Outline Construction & Demolition Waste Management Plan

Project Opera

Limerick City and County Council

Prepared for:

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1. Introduction

AECOM Ireland Limited (hereafter referred to as "AECOM") was commissioned by Limerick City and County Council (LCCC, the Client) to prepare an outline Construction and Demolition Waste Management Plan (CDWMP) to support the planning application for the Project Opera development site, Limerick City, Co. Limerick (the site). The plan presented herein is outline in nature as it has been prepared at a stage when exact quantities and volumes of waste material have not yet been determined.

The subject site has a red line boundary of 2.35 hectares and comprises an existing urban block located on the south side of the River Abbey at the confluence with the River Shannon, adjacent the Hunt Museum and east of Arthur's Quay Shopping Centre. The site bounds Rutland Street and Patrick Street to the west, Ellen Street to the south, Michael Street to the east and Bank Place to the north.

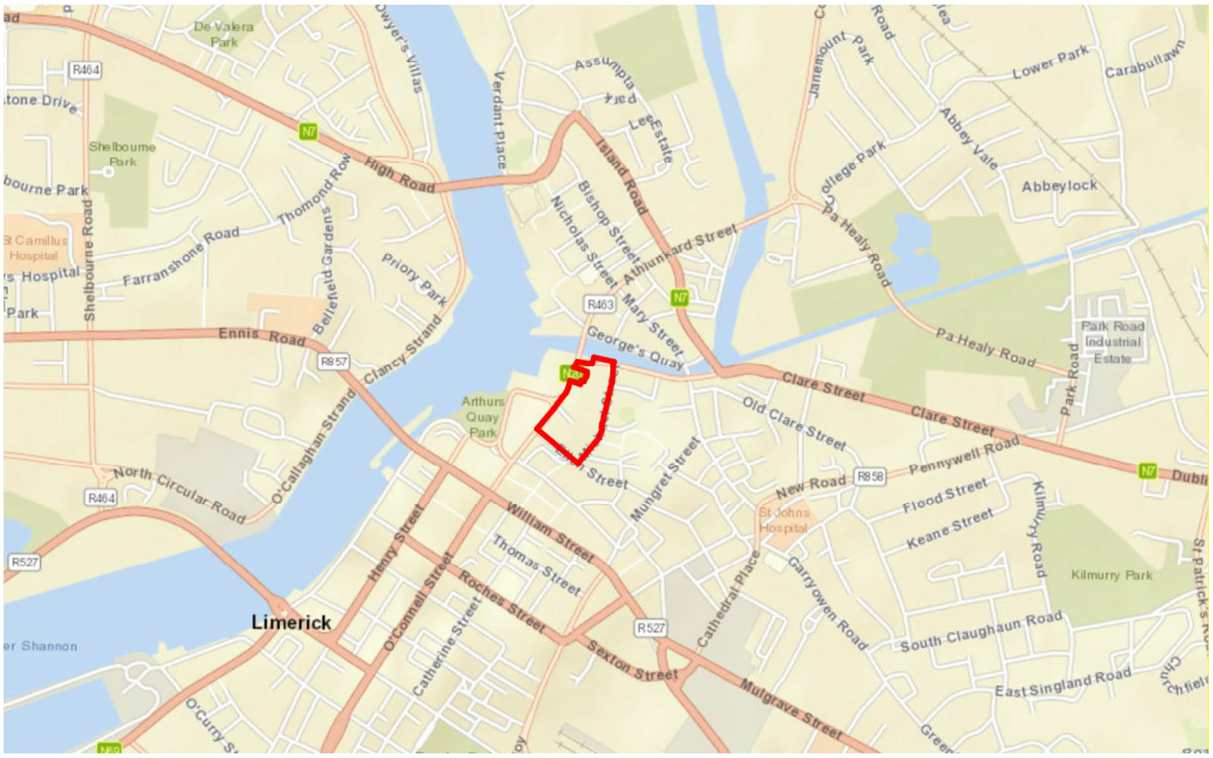

Figure 1. Location of Project Opera site, Limerick, Co. Limerick

It is proposed to develop the Opera Site as a mixed-use scheme comprising office, retail, culture, licensed premises and ancillary uses (see Section 4 for a detailed description).

2. Background

Construction and demolition (C&D) waste is defined as waste which arises from construction, renovation and demolition activities, together with all waste categories mentioned in Chapter 17 of the List of Waste (LoW)[1]. Also included within the definition are surplus and damaged products and materials arising during construction work or used temporarily during the course of onsite activities.

