# Construction & Demolition Waste Management Plan

Donore Project, Donore Avenue, Dublin 8

The Land Development Agency

STG-AEC-S1b-00-XX-RE-U-01_Construction_Demolition_Waste_Management_Plan

November 2022

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## Quality information

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## Revision History

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# 1. Introduction

## 1.1 Overview

AECOM Limited has been appointed by The Land Development Agency (the 'Applicant'), to prepare a Construction & Demolition Waste Management Plan (the 'Plan') for the Donore Project, Donore Avenue, Dublin 8 (the 'Proposed Development'), located within the administrative boundary of Dublin City Council (DCC).

## 1.2 Description of Development

In accordance with Section 175(4) of the Planning and Development Act, 2000 (as amended), The Land Development Agency, on behalf of DCC, gives notice of its intention to make an application for approval to An Bord Pleanála under Section 175(3) of the Planning and Development Act, 2000 (as amended) for a seven year approval to carry out the following proposed development which is located on a site of c. 3.26 hectares (ha), located on the former St. Teresa's Gardens, Donore Avenue, Dublin 8.

The site is bound by Donore Avenue to the north-east, Margaret Kennedy Road to the north-west, The Coombe Women & Infants University Hospital to the west, the former Bailey Gibson factory buildings to the south-west, and the former Player Wills factory to the south-east. The development will consist of the construction of a residential scheme of 543 no. apartments on an overall site of 3.26 ha.

The development (Gross Floor Area, GFA of c. 53,227 sqm) contains the following mix of apartments: 225 no. 1 bedroom apartments (36 no. 1-person and 189 no. 2-person), 274 no. 2 bedroom apartments (including 52 no. 2 bed 3-person apartments and 222 no. 2 bed 4-person apartments), 44 no. 3 bedroom 5-person apartments, together with retail / café unit (168 sqm), mobility hub (52 sqm) and 952 sqm of community, artist workspace, arts and cultural space, including a crèche, set out in 4 no. blocks.

The breakdown of each block will contain the following apartments:

- Block DCC1 comprises 111 no. apartments in a block of 6-7 storeys;
- Block DCC3 comprises 247 no. apartments in a block of 6-15 storeys;
- Block DCC5 comprises 132 no. apartments in a block of 2-7 storeys; and
- Block DCC6 comprises 53 no. apartments in a block of 7 storeys.

The Proposed Development will also provide for public open space of 3,408 sqm, communal amenity space of 4,417 sqm and an outdoor play space associated with the crèche. Provision of private open space in the form of balconies or terraces is provided to all individual apartments.

The Proposed Development will provide 906 no. residential bicycle parking spaces, which are located within secure bicycle stores. 5% of these are over-sized spaces which are for large bicycles, cargo bicycles and other non-standard bicycles. In addition, 138 spaces for visitors are distributed throughout the site.

A total of 79 no. car parking spaces are provided at undercroft level. Six of these are mobility impaired spaces (2 in each of DCC1, DCC3 and DCC5). 50% of standard spaces will be EV fitted. Up to 30 of the spaces will be reserved for car sharing (resident use only). A further 15 no. on-street spaces are proposed, consisting of:

- 1 no. accessible bay (between DCC5 and DCC6);
- 1 no. short stay bay (between DCC5 and DCC6);
- 1 no. crèche set-down / loading bay (between DCC5 and DCC6);
- 1 no. set-down / loading bay (northern side of DCC5);

- 1 no. set-down / loading bay (northern side of DCC3); and
- 10 no. short stay spaces (north-east of DCC1).

In addition, 4 no. motorcycle spaces are also to be provided.

Vehicular, pedestrian and cyclist access routes are provided from a new entrance to the north-west from Margaret Kennedy Road. Provision for further vehicular, pedestrian and cyclist access points have been made to facilitate connections to the planned residential schemes on the Bailey Gibson and Player Wills sites for which there are extant permissions (Ref. No.'s ABP-307221-20 and ABP-308917-20).

The development will also provide for all associated ancillary site development infrastructure, including site clearance and demolition of the boundary wall along Margaret Kennedy Road and playing pitch on the eastern side of the site and associated fencing / lighting, the construction of foundations, ESB substations, switch room, water tank rooms, storage room, meter room, sprinkler tank room, comms room, bin storage, bicycle stores, green roofs, hard and soft landscaping, play equipment, boundary walls, attenuation area and all associated works and infrastructure to facilitate the development, including connection to foul and surface water drainage and water supply.

## 1.3 Scope of Plan

This Plan covers the enabling works (including site investigation) and construction works only. The management of waste when the Proposed Development is eventually occupied and operational is detailed in the accompanying *Operational Waste Management & Recycling Strategy*, which has been developed by AECOM.

'Waste' is defined by Article 1(a) of the European Waste Framework Directive (EWFD)[1] as "*any substance or object (in the categories set out in Annex I) which the holder discards or intends or is required to discard*".

