



Construction Demolition Waste Management Plan

*Carmanhall Road Strategic Housing Development,
Sandyford Industrial Estate, Dublin 18*

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Table of Contents

1.0	INTRODUCTION	1
2.0	APPLICABLE LEGISLATION, PLANS AND GUIDANCE	1
2.1	Legislation	2
2.2	Plans	3
2.2.1	Dun Laoghaire County Development Plan 2016-2022	3
2.2.2	National Waste Policy	4
2.2.3	Eastern-Midlands Region Waste Plans	4
2.3	Guidance	5
3.0	DESCRIPTION OF THE PROJECT AND SITE	5
3.1	Proposed Development.....	5
3.2	Existing Site.....	6
3.3	Construction Phase Sequencing.....	7
4.0	WASTE MANAGEMENT	7
4.1	Demolition Waste	7
4.2	Construction Waste	7
4.3	Proposed Waste Management Options	9
4.4	Management of Waste Streams.....	9
4.4.1	Soils and Stones	10
4.4.2	Contaminated Soils	10
4.4.3	Plasterboard / Gypsum Materials.....	11
4.4.4	Metals.....	11
4.4.5	Timber and Wood.....	11
4.4.6	Plastic.....	12
4.4.7	Wastes from Construction Site Offices and Staff.....	12
4.4.8	Other Wastes	12
4.4.9	Hazardous Wastes.....	12
5.0	ESTIMATED COST OF WASTE MANAGEMENT	12
5.1	Design Out Waste	13
5.2	Reuse	13

5.3 Recycling..... 13

5.4 Disposal..... 13

6.0 RESOURCING 13

6.1 Roles and Responsibilities 13

6.2 Training 14

7.0 RECORD KEEPING PROCEDURES 14

7.1 Waste Tracking and Documenting 14

8.0 WASTE AUDITING PROTOCOLS 15

TABLES

Table 1: Construction and Demolition Projections, (Source: 'A Waste Action Plan for a Circular Economy, Ireland's National Waste Policy 2020-2025)..... 4

Table 2: Typical C&D waste expected from the construction phase of the Proposed Development. 8

FIGURES

Figure 1: European Waste Hierarchy 2

Figure 2: Carmanhall SHD Site Location..... 6

1.0 INTRODUCTION

Atlas GP Limited ('Atlas', 'the Client', 'the Applicant') has commissioned Golder Associates Ireland Limited (Golder) to prepare a Construction Demolition Waste Management Plan (CDWMP) for their proposed Strategic Housing Development (SHD) at the Former Avid Technology International Site, Carmanhall Road, Sandyford Industrial Estate, Dublin 18. (hereafter referred to as the 'Site' or the 'development').

The CDWMP shall detail how waste will be managed during the construction phase of the development. The objective of this plan is to ensure that the development's construction and demolition (C&D) waste is managed in accordance with applicable legislation, local authority plans and policies and regional waste management targets.

C&D wastes are defined as waste which arises from construction, renovation and demolition activities, together with all waste categories mentioned in Chapter 17 of the European Waste Catalogue (EWC).

Based on volume, C&D waste is the largest waste stream in the EU¹. Effective management of C&D waste, including hazardous and recycled materials, can have major benefits on waste management and sustainability targets.

Benefits can also be visualised in the construction and recycling industry, through the increased demand for C&D recycled materials. The Waste Framework Directive 2008/98/EC aimed to have 70% of Construction and Demolition waste recycled by 2020. However, with the exception of a few EU countries, only about 50% of C&D waste is currently being recycled².

The objective of the CDWMP is to ensure that the development's C&D waste is managed in accordance with applicable legislation, local authority plans and policies and regional waste management targets. This CDWMP will form the basis of the appointed Main Contractor's operational CDWMP.

This plan has been developed to establish specific objectives and guidelines prior to construction and to be flexible to allow the plan to evolve throughout the construction phase as required by the Main Contractor.

2.0 APPLICABLE LEGISLATION, PLANS AND GUIDANCE

The European Union has instigated a range of Directives at a European level that seek to deal with the management of waste in a more sustainable manner allied with waste reduction measures. The key drivers to achieve these objectives are the Framework Directive for Waste and the Landfill Directive. Waste legislation and policy of the EU Member States shall apply as a priority order the waste management hierarchy, (Figure 1).

The Department of the Environment, Community and Local Government publication, 'A Resource Opportunity, Waste Management Policy in Ireland' (July 2012) expresses Ireland's commitment to the hierarchy set out in the Directive and aiming for the higher tiers of the hierarchy in the waste management strategy.