A Construction & Demolition Waste Management Plan is required for any project that is likely to exceed the thresholds set out in the DoEHLG (2006) publication 'Best Practice Guidelines on the

[1] Environmental Protection Agency, *Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous*, Valid from 1st June 2015

Preparation of Waste Management Plans for Construction and Demolition Projects', which are set out as follows: -

1. New residential development of 10 houses or more;
2. New developments other than (1) above, including institutional, educational, health and other public facilities, with an aggregate floor area in excess of 1,250 m^2;
3. Demolition/renovation/refurbishment projects generating in excess of 100 m^3 in volume, of C&D waste; and
4. Civil Engineering projects producing in excess of 500 m^3 of waste, excluding waste materials used for development works on the site.

This project meets the DoEHLG thresholds under Item 3 above and thus requires a CDWMP.

This outline CDWMP has therefore been prepared with reference to, and taking account of, the following legislation, plans and waste management guidance documents:

- The Waste Management Act 1996 – 2008, Amendments & Associated Regulations;
- CIRIA document 133 Waste Minimisation in Construction;
- The Litter Pollution Act 1997;
- The Waste Management Plan for the Southern Region 2015 – 2021; and
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (DoEHLG), June 2006.

Further relevant waste legislation is discussed in Section 5.

3. Objective

The objectives of the CDWMP are as follows:

- Promote an integrated approach to waste management throughout the project construction stage and to set out appropriate responsibilities;
- Promote sustainable waste management in line with waste management hierarchy;
- Provide an outline for the management of wastes arising from construction works for the project in accordance with the relevant Irish and EU waste management legislation; and
- Provide a framework for the designers and the Principal Contractor to appropriately manage waste generated during the course of the project. Both the designers and the Principal Contractor will be responsible for implementing the findings and recommendations of the CDWMP in their Site Waste Management Plan (SWMP)[2].

The CDWMP outlines methods to achieve waste prevention, maximum recycling and recovery of waste and provides recommendations for the management of the various anticipated waste streams. The plan also provides guidance on collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil or water resources).

The CDWMP describes the applicable legal and policy framework for C&D waste management in Ireland (both nationally and regionally).

[2] The Principal Contractor will provide a Site Waste Management Plan (SWMP) incorporating the findings and recommendations of the CDWMP and providing further waste management detail such as site-specific waste management procedures and documentation requirements. It is anticipated that the SWMP will act as an addendum to the CDWMP and will provide a working document which can be amended and updated during the course of the construction works as required.

4. Project Outline

Site Location

The subject site has a red line boundary of 2.35 hectares and comprises an existing urban block located on the south side of the River Abbey at the confluence with the River Shannon, adjacent the Hunt Museum and east of Arthur's Quay Shopping Centre. The site bounds Rutland Street and Patrick Street to the west, Ellen Street to the south, Michael Street to the east and Bank Place to the north.

The site is located at the northern end of Limerick's Georgian Quarter. There are 2 buildings within the site included on the Record of Protected Structures. The Town Hall, Rutland Street, was built in 1805 and is currently vacant and in state of serious disrepair. The Granary, Michael Street, is one of the earliest known multiple storey warehouses to be built in Limerick, dating to the late 1700s. The interior was comprehensively redeveloped in the 1980s, with new offices subject to modernisation in 2015. A further 8 buildings on the site are included on the National Inventory of Architectural Heritage (NIAH). A number of these are vacant and in various stages of dereliction despite a significant amount of remedial works undertaken by the Council in recent years to preserve their structural stability and architectural integrity.

The site is also host to the former Cahill May Roberts building, fronting bank place, some existing and unused warehousing/workspace buildings at Bogues Yard and Watch House Lane. The southeast corner of the site currently includes a surface car park with approximately 100 no. spaces.

