workforce and a plan dissemination programme.

The C&D WMP will be revised and updated throughout the construction phase of the proposed Project to ensure that all construction waste is managed, stored and disposed of in an appropriate manner by licensed contractors in accordance with best practice and relevant legislation.

The outline CEMP will also incorporate mitigation measures from Chapter 20 (Soils & Geology) and Chapter 24 (Materials & Waste Management) in relation to identifying and managing excavated materials including potentially contaminations soils.

4.3 Reuse within the MetroLink Project

It is anticipated that approximately 99,931 m^3 of excavated material will be reused within the proposed Project for the construction of embankments, in backfill, and for bunding and landscaping requirements. It is anticipated that only inert material will be reused on the proposed Project. The contractor must confirm the materials are suitable for such uses according to the Earthworks Specification(s).

The MetroLink design requires excavated material to be reused in several areas, in particular at the:

- Depot site at Dardistown to level the site; depot design standards require a level platform to be provided; and
- Embankments at the approaches to the M50 Viaduct, through the area north of the Airport tunnel and Dublin Airport South Portal (DASP) and at the approaches to the Estuary and Pinnockhill viaducts.

There are also a number of roads that will be realigned to ensure a fully segregated railway; the design of which requires excavated material to raise the current alignment, in particular at the:

- Access to the Irish Food Processors (IFP) plant at Dardistown; and
- Access to the quarry at Fosterstown.

In addition, excavated material will be used for:

- Backfilling the temporary works shaft at Albert College Park;
- Backfilling the cut and cover sections and station boxes; and
- Landscaping.

The construction compound site at Northwood will be the temporary storage location for all excavated material throughout the Construction Phase of the proposed Project.

4.4 Reuse of By-product Material Under Article 27

Article 27 of the European Communities (Waste Directive) Regulations 2011 allows an economic operator to decide, under certain circumstances, that material is a by-product and not a waste, and therefore may be used by third parties without the requirements associated with managing material as a waste. Please refer to Section 2.2 of this report for a fuller explanation of Article 27. Appropriate controls will be required to ensure the material will be treated and handled as a resource material and not as waste and will therefore be capable of being classified as a "by-product" in accordance with Article 27.

The reuse of material off-site as fill in a third-party construction project represents a potentially appropriate use of the resources and reduces the quantity of virgin material required for construction. Any material sent off-site for reuse will be subject to validation to confirm its suitability and that it meets the appropriate specification prior to transport.

Given that only "*uncontaminated soil and other naturally occurring material"* can be determined as a by-product under article 27, made ground is unlikely to be deemed suitable for use in this way.

It has been predicted that approximately 90% of the surplus arisings from the proposed Project will be suitable for classification as a by-product under Article 27.

Consultations were undertaken with a number of bodies and organisations in order to identify potential destinations able to accept the by-product material from the proposed Project. Huntstown Quarry in Co. Dublin has been identified as the preferred location due to its ability to take all by-product material that is predicted to be produced by the proposed Project. A notification has been made to the Environmental Protection Agency, outlining that the project is aiming to re-use a significant proportion of the generated spoil material from the project at the Huntstown Quarry site under Article 27.

Huntstown Quarry is operated by Roadstone Ltd. and is located just outside the M50 Motorway near Junction 5, approximately 5.5km from the Northwood Portal location. Roadstone currently have a Waste Licence (No. W0277-03) for a Soil Recovery Facility which permits recovery of 1,500,000 tonnes of soil and stones per annum at the facility, with a total backfilling capacity of 9,450,000 tonnes of backfilling capacity over the life of the facility, of which approximately 2,600,000 tonnes are remaining. The waste licence only covers soil recovery activities in the North and West Quarry, however Roadstone have planning permission in place for development of the wider Huntstown Quarry, including provision for ultimate backfilling and restoration of the North, West and South Quarries and planned Central Quarry to the original ground level.

4.5 Recovery and Waste Disposal Routes

Where material cannot be reused on the proposed Project or classified as a by-product, excavated materials will be classified as "waste". All waste excavated material will be subject to laboratory testing to classify the material in accordance with soil recovery facility acceptance criteria or landfill acceptance criteria.