¹ European Commission, Sept 2016, EU Construction & Demolition Waste Management Protocol

² https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en

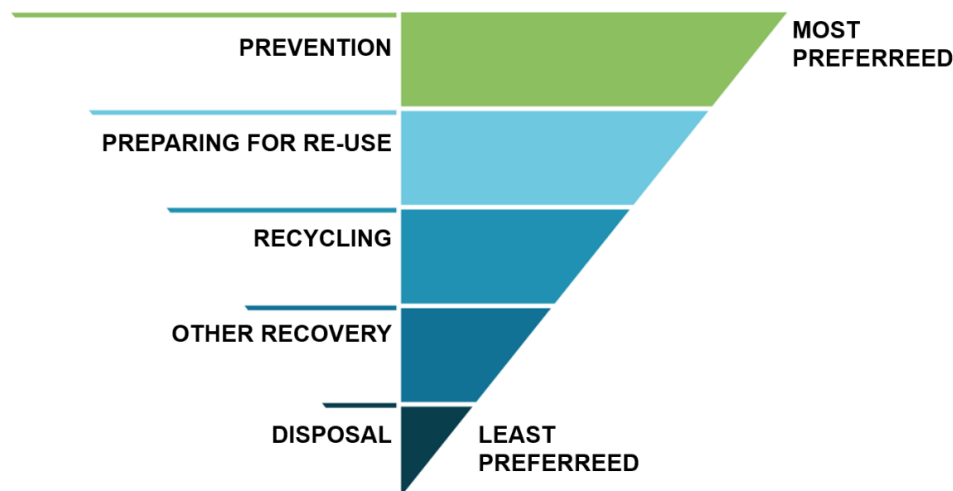


Figure 1: European Waste Hierarchy

2.1 Legislation

The main legislation that governs waste management in Ireland and relates to the C&D activities at the Proposed Development site are:

- Waste Framework Directive 2008/98/EC. The Waste Framework Directive (Directive 2008/98/EC) sets down basic requirements for all EU member states for handling waste and it also defines what is meant by “waste”. To comply with the Directive EU member states must:
 - Ensure that the waste disposal does not present a risk to air, water, soil, plants, and animals;
 - Waste disposal must not be allowed to constitute a public nuisance, (e.g. through noise, unpleasant odours, or the degradation of places of special natural interest);
 - Prohibit uncontrolled disposal of waste or illegal dumping;
 - Establish an integrated and effective network of waste disposal plants,
 - Ensure a proper licence system for waste collection and disposal operations; and
 - Audit and inspect entities involved in waste collection and disposal.
- Landfill Directive 1999/31/EC. This Directive seeks to further the aims of the 1991 Directive in relation to the role of the landfill. It aims to prevent, or reduce as far as possible, the negative effects on the environment from landfilling waste. In order to achieve this, it seeks to:
 - End co-disposal of hazardous and non-hazardous waste in landfill;
 - Introduce rigorous technical requirements for landfills and waste;
 - Phase in the prohibition of landfilling specific wastes including liquid hazardous waste, other hazardous waste, whole tyres, and shredded tyres;
 - Oblige operators to pre-treat all hazardous waste and all other wastes; and
 - Introduce phased targets for the reduction of biodegradable waste being landfilled at 2010, 2013 and 2020
- Waste Management Act 1996 (No. 10 of 1996) as amended 2001 (No. 36 of 2001), 2003 (No. 27 of 2003) and 2011 (No 20 of 2011). Sub-ordinate and associated legislation include:

- European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended;
- Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended;
- Waste Management (Facility Permit and Registration) Regulation 2007 (S.I. No. 821 of 2007) as amended;
- Waste Management (Licensing) Regulations 2000 (S.I. No. 185 of 2000) as amended;
- European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended;
- Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended;
- Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015);
- European Communities (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014);
- Waste Management (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended;
- Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended; and
- European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994).
- Environmental Protection Act 1992 (S.I. No. 7 of 1992) as amended;
- Litter Pollution Act 1997 (Act No. 12 of 1997) as amended; and
- Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended.

These Acts and subordinate regulations enable the transposition of relevant European Union Policy and Directives into Irish law.

2.2 Plans

2.2.1 Dun Laoghaire County Development Plan 2016-2022

The DLR Development Plan (2016-2022) identifies that waste management is an integral requirement essential in the promotion of sustainable development, enhancing good public health and the protection of environment. The plan notes that the continued economic progress in DLR relies on a high-quality environment which, in turn, is dependent on the availability of necessary waste management facilities. DLR is strongly committed to the promotion of the waste hierarchy as defined by EU legislation.