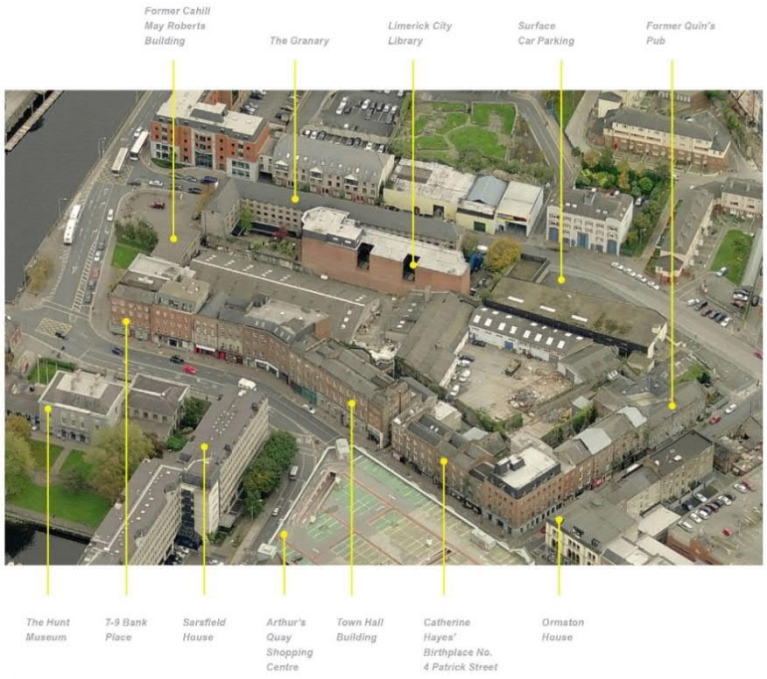

Figure 2. Current site layout (oblique aerial photograph looking north-east)

Proposed Development

The proposed development comprises a mixed-use scheme consisting of primarily office uses. Additional uses proposed also include a range of retail / non-retail services uses, café/restaurant/bar uses, apart-hotel use, civic/cultural uses (including the City Library), residential use. Further elements of the proposed development include the provision of a significant quantum of open space, associated public realm works and the provision of additional routes to enhance the site's overall permeability. The development also includes environmental improvement works to the adjacent public streets

The proposed development comprises the demolition of the following:

- Existing industrial/warehouse/workspace buildings at Bogues Yard and Watch House Lane towards the centre of the site;
- The former Cahill May Roberts office building fronting Bank Place;
- Modern additions/extensions to the rear of the Granary Building (a Protected Structure) and to the rear of heritage structures fronting onto Rutland Street, Patrick Street and Ellen Street, respectively;
- The existing Ellen Street surface car park;
- Nos. 6 & 7 Rutland Street3, Nos. 6 & 7/8 Patrick Street, and No. 3 Ellen Street; and
- The structure adjoining to the south of the former Town Hall (In order to facilitate widening of the existing east-west access route into the site).

The proposed development will also comprise provision of:

- A new 6-storey office building on the corner of Michael Street and Ellen Street (Parcel 1) replacing the existing car park, the proposed new building ranges in height from 4-6 storeys with roof level plant and comprises office, retail and restaurant/café/bar uses at ground floor level and office use on upper levels, providing c. 12,111sq m office use and c. 1,444sq m non-office uses (excluding basement accommodation);
- An apart-hotel on the corner of Patrick Street and Ellen Street (Parcel 2A) replacing No. 6-8 Patrick Street and No. 3 Ellen Street) of 5 storeys with roof level plant and extending to the rear from ground floor level to 4th floor level including a café/bar/restaurant at ground floor. Nos. 4–6 Ellen Street are to be refurbished and modified as required, with retail at ground and basement floor levels of c. 1,014m². Upper levels, will comprise apart-hotel units, linked by bridge access from the new apart-hotel building, providing a total floor area for the apart-hotel (including new build and refurbished areas) of c. 4,710 sq m;
- Refurbishment and modification of No. 9 Ellen Street (Parcel 2B) for the provision of bar/restaurant/café uses at all floor levels, comprising 1,260sq m excluding basement;
- A new City Library within the exiting Town Hall and adjoining structures (Parcel 3A & 3A4) comprising renovation and adaption of the Town Hall (a Protected Structure) and No. 8/9 Rutland Street, replacement of building extensions to the rear with a full height glazed atrium, and connection with new-build structures replacing 6 & 7 Rutland Street, extending and stepping-up to the rear over 4/5 no. floor levels with roof plant (providing a total floorspace of c. 5,460 sq mincluding renovation and new-build areas). A café/restaurant is also proposed at the basement level of the library (c. 250sq m). The new-build structure to the rear is split, providing for commercial office floor space over 4-5 storeys (Parcel 3A4 providing c. 2,581sq m);
- Refurbishment and adaptive re-use of 9 no. Georgian terraced houses (3no. NIAH) at Nos. 7-8 Ellen Street, Nos. 1-5 Patrick Street and Nos. 4-5 Rutland Street, respectively, to provide for retail use at ground and basement levels (comprising a total of 1,167.59sq m retail floor space) and residential use on upper levels (c. 1,878.70sq m). A total of 16 no. residential units are proposed; 3 no. 1 bed apartments, 9 no. 2 bed apartments, 1 no. 2 bed townhouses, 1no. three bed townhouse and 2 no. 4 bed townhouses. Private open space is proposed to be provided in new balconies to the rear or ground/podium level private gardens as appropriate.
- To the north of the site fronting Bank Place, is a proposed landmark building of 11–14 storeys, comprising 13,264sq m office floorspace (Parcel 5);
- The existing 4-storey Granary Building (a Protected Structure) is proposed to be retained in office/restaurant/licenced premises use, with the addition of a circulation core to the

[3] The doorway currently located within the façade of No. 6 Rutland Street does not form a part of the demolition works.

rear in place of the former (modern) library structure (providing a total floorspace of c. 2,715sq m).