In accordance with the waste hierarchy, only when all other options for reuse or recycling of the waste excavated material have been ruled out, will recovery or disposal of the waste excavated material be considered. The waste will be sent to a suitably licensed, permitted or registered waste facility for compliant handling and recovery or disposal. Any material to be removed from site will be transported by vehicles in possession of a valid Waste Collection Permit. Waste excavated material that may be utilised for recovery will include glacial sands and gravels and glacial till, topsoil and limestone.

The Waste Framework Directive requires that a minimum of 70% of non-hazardous construction and demolition waste (excluding natural materials such as soil, rock and stone) shall be recovered, recycled or re-used. According to the EPA's Progress to EU Targets (EPA 2020) Ireland has achieved this target, recovering 77% in 2018 (the last year for which statistics are currently available).

Within the EMR, the majority of C&D waste is composed of soil and stone with approximately 77% of the C&D waste in the region falling into this category in 2018 according to the Construction and Demolition Waste – Soil and Stone Recovery/Disposal Capacity – updated report 2020 (RPS on behalf of DCC 2020). The remaining C&D waste in the region comprised other materials such as contaminated soil, rubble, metals, timber, plastic, glass and wood.

4.5.1 Soil Recovery Facilities

There are several facilities within the EMR region that are licensed to accept clean inert excavated material and may be able to receive some of the excavated materials generated from the proposed Project. Smaller facilities are permitted by Local Authorities while larger scale operations are licensed by the by the EPA. Facilities are licensed to accept excavated material for the following purposes:

- Infilling of quarries;
- Raising land level for site improvements; and
- Reinstating to former use (e.g., agricultural use).

Soil recovery facilities operating under a Waste Licence with backfilling capacity with either an active licence or within the application process in 2016 are summarised in Table 4.1. These are generally worked out quarries which are being restored using 'uncontaminated' soil to achieve prior ground levels, and it should be noted that some of these facilities are licensed to process construction and demolition waste into secondary aggregates either for use within the facilities or onward sale. Table 4.1 includes the authorised annual intakes and remaining capacity of these facilities as well as the expected year of closure (RPS 2020).

According to the Construction and Demolition Waste – Soil and Stone Recovery/Disposal Capacity – updated report 2020 (RPS on behalf of DCC 2020) in 2018 soil recovery sites in EMR used only 1.4 million tonnes (equivalent to around 780,000 m^3) of their available annual capacity. Acceptance at these sites is dependent on chemical analysis of the excavated material showing that it meets the site's acceptance criteria.

Table 4.1: Existing Licensed Soil Recovery Capacities[3]

Facility Name	Licence Number & Facility Type	Status	Annual Authorised Intake (Tonnes)	Remaining Capacity (Tonnes)	Year of Expected Closure	Source of Information
Co. Dublin						
GLV Bay Lane Limited	W0301-01	Application	532,833 (inert soils and stones – 17 05 04 and 20 02 02)	1,332,084	2023	RPS 2020 & EPA Website
Huntstown Inert Clay Facility (Roadstone)[4]	W0277-03	Active	1,500,000 (soil & stones and dredging spoil 17 05 04 and 20 02 02)	2,555,600	2051	RPS 2020 & EPA Website
Milverton Waste Recovery (Roadstone)	W0272-01	Active	400,000 (inert soils and stones – 17 05 04 and 20 02 02)	1,886,795	2025	RPS 2020 & EPA Website
Co. Meath						
Clashford Recovery	W0265-01	Authorised (September 2019) Not yet commenced	170,000 (C&D waste and inert waste for restoration purposes)	805,200	Unknown – approx. 4-6 years from commencement	RPS 2020 & EPA Website
Mullaghcrone Quarry	W0278-01	Authorised (April 2017) Not yet commenced	100,000 (soils & stones, and dredging spoil)	1,800,000	Unknown	RPS 2020 & EPA Website
Tullykane - Kilsaran Concrete, Kilmessan	W0296-01 Materials Recovery	Active	400,000 (soils & stones)	5,600,000	2033	RPS 2020 & EPA Website
Kiernan Sand & Gravel	W0262-01	Active	167,400 (inert soils, stones and dredging material – 17 05 04 and 17 05 06)	938,100	2027	RPS 2020
Co. Kildare						
Blackhall Soil Recovery (Behans Land Restoration Ltd.)	W0247-01	Active	344,000 (inert soils and stones 17 05 04)	122,400	2022	RPS 2020 & EPA Website
N&C Enterprises Ltd	W0292-01	Active	345,000 (inert soils and stones 17 05 04)	1,500,000	2031	RPS 2020 & EPA Website

[3] **Source: RPS 2020 and/or EPA Licence Search Website, October 2021**

[4] Huntstown Inert Clay facility, although co-located with the former quarry site which is also operated by Roadstone, is separate and distinct from the facility which it is proposed will accept the Article 27 material arising from the Project.