In the 2016-2022 DLR development plan has identified six policies applicable to the Proposed Development. These are:

- **Policy EI12 - Waste Management Strategy:** It is Council policy to conform to the EU and National waste hierarchy as follows: waste prevention, minimisation, re-use, recycling, recovery and disposal;
- **Policy EI13 - Waste Plans:** It is Council policy to publish plans for the collection, treatment, handling and disposal of waste in accordance with the provisions of the Waste Management Act 1996 (as amended) and the Protection of the Environment Act 2003 (as amended);
- **Policy EI14 - Private Waste Companies:** It is Council policy to ensure that all waste that is disposed of by private waste companies is done so in compliance with the requirements of the EPA and the Waste Management Legislation and in accordance with the Planning Code;

- **Policy EI15 - Waste Prevention and Reduction:** It is Council policy to promote the prevention and reduction of waste and to co-operate with industry and other agencies in viable schemes to achieve this;
- **Policy EI16 - Waste Re-use and Re-cycling:** It is Council policy to promote the increased re-use and re-cycling of materials from all waste streams. The Council will co-ordinate with other agencies in viable schemes for the extraction of useful materials from refuse for re-use or re-cycling and will adopt the National Targets as stated in The Eastern-Midlands Region Waste Management Plan 2015-2021;
- **Policy EI17 - Refuse Disposal:** It is Council policy to dispose of refuse by means of sanitary landfill or other suitable methods as deemed appropriate.

Chapter 8.2.9.7 (New Developments-Environmental Impacts) of the DLR CDP 2016-2022 identifies that all developments shall incorporate *'An integrated approach to waste management – to include wastes generated during the construction phase of development as well as the operation and maintenance phases – having particular regard to 'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006)'*.

Furthermore, Appendix 10 of the DLR CDP 2016-2022 identifies that a Waste Management Plan is required for *'Demolition/renovation/refurbishment projects generating in excess of 100 m³ in volume of construction and demolition waste'*.

2.2.2 National Waste Policy

In September 2020, the Department of Communications, Climate Action and Environment published 'Ireland's National Waste Policy 2020-2025' (A Waste Action Plan for a Circular Economy). This new national waste policy will inform and give direction to waste planning and management in Ireland over the coming years. The policy shifts the focus from waste disposal and treatment to ensure that materials and products remain in productive use for longer. This aims to prevent waste and supports reuse through discouraging the wasting of resources and rewarding circularity.

The policy document contains over 200 measures across various waste areas including C&D. C&D waste related goals of the policy are to

- Revise the 2006 Best Practice Guidelines for C&D waste;
- Streamline by-product notification and end-of-waste decision making processes; and
- Working group to develop national end-of-waste applications for priority waste streams.

The policy outlines the significant projected contributions that soils and stones makes to overall C&D wastes between 2020 and 2022. These projections are provided below in Table 1.

Table 1: Construction and Demolition Projections, (Source: 'A Waste Action Plan for a Circular Economy, Ireland's National Waste Policy 2020-2025')

	2020	2021	2022
Total C&D Waste	6,410,00	6,570,000	6,930,00
Of which soils and stones	5,000,000	5,130,000	5,410,000

The policy identifies the need to promote waste prevention in the first instance and the need to plan for C&D wastes at the earliest possible stage in a construction project.

2.2.3 Eastern-Midlands Region Waste Plans

The Proposed Development is located within the Eastern-Midlands Region (EMR).

The EMR 'Waste Management Plan (2015)'³ provides a framework for the prevention and management of waste in a sustained manner. The plan was developed in consultation with the Department of the Environment, Community & Local Government (DECLG), the Environmental Protection Agency (EPA), the Irish Waste Management Association (IWMA) and other stakeholders.

Objectives of the EMR Waste Management Plan include: a reduction of 1% per annum in the amount of household waste; increased recycling of domestic and commercial waste; and further reduce landfill: eliminate all unprocessed waste going to landfill from 2016.

In December 2020, an update to the 2015-2021 regional waste management plans was published. This document (Construction & Demolition Waste Soil and Stone Recovery / Disposal Capacity -Update Report 2020⁴) provided an update to the national C&D soil and stone recovery/disposal capacity.

2.3 Guidance

This plan has been written in accordance with the Department of the Environment, Heritage and Local Government's (2006) '*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*'.

These Guidelines provide guidance on the preparation of Project Construction and Demolition Waste Management Plans for certain classes of project, which exceed specified threshold limits.

The Guidelines aim to provide clients, developers, designers, practitioners, contractors, sub-contractors and competent authorities with an agreed basis for determining the adequacy of C&D Waste Management Plans.

3.0 DESCRIPTION OF THE PROJECT AND SITE

3.1 Proposed Development

The Proposed Development comprises the construction of a Build-To-Rent residential development within a new six-seventeen storey over basement level apartment building comprising 428 no. apartments. The residential units are composed of:

- 41 No. Studio apartments;
- 285 No. 1 Bed apartments;
- 94 No. 2 Bed apartments; and
- 8 No. 3 Bed apartments.