The legal definition of waste also covers substances or objects, which fall outside of the commercial cycle or out of the chain of utility. In particular, most items that are sold or taken off-site for recycling are wastes, as they require treatment before they can be resold or reused.

In practical terms, wastes include surplus earthworks materials and soil, scrap, unwanted surplus materials, packaging, recovered spills, office waste, and damaged, worn-out, contaminated or otherwise spoiled plant, equipment, and materials.

Abbreviations and acronyms used in this Plan are detailed in Table 1-1 below.

[1] The European Parliament and the Council of the European Union, Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives, 2008 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02008L0098-20180705

**Table 1-1: Abbreviations and acronyms**

| Abbreviations and acronyms | Definition |
|---|---|
| ACM | Asbestos-Containing Material |
| BGL | Below Ground Level |
| BPM | Best Practice Measure |
| BRE | Building Research Establishment |
| C&D | Construction and Demolition |
| CIRIA | Construction Industry Research and Information Association |
| DCC | Dublin City Council |
| EPA | Environmental Protection Agency |
| EPI | Environmental Performance Indicator |
| ESB | Electricity Supply Board |
| EWFD | European Waste Framework Directive |
| GFA | Gross Floor Area |
| GGBFS | Ground Granulated Blast-Furnace Slag |
| GII | Ground Investigations Ireland |
| GQRA | Generic Quantitative Risk Assessment |
| HWOL | HazWasteOnline™ |
| IMS | Integrated Materials Solutions |
| OCEMP | Outline Construction Environmental Management Plan |
| PFA | Pulverised Fuel Ash |
| RC | Recycled Content |
| RCA | Recycled Crushed Aggregate |
| WAC | Waste Acceptance Criteria |
| WEEE | Waste Electrical and Electronic Equipment |

## 1.4 National and Local Policy

The relevant national and local policies that were reviewed during the preparation of this Plan are outlined below.

### 1.4.1 A Waste Action Plan for a Circular Economy - Ireland's National Waste Policy 2020–2025

*A Waste Action Plan for a Circular Economy*[2] sets out a range of aims and targets for the State and the measures by which these will be achieved, including increased regulation and measures across various waste areas.

The headline points on construction and demolition (C&D) waste are as follows:

- *Project Ireland 2040* sets out the State's development goals over the next 20 years, which allows for the opportunity to forecast large, specific C&D waste streams with a focus on preventing or efficiently managing the waste from these areas.
- Prevention of soil arisings, which are a significant financial burden on the sector, are to progress by placing value on the used material where possible. There is a strong focus on Article 27 by-product and Article 28 end-of-waste decision making process. These processes are to be streamlined and detailed guidance will be developed for specific problematic materials.

[2] Department of the Environment, Climate and Communications (2020) *A Waste Action Plan for a Circular Economy - Ireland's National Waste Policy 2020–2025*
https://www.gov.ie/en/publication/4221c-waste-action-plan-for-a-circular-economy/#

- The use of recycled construction materials will be incentivised (potentially by introducing a levy on virgin aggregates).
- The Plan looks to make national end-of-waste decisions for specific construction and demolition waste streams at the earliest possible stage.
- The 2006 *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Waste Projects* will be revised. (The revised guidelines were subsequently published in 2021).[3]

### 1.4.2 Dublin City Development Plan 2022-2028

DCC's *Dublin City Development Plan*[4] sets out policies and objectives to guide how and where development will take place in the city over the lifetime of the Plan. It provides an integrated, coherent spatial framework to ensure the city is developed in an inclusive way, which improves the quality of life for citizens, whilst also being a more attractive place to visit and work.

The policies summarised in Table 1-2 are of relevance to the management of construction and demolition waste.

**Table 1-2: Relevant policies (Dublin City Development Plan 2022-2028)**

| Policy No. | Policy Text |
|---|---|
| *CA7 Climate Mitigation Actions in the Built Environment* | *To require low carbon development in the city which will seek to reduce carbon dioxide emissions and which will meet the highest feasible environmental standards during construction and occupation (see section 15.7.1 when dealing with development proposals). New development should generally demonstrate / provide for:*<br>*…*<br>*f. minimising the generation of site and construction waste and maximising reuse or recycling;* |
| *CA22 The Circular Economy* | *To support the shift towards the circular economy approach as set out in a Waste Action Plan for a Circular Economy 2020 to 2025, Ireland's National Waste Policy, as updated, together with The Whole of Government Circular Economy Strategy 2022- 2023 https://www.gov.ie/en/publication/b542d-whole-of-government circular-economy-strategy-2022-2023-living-more-using-less/* |
| *CA23 Waste Management Plans for Construction and Demolition Projects* | *To 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.* |
| *SI27 Sustainable Waste Management* | *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. To support opportunities in the circular resource efficient economy in accordance with the National Policy Statement on Bioeconomy (2018).}* |
| *SI28 Sustainable Waste Management* | *To prevent and minimise waste generation and disposal, and to prioritise prevention, recycling, preparation for reuse and recovery in order to develop Dublin as a circular city and safeguard against environmental pollution.* |
| *SI33 Remediation of Contaminated Sites* | *That all potentially contaminated sites shall be remediated to internationally accepted standards prior to redevelopment. Any unearthed contaminants will require some form of remediation measures which may require a licence from the Environmental Protection Agency (EPA).* |