Facility Name	Licence Number & Facility Type	Status	Annual Authorised Intake (Tonnes)	Remaining Capacity (Tonnes)	Year of Expected Closure	Source of Information
Kildare Sand & Gravel Ltd	W0295-01	Active	225,000 (inert soils and stones 17 05 04)	1,500,000	Unknown – approx. 8-10 years from commencement	EPA Website
Co. Wicklow						
Calary Quarry (Roadstone Ltd)	W0293-01	Authorised (November 2019) Not yet commenced	300,000 (C&D inert soil waste only)	3,280,000	2040	RPS 2020 & EPA Website
Potential total annual licensed soil recovery capacity in the counties surrounding the proposed Project			**3,600,000 to 4,485,000 (Equivalent to approx. 2,005,000 to 2,500,000 m^3)**			
Estimated potential remaining licensed soil recovery capacity in the counties surrounding the proposed Project.				**19,865,000 to 21,320,000 (Equivalent to approx. 11,000,000 to 11,854,000 m^3)**		

The declassification of recycled aggregates and crushed concrete as wastes under Article 28 is a mechanism facilitating the reduction of construction and demolition waste. In addition to estimated capacity at EPA licensed soil recovery facilities as outlined above there are, as of September 2020, two approved applications for recycled aggregate under Article 28, one from Integrated Materials Solutions Limited Partnership (IMS) and one from Panda Greenstar. Details of the facilities are provided in Table 4.2.

Table 4.2: Recycled Aggregate Processing Sites Approved under Article 28

Facility Name	Decision date for Article 28 application	Authorised Waste Codes	End of Waste for Recycled Aggregates Uses
Integrated Materials Solutions Ltd	16 July 2019:	17 01 01: concrete	Uses are restricted to roadway construction

Facility Name	Decision date for Article 28 application	Authorised Waste Codes	End of Waste for Recycled Aggregates Uses
Panda Greenstar	13 August 2019	17 01 01: concrete 17 01 02: brick 17 01 03: tiles and ceramics 17 01 07: mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06 17 05 04: soil and stone 17 09 04: mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03. 19 12 12: other wastes (including mixtures of materials) from mechanical treatment of waste other than those mentioned in 19 12 11 19 12 12 wastes shall be restricted to those originating from the processing of 17 01 01, 17 01 02, 17 01 03, 17 01 07, 17 05 04 or 17 09 04.	Use is restricted to the construction of temporary haul roads at the Boliden Tara Mines Tailing Management Facility

4.5.2 Local Authority Waste Permit Holders

In addition to the EPA licensed facilities, there are facilities in possession of a Waste Facility Permit or Certificate of Registration from the applicable County Councils which accept soils and inert waste from construction and demolition works. These facilities are all permitted or certified to operate Class 5 (recovery of excavation or dredge soil), Class 6 (recovery of inert waste (other than excavations or dredging comprising natural materials)), and/or Class 7 (recovery of inert waste arising from construction and demolition activity) waste activities as described in the Third Schedule of the Waste Management (Facility Permit and Registration) Regulations 2007 (GPO 2007). These classes and activities are summarised in Table 4.3.

Table 4.3: Local Authority Permitted Activities

Class	Activity
Class 5	*"Recovery of excavation or dredge spoil, comprising natural materials of clay, silt, sand, gravel or stone and which comes within the meaning of inert waste, through deposition for the purposes of the improvement or development of land, where-* (a) the activity shall have the principal objective that the waste serves a useful purpose in replacing other materials which would have had to be used for that purpose, thereby conserving natural resources, (b) the waste-related activity consists of the direct use of the waste material without further processing other than normal industrial practice, and (c) the total quantity of waste recovered at the facility is less than 100,000 tonnes."
Class 6	*"Recovery of inert waste (other than excavations or dredging comprising natural materials of clay, silt, sand, gravel or stone) through deposition for the purposes of the improvement or development of land, where –* (a) the activity shall have the principal objective that the waste serves a useful purpose in replacing other materials which would have had to be used for that purpose, thereby conserving natural resources, and (b) the waste-related activity consists of the direct use of the waste material without further processing other than normal industrial practice, and (c) the total quantity of waste recovered at the facility is less than 50,000 tonnes."
Class 7	*"Recovery of inert waste arising from the construction and demolition activity, including concrete, bricks, tiles, or other such material, at a facility (excluding land improvement or development) where-* (a) the annual intake shall not exceed 50,000 tonnes, and (b) the maximum quantity of residual waste consigned from the facility for collection, onward transport and submission to disposal at an authorised facility shall not exceed 7,500 tonnes per annum."