- A significant new public square/plaza is proposed at the centre of the site (c. 4,013sq m) linked by east-west connections to Michael Street/Patrick Street, to the south via the existing archway connecting to Ellen Street (under no. 7 Ellen Street), and to the north via a new north-south public space to the rear of the Granary Building ('the Granary Courtyard', c. 778sq m), which links with an enhanced public space at Bank Place (c. 1,775sq m).
- A basement car park, accessed from Michael Street, will be provided with parking for 155 no. cars and 311 no. secure bicycle spaces, together with shower and changing facilities and ancillary plant, attenuation, storage, refuse management and associated areas.
- The proposed development also includes environmental improvement works to the adjacent public streets, hard and soft landscaping changes, signage and flagpoles, lighting, change in level, substations, diversion of underground services, set-down areas, and all related site development and excavation works above and below ground.
- The Bruce House Doorway, Rutland Street (a protected Structure) will be relocated to the internal gable of No. 8 Rutland Street within the new library building atrium.

The proposed layout of the development is shown in **Figure 3**.

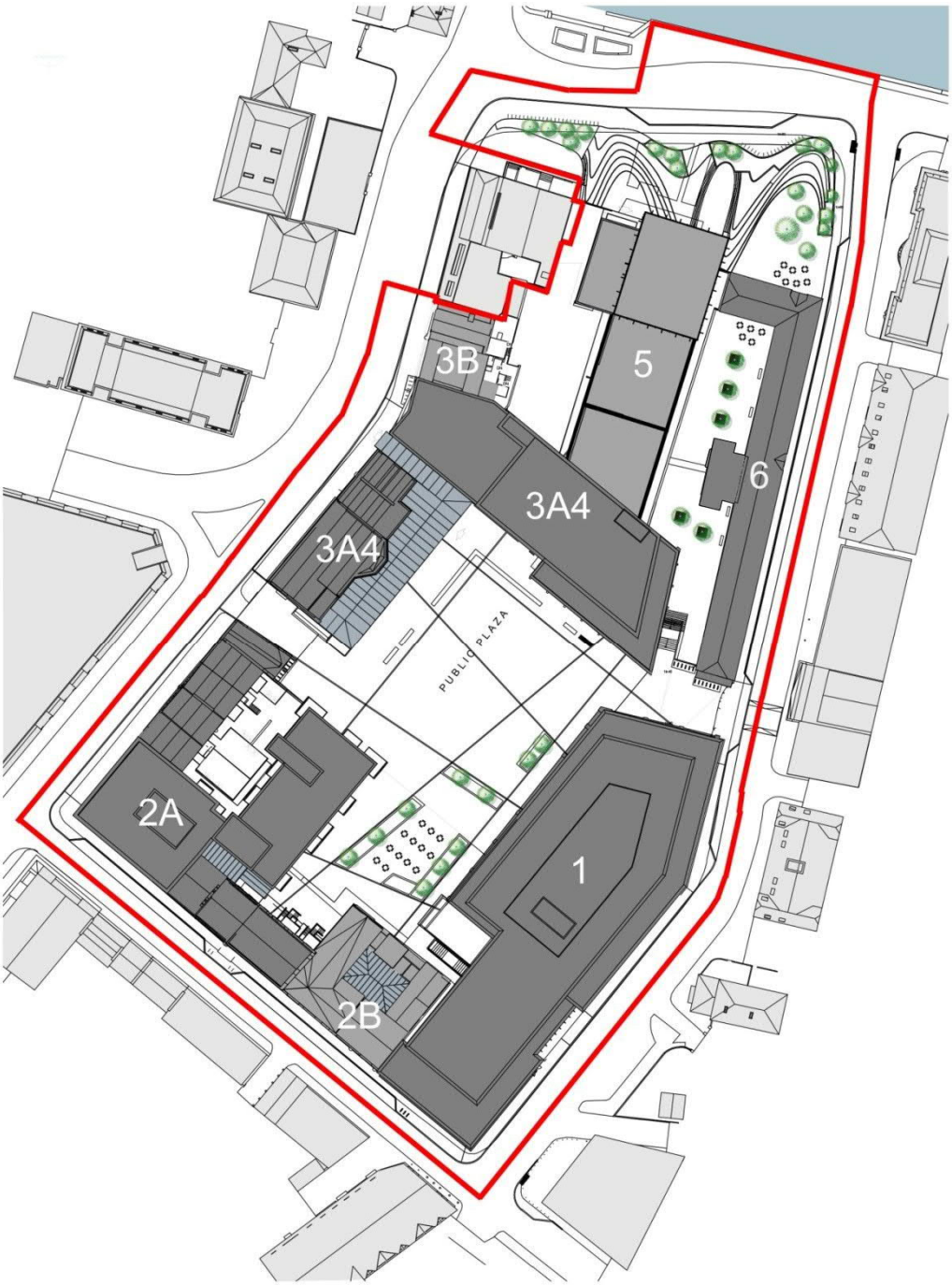

Figure 3. Proposed Development Layout

It is anticipated that the majority of waste generated will be concrete from demolition works and fill, soil, concrete and asphalt excavated during the course of the construction works. The schedule of construction works is expected to be as follows:

- Condition schedules and baseline monitoring surveys. Survey monitoring would be required at all stages through to project completion;
- Install temporary works to buildings to be retained;
- Carefully demolish structures to be removed;
- Commence the repair works to the retained structures;
- The proposed foul and storm water sewers in Michael Street will be laid and commissioned to allow the existing combined sewer crossing the site to be diverted;

- Install earthworks support to the basement perimeter;
- Excavate basement area;
- Construct new basement;
- Construct new buildings;
- Complete the development service connections; and
- Complete public realm and landscaping.

Key construction project elements may be summarised as follows:

1. Demolition and enabling works, including setting up of a foul and storm water sewers and the setting up of a site compound.
2. Excavation of made ground and shallow soils as part of foundation, basement, drainage lines and landscaped areas construction, including excavation of concrete and asphalt surfacing and coarse gravel sub-base due to removal of the existing areas of hardstanding.
3. Construction of multi-storey buildings, for commercial, retail and residential use, ranging from 3 to 14 storeys tall, over basement level.
4. Construction of a public plaza, pedestrian walkways and associated peripheral landscaping.

5. General Waste Management Regulatory and Policy Requirements

Some specific points on waste management policy and regulatory requirements are set out as follows:

- Construction and Demolition (C&D) waste can be defined as all waste that arises from construction, renovation and demolition activities and includes all waste listed in Chapter 17 of the LoW[1], including hazardous and non-hazardous waste types;