[3] EPA (2021) *Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects* https://www.epa.ie/publications/circular-economy/resources/CDWasteGuidelines.pdf
[4] DCC (2022) *Dublin City Development Plan 2022-2028* https://www.dublincity.ie/residential/planning/strategic-planning/dublin-city-development-plan/development-plan-2022-2028

# 2. Management of Demolition, Excavation and Construction Waste

## 2.1 Introduction

This chapter outlines how overarching waste management processes and practices will be undertaken during the demolition, excavation and construction phases of the Proposed Development.

In November 2021, the EPA released waste data for 2019 (the latest reference year). Ireland generated 8.8 million tonnes of C&D waste, 7.5 million tonnes of which was soil and stones. The vast majority of C&D waste was backfilled (82%), while 10% went for disposal and only 7% was recycled. The dominance of backfilling as a treatment operation reflects the large proportion of soil and stones in C&D waste. Recycling was the main treatment operation for metals (100%) and waste bituminous mixtures (64%). It is notable that only 39% of segregated wood, glass and plastic waste was recycled in 2019, while 54% went for energy recovery.[5]

The C&D sector must meet the target of preparing for reuse, recycling and other material recovery (including beneficial backfilling operations using waste as a substitute) of 70% by weight of C&D non-hazardous waste (excluding natural soils and stone).[6]

## 2.2 Considerate Constructors Scheme

The Principal Contractor(s) will register their development plot with the Considerate Constructors Scheme. Construction sites that register with the Scheme sign up and are monitored against a Code of Considerate Practice, designed to encourage best practice beyond statutory requirements.

The Scheme is concerned about any area of construction activity that may have a direct or indirect impact on the image of the industry as a whole. The main areas of concern fall into three categories: the environment, the workforce and the general public. Waste management is a key area of focus and on-site considerations may include:

- How waste is avoided, reduced, reused, and/or recycled;
- Whether there is a Waste Management Plan / Strategy and how this is monitored; and
- The type of feedback received (if any) as to how much waste on-site is diverted from landfill.

It is expected that registered construction sites work in an environmentally conscious, sustainable manner.

## 2.3 Outline Construction Environmental Management Plan

An Outline Construction Environmental Management Plan (OCEMP) has been prepared by Enviroguide Consulting as part of the planning submission and defines the measures that shall be implemented during the construction phase of the Proposed Development to manage, minimise, or mitigate potential environmental impacts at the Site.

It is intended that the OCEMP will be updated to include more site-specific information once the construction management team has been appointed. It should be noted that any updates will be technical in nature and will not change the scope of the permission or have any effect on the screening.

The OCEMP includes details on the role and responsibilities of the Environmental / Waste Manager, as well as the control measures for waste management at the Site.

[5] Environmental Protection Agency (2019) *Construction & Demolition Waste Statistics for Ireland* https://www.epa.ie/our-services/monitoring--assessment/waste/national-waste-statistics/construction--demolition/
[6] Government of Ireland (2020) *A Waste Action Plan for a Circular Economy - Ireland's National Waste Policy 2020-2025* https://assets.gov.ie/86647/dcf554a4-0fb7-4d9c-9714-0b1fbe7dbc1a.pdf

## 2.4 Demolition Waste

The Site comprises open grassed areas in the south, east and north, with a section in the west occupied by a construction compound / temporary car park associated with works undertaken in the adjacent The Coombe Women & Infants University Hospital. The Proposed Development will include the removal of the compound / car park, as well as a boundary wall. The licence agreement the Health Service Executive have with DCC requires them to reinstate the original surfaces. The demolition works are expected to take approximately one week to complete.

The works will involve the demolition of the boundary wall and the breaking up of hardstanding, with the stockpiling and/or removal of material that cannot be reused on-site. This will be undertaken in adherence to all prevailing legislation and by suitably licensed contractors. At the time of writing, no estimation of the volume of expected waste from these activities was available.

All activities will be in accordance with the following:

- *Dublin City Development Plan 2022-2028*;
- *Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects* (2021);[7]
- BS 6187:2011 *Code of practice for full and partial demolition*;
- BS 5228:2009 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*;
- *Guidance Note GS 29/1: Health and Safety in Demolition Work* / 1, 2, 3 & 4;
- S.I. No. 504/2006 - Safety, Health And Welfare At Work (Construction) Regulations 2006;
- Environmental Protection Agency Act, 1992; and
- Air Pollution Act 1987.

## 2.5 Site Preparation and Earthworks

Ground Investigations Ireland (GII) was appointed to carry out a Waste Classification & Generic Quantitative Risk Assessment (GQRA) for the Proposed Development.[8]

All site investigation work was carried out under the supervision of a GII Geo-Environmental Engineer and completed between May and October 2021. The ground conditions encountered during the investigation are summarised below, with reference to in-situ and laboratory test results.