In the case of Certificates of Registration, maximum allowable quantities vary from that outlined above as follows; Class 5 - the total quantity of waste recovered at the facility shall not exceed 25,000 tonnes; Class 6 - the total waste recovered shall not exceed 10,000 tonnes; and Class 7 - the annual intake limit is 10,000 tonnes and the limit to the amount of waste leaving the facility is capped at 1,500 tonnes per annum. Operators of registered or licensed sites can register for 5 years, after which they need to renew their application.

4.5.3 Hazardous Waste Treatment

While most of the arisings from excavation and tunnelling for the proposed Project are expected to be classed as either inert or non-hazardous, there may be some soils (most likely to be in Made ground) which are contaminated such that they are classed as hazardous, based on results of chemical analysis carried out at an accredited laboratory. The material with greatest potential to be hazardous is the top layer of made ground. It is predicted that potentially 94,775m^3 of excavated materials could be classed as Hazardous.

In 2019 (the most recent data available), approximately 83% of the 90,595 tonnes of contaminated soil generated in Ireland was treated within and outside of Ireland, indicating that contaminated soils generated by the proposed Project could be treated and avoid being sent to landfill for disposal.

According to the National Hazardous Waste Management Plan 2014-2020 (EPA, 2014), the only site in Ireland licensed to treat contaminated soil off-site was Enva Ireland Ltd.'s Portlaoise facility (Licence number W0184-01), which can accept up to 40,000 tonnes per annum. Other hazardous soils are exported to the UK, Netherlands, and Germany.

4.5.4 Waste Disposal

While disposal to landfill is the least preferred option it may not be possible to reuse, recycle or recover all excavated material generated by the proposed Project due to the unsuitability of the material and/or lack of appropriate capacity at receiving sites. If excavated material cannot be reused, recycled or recovered, appropriate procedures will be put in place to ensure that this material will be disposed of in a manner that is in accordance with all relevant current legislation and best practice guidelines.

In Ireland, landfills are classified as inert, non-hazardous or hazardous. Assessment of all waste intended for disposal will be required to determine an appropriate classification and disposal route in accordance with European Union Council Decision 2003/33/EC (EU 2003) and European Directive 1999/31/EC on the landfill of waste (EU 1999). Current available inert and non-hazardous landfill capacity is summarised in Table 4.4.

Material potentially requiring disposal to landfill will include excavated materials mixed with bentonite slurry from the TBMs (if bentonite slurry is used in the project) and contaminated soils for which a suitable treatment route cannot be found.

Table 4.4: Licensed Landfill Capacities (Inert and Non-hazardous) in Ireland (Source: RPS 2020 and/or EPA Licence Search Website, October 2021)

Facility Name	Licence Number & Facility Type	Status	Annual Authorised Intake (Tonnes)	Remaining Capacity (Tonnes)	Year of Expected Closure	Source of Information
Co. Dublin						
Integrated Materials Solutions Ltd	W0129-02 Inert Landfill	Active	500,000 (inert construction and demolition waste and inert dredging spoil)	3,874,316	2028	RPS 2020 and EPA Website