Of these apartments 413 no. will have access to private amenity space, in the form of a balcony or lawn/terrace, and 15 no. apartments will have access to a shared private roof terrace (142 m²) at ninth floor level.

All of the apartments will have access to ca. 2,600 m² of communal amenity space, spread over a courtyard at first floor level and roof terraces at the sixth, eighth and ninth floor levels. A residents' childcare facility will be located on the ground floor level. Further residents' amenities will include concierge/meeting rooms, office/co-working space, cinema, gym, yoga studio, laundry and café/lounge at ground floor level. The café/lounge will primarily serve the residents of the development and will be open for community use on a weekly/sessional basis.

³ Eastern-Midlands Region Waste Management Plan 2015 (Published: 2015).

⁴ Construction & Demolition Waste Soil and Stone Recovery / Disposal Capacity – Update Report 2020. Eastern Midlands Region / Connacht Ulster Region / Southern Region Waste Management Plans 2015 - 2021

The Proposed Development is served by a ground floor level carpark, accessible via new vehicular entrance from Carmanhall Road, providing a total of 145 no. vehicular parking spaces (including 8 no. mobility parking spaces, 2 no. club-car spaces and 44 no. electric charging spaces) and 5 no. motorcycle parking spaces. Bicycle parking, plant and storage is accommodated at basement level with 752 no. bicycle parking spaces. A further 22 no. residential short stay bicycle parking are provided at Ground Floor Level bringing the total bicycle parking provision for the development to 774 no. spaces.

The Proposed Development includes improvements to street frontages and the public realm of Carmanhall Road and Blackthorn Road comprising provision of an upgraded pedestrian footpath, an increased quantum of landscaping and street-planting, new cycling infrastructure, the provision of new street furniture comprising bins, benches and cycle parking spaces and the upgrading of the existing Carmanhall Road and Blackthorn Road junction through provision of a new uncontrolled pedestrian crossing.

3.2 Existing Site

The Site is located in south county Dublin, within the administrative area of Dun Laoghaire Rathdown County Council. Specifically, the Proposed Development site is located on a brownfield site where a former commercial (Avid Technology International) premise was recently demolished. As a result, no further demolition works are required on site.

The site lies within the Sandyford Industrial Estate which is composed of retail, warehousing units, industrial uses and office buildings. Vehicular access is provided in the north-western corner of the site via a crossover to Carmanhall Road (Figure 2). The site slopes from south to north towards Carmanhall Road.



Figure 2: Carmanhall SHD Site Location.

3.3 Construction Phase Sequencing

The construction phase of the Proposed Development will follow the below proposed sequence.

- Identification of the location of the Site's surrounding above and below ground utilities and services;
- Removal of limited on site vegetation;
- Site preparation including the stripping of soils, tarmac/asphalt surfaces, segregation, stockpiling and export from site;
- Development of the Proposed Development's foundations and substructure. Activities at this stage include the use of rebar, concrete formwork and concrete pour;
- Development of the Proposed Development's superstructure. Activities at this stage include the use of rebar, concrete formwork, pour and blockwork;
- Construction of the superstructure's external envelope and façade;
- Progression of the development's internal finishes, including the mechanical and electrical fit out; and
- Progression of the external landscaping, including roof top gardens and perimeter planting.

Waste types from each construction sequence will change as the development progresses towards completion and provisions for changing waste streams shall be planned for and accommodated for on site.

4.0 WASTE MANAGEMENT

The Main Contractor will be responsible to the development of a final Construction Management Plan, and to develop final quantities of materials, and construction methodologies and approaches. Quantities of construction waste materials may vary depending on such methodologies. Therefore, the difficulty of estimating waste quantities is noted which depends on the approach of the appointed Main Contractor. During construction these quantities may be subject to change during the phase.

This CDWMP will form the basis of the appointed Main Contractor's operational CDWMP. Their operational plan will incorporate the elements identified in this plan to promote sustainable waste management in line with the waste hierarchy, and also focus on integrating good site management practices to ensure efficiency and reduce potential for any other negative environmental effects.

4.1 Demolition Waste

As noted previously, all structures on the site were previously demolished and removed offsite and not considered further in this document.

Remaining materials on site include tarmac surfaces from the site entrance and access route and the surface of the previous car-park. The approximate area of this tarmac surface is ca. 3,000 m². With an estimated thickness of 75 mm, this will result in ca. 580 tonnes of material.

4.2 Construction Waste

It is anticipated that the majority of wastes generated will be suitable for reuse, recovery or recycling and will therefore be segregated to facilitate the reuse, recovery and/or recycling, wherever possible.