The sequence of strata encountered was consistent across the site and generally comprised:

- Topsoil / fill;
- Made ground;
- Cohesive deposits; and
- Bedrock.

### 2.5.1 Topsoil

Topsoil was encountered in the majority of exploratory holes and was present to a maximum depth of 0.20m Below Ground Level (BGL).

### 2.5.2 Fill

Granular Fill was encountered at exploratory holes completed within The Coombe Women & Infants University Hospital building site and staff car park. The deposit was present to a maximum depth of 0.45m BGL.

[7] EPA (2021) *Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects* https://www.epa.ie/publications/circular-economy/resources/CDWasteGuidelines.pdf
[8] GII (2021) *Ground Investigations Ireland, Saint Teresa's Gardens, Waste Classification & GQRA Report*

### 2.5.3 Made Ground

Made ground deposits were encountered either from ground level or beneath the topsoil / fill and were present to variable depths of between 0.70m and 3.00m BGL. These deposits were described generally as dark brown, slightly sandy, slightly gravelly clay, with occasional cobbles and boulders and contained occasional fragments / pieces of concrete, brick, metal, glass, ceramic and plastic. At BH07 and BH11, possibly made ground deposits were noted to a depth of 3.00m BGL. They have been referred to as possible made ground due to their low strength, however, no anthropogenic material was observed within these deposits.

### 2.5.4 Cohesive Deposits

Cohesive deposits were encountered beneath the made ground and were described typically as brown / dark brown, slightly sandy gravelly clay, with occasional cobbles and boulders overlying a stiff dark grey / black, slightly sandy gravelly clay with occasional cobbles and boulders.

The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. The strength of the cohesive deposits typically increased with depth and was stiff or very stiff below 3.00m BGL at most borehole locations. These deposits had occasional, some or many cobble and boulder content where noted on the exploratory hole logs.

### 2.5.5 Bedrock

The rotary core boreholes recovered medium strong to strong thinly laminated dark grey fine grained argillaceous limestone interbedded with a medium strong to strong dark grey / black calcareous mudstone. This is typical of the Lucan Formation, which is noted on the Geological Survey of Ireland's mapping of the proposed site. Rare visible pyrite veins and calcite veins were noted during logging, which are typically present within the Lucan formation.

The depth to rock varies from 4.20m BGL to a maximum of 6.60m BGL.

### 2.5.6 Groundwater

Groundwater strikes were noted on the exploratory hole logs where they occurred and where possible drilling was suspended for 20 minutes to allow the subsequent rise in groundwater to be recorded. GII pointed out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors.

### 2.5.7 Asbestos

GII confirm that asbestos fibres were not detected in the samples and the laboratory did not identify any Asbestos Containing Materials (ACMs) in the samples. ACMs are defined as any material containing more than one percent asbestos.

### 2.5.8 HazWasteOnline™ Results

In total, 61 samples were assessed by GII using the HazWasteOnline™ (HWOL) tool.[9] All samples were classified as being non-hazardous.

All samples were assessed in terms of waste classification using the HWOL tool and also the Waste Acceptance Criteria (WAC)[10] set out in Council Decision 2003/33/EC and the Integrated Materials Solutions (IMS) specific WAC to give a final waste categorisation to determine the most appropriate disposal route for any waste generated.

### 2.5.9 Landfill Waste Acceptance Criteria

The WAC data considered in combination with the waste classification outlined in section 2.4.8 above allows the most suitable waste category to be applied to the material tested. The potentially applicable waste categories are summarised in Table 2-1 below.

[9] HazWasteOnline™ is an online software for assessing and classifying hazardous waste based on European and national regulations and utilising EU technical guidance.
[10] WAC are the technical and administrative requirements that a waste must meet in order for it to be accepted at a storage, treatment, or disposal facility.

**Table 2-1: Potential waste categories for recovery / disposal**

| Waste category | Classification criteria |
|---|---|
| Category A<br>Unlined Soil Recovery Facilities | Soil and Stone only which are free from anthropogenic materials such as concrete, brick, timber. Soil must be free from "contamination" e.g. PAHs, Hydrocarbons. |
| Category B1<br>Inert Landfill | Reported concentrations within inert waste limits, which are set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002).<br>Results also found to be non-hazardous using the HWOL application. |
| Category B2<br>Inert Landfill | Reported concentrations greater than Category B1 criteria but less than IMS Hollywood Landfill acceptance criteria, as set out in their Waste Licence W0129-02.<br>Results also found to be non-hazardous using the HWOL application. |
| Category C<br>Non-Hazardous Landfill | Reported concentrations greater than Category B2 criteria but within non-hazardous landfill waste acceptance limits set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002).<br>Results also found to be non-hazardous using the HWOL application. |
| Category C 1<br>Non-Hazardous Landfill | As Category C but containing < 0.001% w/w asbestos fibres. |
| Category C 2<br>Non-Hazardous Landfill | As Category C but containing >0.001% and <0.01% w/w asbestos fibres. |
| Category C 3<br>Non-Hazardous Landfill | As Category C but containing >0.01% and <0.1% w/w asbestos fibres. |
| Category D<br>Hazardous Treatment | Results found to be hazardous using HWOL Application. |
| Category D 1<br>Hazardous Disposal | Results found to be hazardous due to the presence of asbestos (>0.1%). |

*Source: GII, Waste Classification & Generic Quantitative Risk Assessment (2021)*

The final and most applicable waste category for each of the 61 samples is summarised in Table 2-2.