Facility Name	Licence Number & Facility Type	Status	Annual Authorised Intake (Tonnes)	Remaining Capacity (Tonnes)	Year of Expected Closure	Source of Information
Co. Meath						
Knockharley Landfill	W0146-02 (W0146-04 in application) Landfill	Active (application for increase in permitted annual intake and site changes)	25,000 (C&D for recovery) 70,000 (inert waste for recovery) (application for increase in total annual authorised intake from 200,000 to 440,000 tonnes)	2,300,000 approx.	2021	EPA Website
Co. Kildare						
Walshestown Restoration Ltd	W0254-01 Inert Landfill	Active	330,000 (total including soils & stones and other waste)	2,105,239	2026/2027	RPS 2020 & EPA Website
Co. Wicklow						
Ballynagran Residual Landfill (Greenstar Holdings Ltd)	W0165-02 Landfill	Active	28,000 (C&D waste)	2,200,000 (based on 1,900,000 m^3)	2026	EPA Website
Kyletalesha Landfill	W0026-03	Active	28,596 tonnes inert material recovered in 2020	95,400 tonnes	Unlikely to still be accepting material in 2025 based on remaining capacity	RPS 2020 & EPA Website
Potential total annual licensed soil/C&D waste capacity in the counties surrounding the proposed Project			**Approximately 883,000 tonnes**			
Estimated potential remaining licensed soil/C&D waste capacity in the counties surrounding the proposed Project				**Approximately 9,551,000**		

4.6 Waste Transfer Stations

There are EPA licensed waste transfer stations (buildings or processing sites where wastes can be temporarily deposited) which handle construction and demolition waste. Transfer stations can reduce the cost and traffic impact of transporting waste as the transfer station facilitates the bulk haulage of waste in larger vehicles to the final destination in contrast to multiple smaller vehicles transporting the same volume of waste to the same destination. All relevant transfer stations which are currently operational in the counties surrounding the proposed Project are summarised in Table 4.5.

Table 4.5: Licensed Waste Transfer Stations and their permitted C&D intake per annum (Source: RPS 2016 and/or EPA Licence Search Website January 2021)

Location	Facility	Licence Number	Annual Intake (Tonnes)
Co. Dublin	Starrus Eco Holdings Ltd.	W0039-02	150,000 (total including all waste types)
	Paidraig Thornton Waste Disposal Ltd.	W0044-02	30,000 (maximum C&D waste per annum)
	Key Waste Management Ltd.	W0045-01	200,000 (maximum C&D waste per annum)

Location	Facility	Licence Number	Annual Intake (Tonnes)
	Starrus Eco Holdings Ltd.	W0183-01	24,000-30,000 (maximum C&D waste per annum)
	Starrus Eco Holdings Ltd.	W0188-01	5,000 (maximum C&D waste per annum)
	Rilta Environmental Ltd.	W0192-03	500 (maximum non-hazardous C&D waste per annum) 68,000 (maximum hazardous C&D waste per annum)
	Oxigen Environmental	W0152-01	10,200 (maximum C&D waste per annum)
	Advanced Environmental Solutions Ltd.	W0222-01	29,000 (maximum C&D waste per annum)
	Paidraig Thornton Waste Disposal Ltd.	W0277-01	20,000 (maximum C&D waste per annum)
	Irish Packaging Recycling Ltd.	W0263-01	50,000 (maximum C&D waste per annum)
Co. Meath	Advanced Environmental Solutions Ltd.	W0131-02	23,750 (maximum C&D waste per annum)
	Mulleadys Ltd.	W0197-02	8,000 (maximum C&D waste per annum)

5. Material Characterisation

It is the responsibility of the contractor(s) to design a robust sampling and analysis regime for testing the excavated materials arising from the proposed Project. This will enable the correct procedures to be followed with regards to the segregation and storage of excavated materials on site to prevent cross-contamination of Article 27 compliant material with non-compliant material and separation and suitable stockpiling of inert, non-hazardous and hazardous material, including materials to be re-used on the proposed Project.

Suitable testing (including taking sufficient samples per volume/ mass and testing for relevant parameters) will enable the contractor to identify materials with suitable physical and chemical properties to be used on site and ensure that materials sent off-site meet the receiving facilities' acceptance criteria.

6. Transport

Environmental impacts from the transport of excavated materials off-site during the proposed Project construction phase must be minimised in accordance with the mitigation as set out within the EIAR and requirements of the Railway Order (once granted). Measures include development of a Scheme Traffic Management Plan (STMP), the overarching goal of which is to minimise the impact of the construction of the proposed Project on all modes of transport (public transport, road, and vulnerable users) users and to maintain the access to businesses and other premises, ensuring all networks operate safely and with minimal disruption. The STMP can be found in Appendix A9.5 of the EIAR.