A non-exhaustive list of construction waste categories which may be generated during the construction phase of the Proposed Development have been identified below and the appropriate European Waste Catalogue Code for these wastes has been identified in Table 2.

Non-Hazardous Waste Streams

- Topsoil, sub soil, stones, made ground fill from excavations;
- Excess new concrete, brick, tiles and ceramics;
- Excess asphalt and tar products;
- Excess plasterboard;
- Scrap metal;
- Cardboard and other packaging;
- Plastic including wrapping and packaging;
- Waste wood;
- Paper;
- Glass;
- Waste from portable site toilets;
- Canteen and food waste; and
- Damaged materials.

Hazardous Waste Streams

- Contaminated soils;
- Asbestos;
- Batteries;
- Oils, fuels and lubricants from machinery and equipment; and
- Excess paints.

Table 2: Typical C&D waste expected from the construction phase of the Proposed Development.

Waste Material	LoW / EWC Code
Concrete, Bricks, Tiles and Ceramics	17 01
Bricks	17 01 01
Tiles	17 01 02
Ceramics	17 01 03
Mixture of concrete, bricks tiles & ceramics	17 01 07
Wood, Glass and Plastic	17 02
Wood	17 02 01
Glass	17 02 02
Plastic	17 02 03
Bituminous mixtures, coal tar and products	17 03 01*
Bituminous mixtures containing other than those mentioned in 17 03 01	17 03 02
Metals (including their alloys)	17 04

Waste Material	LoW / EWC Code
Copper, Bronze, Brass	17 04 01
Aluminium	17 04 02
Lead	17 04 03
Zinc	17 04 04
Iron and Steel	17 04 05
Tin	17 04 06
Mixed Metals	17 04 07
Soil and stones containing hazardous substances	17 05 03*
Soil and stones, other than those mentioned in 17 05 03*	17 05 04
Insulation and Construction Materials	17 06 04
Construction materials containing Asbestos	17 06 05*
Gypsum based construction material	17 08 02
Mixed Construction and Demolition Waste other than those mentioned in 17 09 01, 17 09 02, 17 09 03	17 09 04
Paper and Cardboard	20 01 01
Wood other than that mentioned in 20 01 37	20 01 38
Soil and Stones	20 02 02
Mixed Municipal Waste	20 03 01
Hydraulic oils	13 01 01*
Fuel oils and diesel	13 07 01*
Aqueous liquid waste other than those mentioned in 16 10 01 (to be considered for portable toilet wastes)	16 10 02

4.3 Proposed Waste Management Options

The Main Contractor and C&D Waste Manager will be responsible for defining and maintaining waste storage areas across the site during the construction phase. These areas will be secured and provide for appropriate segregation of waste materials. The relocation of these areas will be planned appropriately as works progress. The Main Contractor will implement waste management policies whereby waste materials generated on site are to be segregated as far as practicable.

The Main Contractor and C&D waste Manager will ensure that all waste which arise from the construction of the proposed development will be removed from site by an approved waste contractors. These contractors will be required to hold a valid waste collection permit. Furthermore, all waste materials which are required to be disposed off-site will be reused, recycled, recovered or disposed of at an appropriate facility which holds appropriate registration, permit or licence. The C&D Waste Manager will retain on file up-to-date copies of the relevant collection permits, and facility registrations, permits and licences.

Other written records of the waste arisings will be maintained as per Section 7.0 of this CDWMP.

4.4 Management of Waste Streams

Volumes of soils to be removed are detailed below as these are located in a defined basement dig area and there will be limited opportunity to re-use these materials on Site and must be removed offsite for onward recovery or disposal.

Quantities of other wastes identified below are based on estimates for a development of this size and scale. Final waste quantities will be dependent on the appointed Main Contractor's construction methodology and the contractor's waste management efficiency. Waste volumes will also be dependent on whether construction components are arriving on Site prefabricated or require fabrication with raw materials on site which results in higher residual wastes being generated. These quantities will be tracked and assessed for improvement opportunities throughout the course of the build.

4.4.1 Soils and Stones

The development of the subject site will require the stripping of top and sub soils and the excavation of ground to basement level. The volume of material to be excavated has been estimated to be approximately 40,000 m³. With an anticipated bulk density of 1.9 tonne/m³ this equates to ca. 76,000 tonnes for removal offsite. The bulk density conversion is based on industry experience of similar soils. Given the constrained nature of the Site it is anticipated that there will be limited opportunities to reuse excavated materials onsite therefore these materials will be required to be removed offsite for appropriate reuse, recovery, recycling or disposal where no reuse options are available.

The Soil and Stone Recovery & Disposal Capacity (Update Report 2020) recommends that proposed developments with demolition and excavation processes exhaust all reuse possibilities before sending to recovery or disposal facilities. Provisions in the EC (Waste Directive) Regulations 2011 provide for the reclassification of waste as resources and this is address under Article 27 (by-product) and Article 28 (end-of-waste).