**Table 2-2: Most Applicable Waste Category for Samples**

| Category | No. Samples | Proportion |
|---|---|---|
| Category A | 28 | 46% |
| Category B1 | 15 | 25% |
| Category B2 | 6 | 10% |
| Category C | 12 | 19% |
| Category D | 0 | 0% |
| **Total** | **61** | **100%** |

*Source: GII, Waste Classification & Generic Quantitative Risk Assessment (2021)*

## 2.5.10 Estimated Generation of Excavated Materials

The estimated volumes of excavated materials are summarised in Table 2-3 below. The breakdown per waste category has been sourced from the structural engineer.

**Table 2-3: Estimated excavation volumes**

| Development plot | Category A ($m^3$) | Category B1 ($m^3$) | Category B2 ($m^3$) | Category C ($m^3$) | Total excavation ($m^3$) |
|---|---|---|---|---|---|
| DCC1 (500 deep) | 562 | 305 | 122 | 232 | **1,221** |
| DCC3 (500 deep) | 768 | 417 | 167 | 317 | **1,669** |
| DCC5 (500 deep) | 625 | 340 | 136 | 258 | **1,359** |
| DCC6 (500 deep) | 165 | 90 | 36 | 68 | **359** |
| Site Works | 6,716 | 3,650 | 1,460 | 2,774 | **14,601** |
| **Total** | **8,836** | **4,802** | **1,921** | **3,649** | **19,209** |

*Source: Structural Engineer (August 2022)*

In total, it is currently estimated that excavated material from the Proposed Development would be 19,209 $m^3$ (i.e. Site Works total + Development Plot totals).

Excavated material that cannot be reused on-site will be removed by licensed waste carriers and sent for reuse at other local development sites or sent for disposal at appropriately licensed facilities (these are expected to be inert or non-hazardous waste landfill sites). These activities will be undertaken in compliance with all relevant legal requirements.

## 2.6 Construction Waste

During each stage of the construction process, there is the potential to generate waste from a variety of means, including the over-ordering or on-site damage of raw materials and construction process waste, such as material off-cuts, packaging and chemical residues.

Opportunities for minimising construction waste are discussed in this section, considering issues such as reducing waste through selection of more sustainable raw materials and the implementation of effective on-site waste management practices.

### 2.6.1 Estimating Construction Waste

The Building Research Establishment (BRE) has developed indicators to aid in the calculation of construction waste arisings at the design of a new development. The Environmental Performance Indicator (EPI) measures tonnes of waste / 100 sqm of GFA. Table 2-4 shows the EPI from the BRE.

**Table 2-4: Construction waste benchmarks**

| Project type | Tonnes / 100 sqm GFA |
|---|---|
| Residential | 15.3 |
| Public Buildings | 13.7 |
| Leisure | 14.8 |
| Industrial Buildings | 12.4 |
| Healthcare | 13.0 |
| Education | 14.9 |
| Commercial Other | 21.0 |
| Commercial Offices | 12.4 |
| Commercial Retail | 15.7 |

*Source: BRE Waste Benchmark Data (issued October 2017)*

The indicators applicable to the Proposed Development have been used to measure construction waste generation and relate to rates where no minimisation, reuse or recycling of materials has taken place. This will provide the baseline figure against which a reduction in waste arisings would then be planned.

Table 2-5 shows the estimated construction waste arisings from the Proposed Development, based on the GFAs, together with the relevant EPI from the BRE.

**Table 2-5: Estimated construction waste arisings**

| Description | Assumed BRE project type | GFA (sqm) | Tonnes / 100 sqm floor area (BRE) | Estimated construction waste (tonnes) |
|---|---|---|---|---|
| Residential | Residential | 46,954.76 | 15.3 | 7,184 |
| Ancillary | Commercial Other | 5,099.79 | 21.0 | 1,071 |
| Crèche | Education | 663.71 | 14.9 | 99 |
| Artist Workspace | Commercial Other | 159.98 | 21.0 | 34 |
| Arts / Cultural Space | Public Buildings | 128.10 | 13.7 | 18 |
| Retail / Café Unit | Commercial Retail | 168.42 | 15.7 | 26 |
| Management / Mobility Hub | Commercial Other | 52.59 | 21.0 | 11 |
| **Total** | **-** | **53,227.35** | **-** | **8,443** |

It is estimated that approximately 8,443 tonnes of construction waste will be generated. Over the duration of the construction works (expected to be three years), this equates to an average of approximately 2,814 tonnes per year, although this is likely to vary significantly according to the construction programme.