- The EU Waste Framework Directive (2008/98/EC), enacted in Ireland under the Waste Directive Regulations, 2011 of the same title, requires Member States to take the necessary measures to achieve the minimum recycling/recovery target of 70% by weight for non-hazardous C&D waste, excluding naturally occurring materials, by 2020. The Directive specifies that such a target should be achieved by preparing for reuse, recycling and other material recovery, including backfilling operations using waste to substitute other material;
- The Southern Region Waste Management Plan 2015 – 2021 (SRWMP) was published in May 2015. Notable and relevant points are:
  - There has been a sharp drop in the number of available operational landfills nationally, Limerick has no operational landfill. Historically these were a significant outlet for C&D waste. Therefore, there is a need to maximize diversion of infill of C&D waste and consider alternative uses, for example, crushing and screening of masonry, stone and concrete wastes for re-use in a variety of engineering applications.
  - The need to progress towards a ‘circular economy’ whereby raw materials, traditionally almost entirely becoming waste in a linear life cycle, instead become a much smaller input into a circular approach to materials use from design through to production, through to consumption but then maximizing re-use and

recycling to close the circle back to design. For example, C&D wastes can become raw materials in the design phase of a project.

- The SRWMP plan sets out a target of 70% of C&D waste re-use and recycling (excluding soil and stones) by year 2020.
- The SRWMP brings in the concept of 'upcycling' which is the re-purposing of items that otherwise are seen as waste or useless products.

The primary legislative instruments that govern waste management in Ireland and are applicable to the project are:

- Waste Management Act 1996 (S.I. No. 10 of 1996) as amended by the Waste Management (Amendment) Act 2001. Sub-ordinate legislation to this Act includes:
  - European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011) as amended 2011 (S.I. No. 323 of 2011)
  - Waste Management (Collection Permit) Regulations S.I No. 820 of 2007 as amended 2008 (S.I No 87 of 2008)
  - Waste Management (Facility Permit and Registration) Regulations, S.I No. 821 of 2007 as amended 2008 (S.I No. 86 of 2008)
  - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended 2004 (S.I. No. 395 of 2004), 2010 and (S.I. No. 350 of 2010)
  - Waste Management (Packaging) Regulations 2003 (S.I. No. 61 of 2003) as amended 2004 (S.I. No. 871 of 2004), 2006 (S.I. No. 308 of 2006) and 2007 (S.I. No. 798 of 2007)
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997)
  - Waste Management (Landfill Levy) (Amendment) Regulations 2012 (S.I. No. 221 of 2012), as amended 2015 (S.I. No. 189 of 2015)
  - European Communities (Waste Electrical and Electronic Equipment) Regulations 2011
  - Waste Management (Registration of Brokers and Dealers) Regulations 2008 (S.I. 113 of 2008)
  - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009), as amended 2015 (S.I. 190 of 2015)
- Protection of the Environment Act 2003 (S.I. No. 413 of 2003)
- Litter Pollution Act 1997 (S.I. No. 12 of 1997)

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

6. Roles & Responsibilities

All parties involved in the Project will have responsibility for waste management. Responsibility will vary at different stages of the project lifecycle. Key responsibilities are set out in **Table 1**.