When certain criteria can be demonstrated by the economic operator, Article 27 allows for the declaration of a material as a by-product rather than a waste. This instrument is well established for soils and stone. The classification of soils and stone as a by-product can have significant economic benefits and allow for the handling of these materials outside waste legislation. There are also large environmental benefits through facilitating a circular economy approach.

These decisions made by the economic operator must be notified to the EPA. This is considered by the EPA on a case-by-case basis and the EPA then takes a risk-based approach in making their determination. This determination has an advisory period of 10 weeks. For this declaration the economic operator is required to demonstrate that all four of the by-product conditions are met:

- 1) The further use of the soil and stone is certain;
- 2) The soil and stone can be used without any further processing other than normal industrial practice;
- 3) The soil and stone are produced as an integral part of a production process; and,
- 4) Further use is lawful fulfilling relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

Given the constrained nature of the Site, soils and stones from the basement excavations are required to be removed from site and therefore these excavation and removal of these wastes cannot be prevented.

This process requires that these excavated materials are advised to not be removed from the Site until appropriate approvals are received from the EPA.

The Main Contractor should seek advice on this process from an appropriately qualified consultant.

4.4.2 Contaminated Soils

A geotechnical site investigation and associated report, (completed by IGSL Ltd in June 2020), indicates made ground to 1.9 m bgl (meters below ground level) underlain by undisturbed natural clay soils and limestone rock.

Sixteen samples of the made ground were sampled from 0.5 to 1.0 m bgl. Soil chemical analysis (Rilta Suite) was undertaken on these sixteen samples which was subsequently compared to landfill WAC (Waste Acceptance Criteria). The results of these analyses indicates that the soils at the site are uncontaminated in nature.

It is expected that basement construction will extend to approximately 5 m below ground level requiring the excavation of soils to below formation level for basement construction. Further testing of these soils will be required and shall be conducted by a suitably qualified consultant and overseen by the Main Contractor to determine suitability for reuse, recovery or disposal as required. The qualified consultant will prepare a sampling and analysis plan which will grid the excavation. In-situ composite samples will be achieved from vertical and horizontal samples in each grid. This will allow for the segregation of areas depending on laboratory analyses and classifications. Soils identified for specific re-use at a suitable location may be notified to the EPA under Article 27 of the Waste Management Act 1996 as amended.

Soils may be suitable for recovery at soil recovery facilities subject to meeting the waste acceptance criteria specific to those facilities rather than disposal to landfill.

Soils not suitable for re-use or recovery will be removed offsite to appropriately licenced waste disposal facilities. Soils intended for disposal are required to undergo Waste Classification in accordance with WM3 to determine if soils are hazardous or non-hazardous in nature prior to WAC assessment. Hazardous soils are not anticipated at this site, however, where hazardous soils are discovered on site, these soils should be stored separately and covered prior to removal offsite.

Initial asbestos screening of in-situ soils has reported no asbestos containing soils at the depth profile examined. Demolition is also completed at the site and no asbestos materials are currently on site (with the exception of the asbestos cement watermain). Where asbestos or asbestos containing soils are discovered onsite, these materials shall be stored separately, covered prior to removal offsite for disposal.

4.4.3 Plasterboard / Gypsum Materials

The use and supply of plasterboard and gypsum materials will be monitored on the construction site to avoid wastage. The C&D Waste Manager will ensure gypsum wastes are appropriately segregated in and stored in a water-tight receptacle for onward recycling.

Given the cost of plasterboard and gypsum materials it is estimated that waste volumes will be minimised as far as practicable and will result in approximately 10 tonnes of waste materials.

4.4.4 Metals

Metals will be segregated in appropriate skips or other receptacles in accordance with the authorised waste collectors' requirements. The C&D Waste Manager shall liaise with the metal waste contractor as to the segregation streams relevant to their site. The majority of metal waste will be recycled therefore it is estimated that the construction phase will result in the 20 tonnes of waste metal for disposal.

4.4.5 Timber and Wood

Uncontaminated timber and wood products will be segregated accordingly. The C&D Waste manager shall ensure that appropriate segregation is maintained to exclude materials containing glues, preservatives, paints, varnishes, etc.

Waste timber production will vary during the course of the construction phase. It is estimated that approximately 50 tonnes of timber materials will be disposed of.

4.4.6 Plastic

Appropriate waste and 'off-cut' construction plastic (hard plastic) will be segregated appropriately in accordance with the waste contractor's requirements and recycled appropriately.

Plastic wastes for disposal are estimated to be approximately 15 tonnes.