The estimations have significant potential to be reduced through best practice on-site waste minimisation and management. The estimated waste arisings data can be used as an indicator for measuring and monitoring waste generated. This will enable the setting of realistic and attainable waste minimisation and management targets.

Figure 2-1 illustrates the estimated composition of construction waste arisings for the Proposed Development, based on tonnage data for C&D waste material collected in Ireland in 2019, the latest reference year (excluding soils, stones and dredging spoil).[11]

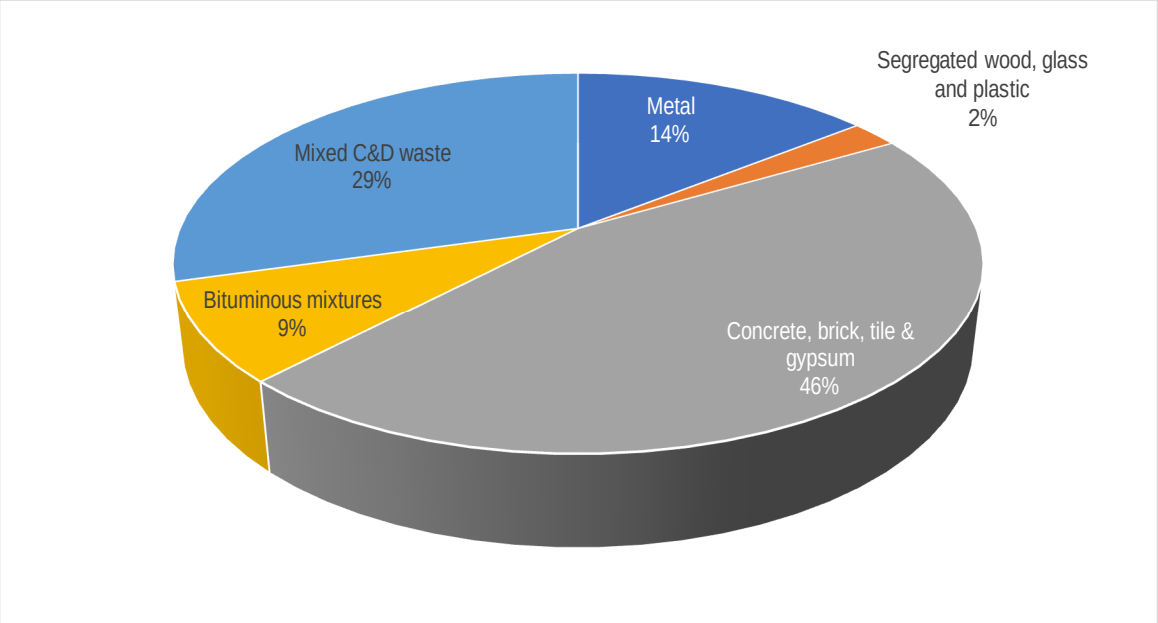


**Figure 2-1: Composition of C&D waste collected in Ireland (2019)**

Using the estimated composition of C&D waste from Figure 2-1, Table 2-6 below shows the projected tonnages for each waste type for the Proposed Development using the estimated total figures from Table 2-5.

[11] Source: https://www.epa.ie/our-services/monitoring--assessment/waste/national-waste-statistics/construction--demolition/

### Table 2-6: Estimated construction waste composition

| Waste type | Proportion | Estimated tonnes |
|---|---|---|
| Concrete, brick, tile and gypsum | 46% | 3,884 |
| Mixed C&D waste | 29% | 2,448 |
| Metal | 14% | 1,182 |
| Bituminous mixtures | 9% | 760 |
| Segregated wood, glass and plastic | 2% | 169 |
| **Total** | **100%** | **8,443** |

Table 2-7 shows the standard, good and best practice recovery rates for construction materials.

### Table 2-7: Recovery rates of construction materials

| Material | Standard recovery * % | Good practice recovery * (quick wins) % | Best practice recovery * % |
|---|---|---|---|
| Timber | 57 | 90 | 95 |
| Metals | 95 | 100 | 100 |
| Plasterboard | 30 | 90 | 95 |
| Packaging | 60 | 85 | 95 |
| Ceramics | 75 | 85 | 100 |
| Concrete | 75 | 95 | 100 |
| Inert | 75 | 95 | 100 |
| Plastics | 60 | 80 | 95 |
| Miscellaneous | 12 | 50 | 75 |
| Electrical Equipment | Limited information | 70** | 95 |
| Furniture | 0-15 | 25 | 50 |
| Insulation | 12 | 50 | 75 |
| Cement | Limited information | 75 | 95 |
| Liquids and oils | 100 | 100 | 100 |
| Hazardous | 50 | Limited information*** | Limited information*** |

* Proposed waste management actions
'Reuse' and 'recycling' are forms of waste recovery.