Some responsibility assignments indicated in Table 1 may change, depending on the agreed project contractual arrangements and project design requirements.

The appointed Principal Contractor will be responsible for refining and implementing the findings of the outline CDWMP within their own over-arching Site Waste Management Plan (SWMP).

Table 1. Construction Stage Waste Management – Key Responsibilities

Responsible Party	Responsibility	Project Stage
Client	Appointment of competent Principal Contractor and Design Team	Project initiation and subsequent tendering phases
	Responsibility of waste management from 'cradle to grave', including documentation of same.	All project stages
Principal Contractor	Construction & Demolition Waste Management Plan implementation	Project Implementation
	Refinement and implementation of the outline CDWMP within their own over-arching Site Waste Management Plan (SWMP)	Project Implementation
	Appoint competent and authorized waste management contractor(s)	Project tendering phase
	Appoint trained, competent Waste Manager[4]	Construction phase
Waste Manager	SWMP implementation	Project Implementation
	Ensure that's the objectives of both the CDWMP and the contractors SWMP are put in place.	Construction stage
	Waste characterisation. Selection of techniques and design to minimize waste and to maximize recovery and recycling of waste during the project	Construction stage
	Maintenance of Waste Documentation for 3 years.	Project Design Phase and during project implementation
	Completion of Final Waste Management Report	Post-construction stage
	Educate colleagues, site staff, external contractors and suppliers about alternatives to conventional construction waste disposal	Construction stage
Design Team	Identification of Key Waste Streams	Project Design Phase
	Design to minimize waste generation in lifecycle of completed construction.	Project Design Phase

[4] The Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (DoEHLG) outline that a Waste Manager should be appointed. This Waste Manager may well be a number of different individuals over the life-cycle of the Project, but in general is intended to be a reliable person chosen from within the Planning/ Design /Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the Project Waste Management Plan are delivered and who is assigned the requisite authority to secure achievement of this purpose. The role will include the important activities of conducting waste checks/audits and adopting construction and demolition methodology that is designed to facilitate maximum reuse and/or recycling of waste.

Responsible Party	Responsibility	Project Stage
	Design of Soil Excavation Plan	Project Design Phase
	Adequately provide for waste management in tender documents and declare all relevant information & data.	Project Procurement Phase
Subcontractors	Comply with CDWMP and Contractors SWMP, where relevant	Project Implementation

7. Waste Hierarchy

Besides the requirements that the off-site handling of waste generated by this project are subject to the required statutory authorisations under the Waste Management Act, there is also a necessity that it conforms to the Waste Hierarchy[5]. This hierarchy outlines that waste prevention and minimisation are the first priority in managing wastes, followed by waste reuse and recycling with disposal being considered as a last resort.

The EU Waste Directive (2008/98/EC) also mandates that hazardous waste generation should be avoided or at least minimised.

Figure 4. EU Waste Hierarchy

Definitions defined in the Waste Framework Directive of key terms indicated in Figure 1 are (in order of priority):

- **Prevention** includes measures taken before a substance, material or product has become waste, that reduce (a) the quantity of waste, including through the reuse of products or the extension of the lifespan of products, (b) the adverse impacts of the generated waste on the environment and human health or (c) the content of harmful substances in materials and products.
- **Re-Use** is defined as any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.
- **Recycling** is any recovery operation by which waste materials are processed 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.

[5] Waste Hierarchy as set out in Article 4 of the Waste Framework Directive (2008/98/EC) and transposed into Irish law via Section 21A of the Waste Management Act

- **Recovery** is defined as 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.

The Waste Hierarchy only applies to material that is defined as “waste”, so does not apply to the proportion of the spoil that is handled on-site in conformity with the statutory exclusions.

The Waste Management Hierarchy will be activated for any material which does not satisfy the exclusions; in this regard the contract documents for the detailed design/construction project will clearly set out the staged approach which the contractor will be required to adhere to through the use of the Waste Hierarchy.