4.4.7 Wastes from Construction Site Offices and Staff

During the course of the construction phase waste will be generated from employees on the site. These will encompass general refuse, mixed dry recyclables, food wastes and wastes from onsite porta-loos. These wastes will be managed by appropriately licenced and specialised waste contractors. These wastes will be collected and stored separately from the C&D wastes generated through construction activities.

4.4.8 Other Wastes

As required and depending on the stage of the construction, the C&D Waste Manager will determine if other waste streams need appropriate segregation. These streams may include: glass, waste electrical and electronic equipment, and batteries. These needs will be periodically assessed and evaluated by the C&D Waste Manager in conjunction with the relevant contractors on site.

4.4.9 Hazardous Wastes

The management of all hazardous waste streams will be coordinated in conjunction with the Main Contractor's Site Health and Safety Manager.

Hazardous wastes (anticipated to be limited to waste oils, lubricant and other construction liquids) will be stored in secure, dedicated and clearly labelled impermeable containers. These will be located in an appropriate waste compound. If identified through additional testing, contaminated soils will also be appropriately segregated on Site for onward disposal.

An asbestos cement watermain has been identified beneath the Site (Infrastructure Report; AECOM, 2021). When removing and replacing this infrastructure, the material will be treated appropriately in accordance with best practice guidance, including '*Asbestos-containing materials (ACMs) in Workplaces*' (Health and Safety Authority, 2013). Alignment of these pipes will be demarcated and waste management procedures for asbestos containing materials prepared.

Management strategies for this waste stream will focus on the recovery of these wastes, where appropriate. If this is not possible then these wastes will be disposed of appropriately and record of disposal retained on file.

5.0 ESTIMATED COST OF WASTE MANAGEMENT

There is a benefit to construction site management when costs associated with waste production are identified. This will enhance cost control and ensure the avoidance of C&D waste management during the construction phase.

Costs benefits associated with waste management strategies are outlined in this section. The potential costs and savings will be entirely dependent on the final quantities of materials and the appointed Main Contractor's construction methodologies and approaches. Methodologies will be designed in such a way as to design out waste and manage its generation before materials come to site.

The ongoing costs of C&D waste management during the construction phase will be closely monitored by the Main Contractor's C&D Waste Manager. Their assessments will take into account handling costs, storage costs, transportation costs, revenue from potential rebates and disposal costs. On site waste management will strive to reuse materials as far as practicable. If materials are required to be sent off site as waste, then recycling is the preferred alternative to landfill disposal.

5.1 Design Out Waste

Opportunities exist during the design, procurement and construction phases to design out waste from construction activities. Waste prevention will be prioritised by the Main Contractor whilst the methodologies and Construction Management Plan are being defined.

This can be achieved through a combination of strategies, i.e., off-site construction methods, materials optimisation and standardisation, etc. Specific practices would include: the use of prefabricated materials and components in construction, where feasible, in order to reduce waste generation on site and associated transportation impacts; purchasing power can be used to minimise materials packaging and ensure that packaging is recyclable where feasible; and any unused materials will be returned to suppliers (where possible) or used on other projects to avoid their potential wastage and disposal.

5.2 Reuse

The reuse of waste materials will result in a reduction of waste management costs, for example, collection, transportation and other contractor recycling, recovery and disposal costs.

Cost savings can be made where clean and inert soils and stones that can't be reused on site are utilised as capping material at landfill sites, or for the reinstatement of land voids. Depending on the sites and the authorisation, the material can be taken without charge or at a reduced fee, thereby reducing waste management costs for the construction site.

5.3 Recycling

Efficient on-site waste management and segregation of wastes can provide significant cost savings to the construction site. Waste contractors charge considerably less to receive appropriately segregated wastes streams from a site as opposed to mixed waste.

Clean and uncontaminated wastes such as cardboard and various hard plastics can be recycled, similarly wood and timber products can be recycled.

Recyclable metals can earn a rebate from metal recycling contractors which can positively affect the cost of waste management on the construction site.

5.4 Disposal

Disposal is the most expensive option to manage waste and varies per facility and per region. The Waste Management (Landfill Levy) Regulations (SI No. 189 of 2015), has stipulated a landfill levy per tonne of waste destined for disposal at EPA Waste Licence Landfill. Disposal of waste is the least favourable option due to the high costs of disposal, therefore design-out, recycling and recovery is more favourable in terms of cost benefit to the project.

6.0 RESOURCING

6.1 Roles and Responsibilities

The Applicant/Developer will be required to appoint a Main Contractor to the project.

The appointed Main Contractor will nominate a C&D Waste Manager. The C&D Waste Manager will report directly to the site's overall Construction Project Manager. This nominated person will be required to take responsibility for the C&D waste management practices on the proposed construction site and ensure waste management issues of prevention, reuse and recycling are given adequate priority.