** This is a required recovery target for the type of Waste Electrical and Electronic Equipment (WEEE) likely to be produced from construction sites, e.g. lighting.

*** This cannot be 100% as most hazardous waste streams (e.g. asbestos) must be landfilled.

Typical hazardous materials from construction sites include:

- Treated wood, glass, plastic (alone or in mixture) containing dangerous substances;
- Bituminous mixture containing coal tar and other dangerous substances;
- Metals and cables containing oil, coal tar and other dangerous substances;
- Rubble or hardcore containing dangerous substances;
- Soil and stones containing dangerous substances;
- Gypsum materials such as plasterboard containing hazardous materials;
- Unused or unset cement;
- Paints and varnishes containing organic solvents or other dangerous substances;
- Paint or varnish remover;
- Adhesives and sealants containing organic solvent or other dangerous substances; and
- Empty packaging contaminated with residues of dangerous substances e.g. paint cans.

Hazardous waste materials will be stored in secure bunded compounds in appropriate containers which are clearly labelled to identify their hazardous properties and are accompanied by the appropriate assessment sheets.

Any fuels, oils and chemicals that are used will be stored in appropriate containers within secure bunded compounds in accordance with good site practice and regulatory guidelines and located away from sensitive receptors.

## 2.7 Use of Secondary and Recycled Construction Materials

A sustainable materials selection strategy would be prepared prior to construction. Measures should be taken to ensure that contractors are committed to identifying appropriate opportunities to reduce waste, promote recycling and use secondary or recycled construction materials. The ordering of appropriate, minimum amounts of building materials should be part of the materials selection strategy.

Some examples of manufactured materials or components with significant and known Recycled Content (RC) are listed below:[12]

- Concrete made with Recycled Crushed Aggregate (RCA)[13] (typically up to 40%, depending on the source). For example, using 'waste' from quarries.
- Concrete using cement replacement materials such as Pulverised Fuel Ash[14] or Ground Granulated Blast-Furnace Slag (GGBFS)[15] (5-15% RC).
- Precast concrete blocks, paving stones, kerbs, etc. made using RCA (more than 60% RC).
- Concrete pipes, drains, etc. made using RCA (more than 60% RC).
- Plastic street furniture (bollards, barriers etc.) made from 100% RC plastic.
- Decking, furniture etc made from 100% RC 'plastic lumber' that looks like timber.
- Plastic drain or soil pipes made using recycled plastic (50-100% RC).
- Cast iron drainpipes made using recycled cast iron (up to 96% RC).
- Tarmac with crushed glass fill (up to 30% RC).

## 2.8 Raw Material and Waste Storage

Emphasis will be placed on the provision of appropriate storage conditions for raw materials and key waste streams relating to each development plot. This will include the segregation of material for reuse or recycling on-site. Where this is not practicable, materials will be segregated for off-site recycling.

The locations of the waste storage areas will be clearly labelled, identifying the materials that can be received. Provisions that will be made include:

- Temporary offices and work compounds on-site will retain all details relating to the waste strategy for the site, health and safety and monitoring and reporting details;
- Storage areas for raw materials and assembly areas for construction components will be located away from sensitive receptors;
- Clearly identified containers for segregated waste streams for reuse and recycling; and
- Dedicated skips will be provided for any construction waste that requires off-site disposal.

In addition, the provision of effective and secure storage areas for construction materials is important to ensure that potential loss of material from damage, vandalism or theft is avoided. These measures will be supported by ensuring well-timed deliveries to the site, providing on-site security and installing temporary site security fencing.

[12] Source: https://www.designingbuildings.co.uk/wiki/Sustainable_materials_for_construction
[13] RCA is the term used to describe the material produced from crushed C&D waste, primarily consisting of concrete, but also including aggregate materials such as sand, gravel, slag, and crushed stones.
[14] PFA is formed during the process of combustion of pulverised coal in the furnace of a power station's boiler.
[15] GGBFS is a by-product of iron in a blast-furnace. It mainly consists of silicate and aluminosilicate of melted calcium.

Implementation of good practice measures in terms of on-site storage and security practices will assist in reducing unnecessary wastage of material and ensure that high standards are maintained throughout the development process.

## 2.9 Waste Prevention and Reduction Measures

To reduce the potential impacts from materials and waste, and to achieve high levels of sustainability in the Proposed Development as a whole, the Applicant and their Contractor will apply the principles of the Waste Hierarchy (Figure 2-2) and adopt Best Practice Measures (BPMs) which go beyond statutory compliance.

This may include BPMs set out in construction industry guidance for example, guidance from the Considerate Constructors Scheme, or Construction Industry Research and Information Association (CIRIA).