Waste Minimisation

The following waste minimisation measures will be implemented during the course of the construction works:

- Facilitate recycling and appropriate disposal by on site segregation of all waste materials generated during construction into appropriate categories, including:
  - Top-soil, subsoil, gravel hard-core
  - Concrete, bricks, tile, ceramics, plasterboard
  - Asphalt, tar and tar products
  - Metals
  - Dry Recyclables e.g. cardboard, plastic, timber
- All waste assessed by the Waste Manager as ‘not suitable for reuse’ will be stored in skips or other suitable receptacles in a designated area of the site, to prevent cross contamination between waste streams;
- Wherever possible, leftover materials (e.g. timber off cuts) and any suitable demolition materials will be reused on-site;
- Uncontaminated excavated material (top-soil, sub soil, etc.) will be segregated, stockpiled and re-used on site in preference to importation of clean fill, where possible; and
- Where possible, the Waste Manager will ensure that all waste leaving site will be recycled or recovered.

8. Waste Identification, Classification, Quantification and Handling

Waste Identification, Classification and Quantification

It is anticipated that the majority of waste generated will be concrete from demolition works and fill, soil, concrete and asphalt excavated during the course of the construction works. It is not currently anticipated that this material will be reused on site, however if and where required, clean soil and fill will be retained on site and reused in areas for backfilling. A record of the volumes and reuse requirements will be maintained by the Principal Contractor as part of their SWMP, see Section 6.

The SWMP will identify waste soils suitable for reuse on site, as well as suitable recycling and/or recovery options if required, see Section 9 for further details.

Soil samples from site investigation works completed in 2017 were submitted for laboratory analysis of Waste Acceptance Criteria. These laboratory results were input to the HazWasteOnline™ classification tool in 2017. Based on the available analytical results, the following waste categories were identified and classified in accordance with European Waste Catalogue and Hazardous Waste List (EPA, 2002). The findings of the hazardous waste classification are summarised in Table 2 below.

Soil samples were screened for the presence of asbestos containing materials and none were identified.

Table 2. Summary of Soil Waste Classification

Waste Classification		EWC Code	Number of Made Ground Samples	Number of Clay Samples	Total Number of Samples
Category A	Inert	17 05 04	7	6	13
Category B	Inert	17 05 04	3	-	3
Category C1	Non-Hazardous	17 05 04	3	2	5
Category D1	Hazardous	17 05 03	2	-	2

During the course of excavation works additional sampling and analysis may be required to classify excavated material for waste disposal purposes and identify suitable disposal routes.

An asbestos demolition survey was conducted in six areas across the proposed redevelopment site for the purpose of identifying asbestos containing materials in premises planned for demolition, as well as assessing and identifying the risks these may pose to workers. Areas where ACM was identified are summarised in Table 3 below.

Table 3. Asbestos Containing Materials

Location	Identified ACM
Bank Place	Insulation containing asbestos is present to pipework in the Cahill May Roberts Building boiler house
Centre Yard	Roof sheeting, all units contain asbestos Rain water goods to all units contain asbestos There are damaged asbestos cement products on the ground of the yard Wall and ceiling panels to the printers contain asbestos Vinyl floor tiles and bitumen containing asbestos are present to the floor of the printers
Ellen Street	Roof slates to the buildings contain asbestos Roof sheeting on the building of the rear of number 8 contains asbestos Door seals to filing cabinets in no.8 contain asbestos Broken asbestos cement roof slates are present in the top floor and attic of no. 8 Broken asbestos cement roof slates and corrugated sheets are present to the ground to the rear of the buildings An acoustic panel contains asbestos to a sink in no.5
Michael Street	The roof slates to the Granary Building contain asbestos
Patrick Street	Roof slates to the buildings contain asbestos Vinyl floor tiles and bitumen adhesive to the floor of no. 6 contain asbestos

Location	Identified ACM
Rutland Street	Roof slates to the block contain asbestos Debris and broken roof slates are present to the top floors/ attics of the buildings Wall panels to the shop area of number 5 contain asbestos An acoustic panel to the sink of number 6-7 contains asbestos Vinyl floor tiles and bitumen adhesive to basement of number 4 contain asbestos Vinyl floor tiles and bitumen adhesive to basement of number 6-7 contain asbestos Vinyl floor tiles and bitumen adhesive to the Shop of number 8 contain asbestos Paper gaskets to the Town Hall pipework contain asbestos Toilet cistern containing asbestos is present to the top floor of number 8

During the construction phase, there will be some building material and packaging waste generated. This will mainly include excess ready-mix concrete and mortar, timber off cuts, plastics, metal off cuts, cladding and tile offcuts, as well as plastic and cardboard waste from packaging and potential over-supply of materials.