The STMP assesses material haul routes, deliveries and waste disposal, and their impacts on the wider strategic network. Haul routes have been identified in order to direct construction traffic onto suitable roads and to minimise the negative effects of increased HGV traffic on the environment. The STMP also defines the process for consultation with the relevant authorities.

The contract specific outline CEMP will detail how the mitigation measures identified in the STMP will be implemented. The outline CEMP will include requirements for the monitoring and management of the construction works, including reporting any incidents of HGVs not following designated routes to and from sites receiving materials for reuse, treatment or disposal.

7. Conclusions

The MetroLink Project will produce a considerable quantity of excavated materials from made ground, superficial deposits and bedrock during construction from a variety of activities including tunnelling and excavation for grade alignment and at grade and retained cut stations. The predicted quantities are summarised in Table 7.1.

Table 7.1 Predicted Excavated Materials Arisings by Material Type

Material type	Estimated Excavated Material Quantities (m3)	Percentage of Total Excavated Materials
Soil	1,895,716	63%
Mixed	155,302	5%
Rock	974,570	32%
Total	**3,025,588**	**100%**

This Excavated Material Management Strategy has identified various options for the management of excavated materials on-site and off-site.

Excavated materials will be managed in accordance with current policy and legislation at both the national and regional level, and via application of the waste hierarchy. Table 7.2 shows the predicted volumes for total excavated materials, materials to be reused on site, materials classified as Article 27 compliant and non-compliant and the predicted classifications of the Article 27 non-compliant materials.

Table 7.2: Summary of Predicted Quantities of Excavated Materials, from the proposed Project and Predicted Reuse, Treatment and Disposal

Excavated Materials		Volume (m^3)	Tonnage
Total excavated material volume		3,025,588	5,446,058
Excavated material to be reused on site		99,931	179,876
Total surplus excavated material		2,925,657	5,266,183
Material for re-use as a by-product (Article 27)		2,715,271	4,887,488
Classification of A27 non-compliant surplus as waste	Hazardous	94,775	170,595
	Non-hazardous	155,481	279,866
	Increased Inert	49,093	88,367
	Inert	10,968	19,742
*There is a requirement for 99,931m^3 of material for backfill on the Project. This has been taken from the figures above.			

Excavated materials will be managed via the following methods in order of preference:

- Designing out/reducing need to generate excavated material during development of the design ('prevention' within the waste hierarchy). This will be achieved through measures including the use of a Construction and Demolition Waste Management Plan and other plans following best practice guidance to minimise waste generation and optimise waste management on site.
- Reusing excavated materials for construction purposes within the proposed Project, for example for backfill or within embankments, where possible ('reuse' within the waste hierarchy). Back-filled areas, bunds and landscaped areas on the proposed Project will be completed using suitable excavated materials generated

from construction activities on site. Excavated materials will be assessed for their potential to be reused on site and stored appropriately to avoid mixing with other wastes.

- Reusing excavated materials on other sites under an agreement to use “by-product” as defined by Article 27 (‘reuse’ within the waste hierarchy). A Memorandum of Understanding has been reached by TII and the licensed owner of Huntstown Quarry, Roadstone Ltd., regarding depositing suitable Article 27 compliant by-product material in Huntstown Quarry South Quarry.
- If possible, options will be identified for sending other excavated materials for restoration or processing at nearby licensed soil recovery sites to produce a useable product (‘recycling’ within the waste hierarchy).
- Recovery through treatment of hazardous waste to non-hazardous status.
- Disposal to licensed landfill only where other options are not feasible (‘disposal’ within the waste hierarchy).

The calculations and assumptions in this section are based on currently available historical data on the national (and some international) waste management capacities. The contractor must identify the most appropriate licensed sites to which to send surplus excavated materials based on classification of the waste (determined by chemical analysis) and in accordance with the waste hierarchy.

Volumes of excavated materials arising during construction of the proposed Project are based on the current design at the time of writing, which may change. Categorisation of arisings as inert, non-hazardous and hazardous have been assessed based on geological maps and other sources of information about baseline conditions on and close to the site and ground investigation data from historical investigations and investigations carried out for the proposed Project.

This Excavated Material Management Strategy is to be used by the contractor as the basis for a detailed Excavated Material Management Plan. The contractor must confirm volumes arising and waste management options based on actual arisings and waste management capacities during the construction phase of the proposed Project.

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