The C&D Waste Manager will be required to maintain accurate records on the quantities of wastes and surpluses arising and the real cost associated with waste generation and management.

The manager will be a reliable member of the construction team (i.e., Planning, Design, Contracting Team) who will be technically competent and able to direct decisions at the various stages of the Project.

The appointed C&D Waste Manager will be required to communicate effectively with construction team colleagues with regards to the aims and objectives for waste management on the Project.

All personnel on site will be responsible for the effective implementation of the CDWMP. Training will be provided to all staff on waste prevention, segregation and best practice guidelines.

6.2 Training

A hard copy of the CDWMP will be maintained on Site in the main construction site office, (and in other applicable locations) so that it is available to all relevant personnel on site.

Arrangements will be put in place for all site personnel and sub-contractors to be instructed on the objectives of the CDWMP and site materials management. These instructions shall be incorporated into the Site's induction and refreshed during regular toolbox talks throughout the construction phase.

Site management shall ensure that all site personnel are aware of their specific responsibilities under the plan, including appropriate storage and handling of waste materials, reusable materials and recyclables.

7.0 RECORD KEEPING PROCEDURES

Waste contractors have not been appointed at this stage of the project. Prior to commencement on site the Main Contractor will update the CDWMP with the authorised waste contractors' details for each waste type (name, permit numbers, authorised waste sites etc.). Waste handling and all documentation will be monitored in accordance with the procedures outlined.

The Site Manager will maintain a copy of all waste collection permits if necessary. A waste docket must be issued to the collector. If being transported to another site, a copy of the waste permit or EPA Waste Licence for that site must be provided to the waste manager.

As well as a waste collection docket, a receipt from the destination of the material will be kept as part of the on-site waste management records. All information will be entered in a waste management system to be maintained on-site.

7.1 Waste Tracking and Documenting

The C&D Waste Manager will maintain a system whereby quantities, descriptions and relevant codes of all wastes arising (whether reused and recycled or exported off-site) and if applicable, Article 27 declarations made.

The tracking system employed will enable the contractors to effectively measure and record the quantity of waste being generated, which allows wastage to be more readily identified. The most significant areas where waste products arise can be identified along with the percentage of new material which may be wasted.

The system will allow the C&D Waste Manager to measure performance against site targets and will input to site waste action planning.

All materials being transferred from the site, whether for recycling or disposal, will be subject to a documented tracking system which can be verified and validated. This information will include the below at a minimum:

- Date and time of removal;
- Waste type and description;
- EWC Code;

- Volume of waste;
- Name of waste collection contractor;
- Waste collection contractor's permit number;
- Waste collection receipt;
- Vehicle registration number;
- Driver's details;
- Destination of waste; and
- Waste Permit / Licence number of destination facility.

Where required by the client for sustainability/green construction credits, the tracking system will also record a description of how waste at facility shall be treated and whether this is through disposal, recycling/recovery or onward export. The tracking system will also contain appropriate details of all Article 27 declarations made on the site.

8.0 WASTE AUDITING PROTOCOLS

The waste audit procedures represent a systematic study of the site's waste management practices. The purpose of the waste auditing is to identify any problems with the site's waste procedures and also the benefits of prevention and minimisation that is in place.

The audit will be a 'self-audit' process carried out by the C&D Waste Manager or appointed team member/contractor. The C&D Manager will create an Audit Plan and identify the appropriate frequency at which the audits are to be conducted over the course of the construction phase. This Audit Plan will be carried out in conjunction with other audits conducted by the overall Construction Project Manager.

The waste audit will document details of raw material inputs and the quantity, type and composition of all waste removed from the site.

The audit process will identify appropriate performance and waste output or re-use targets. As appropriate, corrective actions will be identified if targets have not been met.

The audit findings will highlight any corrective actions that may need to be taken in relation to waste management procedures or site practices. These corrective actions will be tracked in order to identify root-causes as appropriate.

The results of the audits will be documented in a periodic summary report which will outline the types, quantities of waste arisings and their final treatment method. In accordance with DLR conditions and requirements these audit reports will be sent to the appropriate persons in the local authority's Waste or Environment Department. These summary reports will be prepared and submitted as required by the local authority.

Where BREEAM (Building Research Establishment Environmental Assessment Method), LEED (Leadership in Energy and Environmental Design), IGBC (Irish Green Building Council) or other sustainability performance is being assessed, key performance indicators (KPIs) shall be established, e.g., an 85% overall recycling target, successes and failures will be recorded, and action plans will be developed to address any issue which arise. Inspections of the waste storage areas will be undertaken on a weekly basis, issues relating to housekeeping, inappropriate storage and / or segregation will be actioned at the earliest practicable opportunity.



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