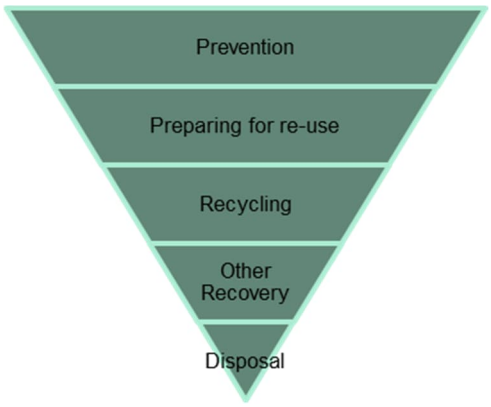


**Figure 2-2: Waste Hierarchy**

The following approaches will be implemented, where practicable, to minimise the quantity of waste arising and requiring disposal:

- Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme.
- Implementation of a 'just-in-time' material delivery system where possible to avoid materials being stockpiled, which can increase the risk of damage and subsequent disposal as waste.
- Attention to material quantity requirements to avoid over-ordering and the generation of waste materials due to surplus.
- Reuse of materials on-site wherever feasible, e.g. reuse of excavated soil for landscaping, recycling of demolition materials into aggregates. Every opportunity will be taken during the Scheme to ensure that surplus material shall not be classified as waste by using it within planned construction activities on site.
- Off-site prefabrication, where practical, including the use of prefabricated structural elements.
- Segregation of waste at source, where practical, to facilitate a high proportion and high-quality recycling.
- Off-site reuse, recycling and recovery of materials and waste where reuse on-site is not practical, e.g. through use of an off-site waste segregation or treatment facility or for direct reuse or reprocessing off-site.

## 2.10 Promotion of Best Practice

As part of the encouragement of on-site best practice, there will also be a need to ensure that suppliers of raw materials to the Proposed Development are committed to reducing any surplus packaging associated with the supply of any raw materials. This includes the reduction of plastics (i.e. shrink wrap and bubble wrap), cardboard and wooden pallets. This may involve improved procurement and consultation with selected suppliers regarding commitments to waste minimisation, recycling and the emphasis on continual improvement in environmental performance.

Table 2-8 below summarises the most important mitigation measures to minimise the potential waste of on-site materials during construction. It is important to note, however, that not all construction materials will be provided by local suppliers.

**Table 2-8: Measures to reduce wastage of on-site construction materials**

| **Ordering** | **Delivery** |
|---|---|
| Avoid:<br>Over-ordering (order 'just in time')<br>Ordering standard lengths rather than lengths required<br>Ordering for delivery at the wrong time (update programme regularly) | Avoid:<br>Damage during unloading<br>Delivery to inappropriate areas of the site<br>Accepting incorrect deliveries, specification or quantity |
| **Storage** | **Handling** |
| Avoid:<br>Damage to materials from incorrect storage<br>Loss, theft or vandalism through secure storage and on-site security | Avoid:<br>Damage or spillage through incorrect or repetitive handling |

Where practicable, waste types that have the potential to be reused on-site or transported off-site for recycling will need to be segregated. Although every effort will be made to retain all suitable materials on-site, it is possible that some of these materials cannot be reused or recycled during the construction process. In these situations, the Site Managers will work to identify a nearby Transfer Station or suitably licensed facility in order for material to be redistributed as fill on other suitable sites. This represents the most sustainable alternative to landfill disposal.

# 2.11 Roles, Responsibilities and Training Provisions

A member of the construction team will be appointed as the Proposed Development's waste manager to ensure commitment, operational efficiency and accountability during the C&D phase.

The nominated waste manager will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid him/her in the organisation, operation and recording of the waste management system implemented on site. The waste manager will have overall responsibility to oversee, record and provide feedback to the Applicant on everyday waste management at the site. Authority will be given to the waste manager to delegate responsibility to subcontractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The waste manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The waste manager will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this Plan.

## 2.11.1 Site Crew Training

Training of site crew will be the responsibility of the waste manager and, as such, a waste training program would be organised. A basic awareness course will be held for all site crew to outline the Plan and to detail the segregation of waste materials at source. This may be incorporated with other site training needs, such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of waste storage areas. A sub-section on hazardous wastes will be incorporated into the training program and the dangers of each hazardous waste will be explained.

# 2.12 Construction Logistics and Traffic Impacts

The logistics associated with construction waste are affected by a wide range of factors. The quantity and types of waste materials generated will fluctuate during the construction phase and the resulting number of waste collections will be dictated by a range of variables, including the amount of storage space for waste, the capacity of waste containers used, the materials segregated for recycling and whether any on-site processes are used for reducing the volume of waste (e.g. compactors / balers / shredders etc.).

The Principal Contractor will be expected to provide construction waste logistics forecasts, that will be discussed with waste contractors and relevant authorities following appointment of relevant parties.

The impact of traffic associated with the movement of construction and waste materials on surrounding neighbourhoods and the local road network will be minimised by a combination of factors. These include reducing the need to import / export materials; and minimising off-site removal of waste to landfill. Dedicated haulage routes will be agreed with the relevant authorities to minimise disturbance to local communities.

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