Where possible, individual waste arisings shall be identified, classified and quantified (volume, weight) as early in the project lifecycle as is possible but, inevitably, unanticipated waste arisings may occur as site work progresses, necessitating the need for a procedure to provide for waste classification as the site work proceeds.

It is anticipated that the majority of non-hazardous and inert waste generated will be suitable for reuse, recovery or recycling and will be segregated to facilitate the reuse, recovery and/or recycling, where possible.

A non-exhaustive list of anticipated wastes from the construction phase and preliminary classification as either hazardous or non-hazardous is presented in Table 4.

Table 4. Potential Non Hazardous and Hazardous Waste Classification

Hazardous Waste	Non Hazardous Waste
Excess Electrical & Electronic Components	Asphalt
Liquid Fuels	Metals (stainless steel, mild steel, copper, aluminium)
Batteries	Wood (Clean), glass, plastic, paper and cardboard
Concrete (contaminated with dangerous substances)	Concrete (not contaminated with dangerous substances)
Excavated Soil (contaminated with dangerous substances)	Excavated soil/fill (not contaminated with dangerous substances)
Other construction and demolition wastes containing dangerous substances	Municipal waste

Wastes arising for the project will be segregated, identified and classified by the Principal Contractor in accordance with applicable waste regulations.

Wastes shall not be removed from the site until properly classified, assigned a correct LoW code and all appropriate tracking and disposal documentation is in place.

For each waste stream identified and classified, and for each waste stream that may arise during the course of the works, the following shall be identified and documented by the Principal Contractor in their SWMP:

- An appropriate waste classification and correct LoW code; Where a waste type is considered a mirror entry, the classification of materials as non-hazardous and/or hazardous waste will be determined based on the www.hazwasteonline.com web-based

waste assessment system (as recognized by the Environmental Protection Agency) and using Waste Acceptance Criteria in accordance with the European Communities (EC) Council Decision 2003/33/EC, which establishes criteria for the acceptance of waste at landfills;

- A suitable Waste Collection Contractor in possession of a valid Waste Collection Permit for the collection of waste within the Limerick City Council area;
- Appropriate waste recovery, recycling or disposal facilities, including any required transfer stations whereupon the said facilities shall be in possession of a valid Waste Facility Certificate of Registration, permit or Waste Licence, as appropriate;
- A recovery, recycling or disposal plan for the waste, where applicable. Where any material is being recovered onsite or offsite for reuse; the Principal Contractor will provide confirmation of any application to EPA under Article 27[6] or Article 28[7] to classify material as a by-product or as end of life waste respectively; and
- Final reconciled waste quantities generated, including details of waste disposal, reuse and recovery quantities.

Site demolitions are estimated to give rise to a total of circa 51,700m^3 of wastes as set out in Table 5. Reuse of materials on site will be encouraged where it meets the required regulatory and engineering requirements.

Table 5. Construction waste arising as a result of the proposed development

Building	Approximate volume m^3
Former Cahill May Roberts Office	1,500
Former Cahill May Roberts Warehouse	13,000
Sundry Former Warehouses / Factories	7,500
Existing Library	13,000
6 & 7 Rutland Street	7,000
Corner Patrick Street & Ellen Street	7,500
Add-ons to rear of Rutland/Patrick Street	200
Sundry other	2,000
Basement excavation	40,000

It is expected the bulk of all masonry/brick excavated will go offsite for disposal with none suitable expected for recovery. However, until detailed assessment of these volumes takes place by the contractor, the extent of removal/reuse cannot be stated.

[6] Notification of by-product decisions by economic operators under Article 27 of the European Communities (Waste Directive) Regulations 2011, S.I. No. 126 of 2011
[7] End-of-Waste Status under article 28 of the European Communities (Waste Directive) Regulations, 2011, S.I. No. 126 of 2011.

The EPA have produced figures regarding the amount of waste generated by various developments, the split between individual construction and demolition categories is shown in Table 6.

Table 6. Breakdown of construction and demolition waste materials on a typical site

Waste Types	%
Soil and Stone	51
Concrete, Bricks, Tiles, Ceramics, Plasterboard	39
Asphalt, Tar and Tar Products	2
Metals	2
Others	6
Total Waste	100

Based on the volume of material expected to be generated from the proposed development, using the percentages in Table 6, a preliminary breakdown of the types of materials expected to be encountered can be produced. The building volume information has been calculated based on the above ground elements of the buildings and as such, they are not expected to have a soil or stone element to their volume. As a result, the percentages in table 5 are further refined, to focus on building materials for removal. Table 7 shows this breakdown for each of the buildings proposed for demolition.

Table 7. Estimate of construction wastes composition arising

Building	Approximate volume m^3	Soil and stone m^3	Concrete, brick, tiles, ceramics, plasterboard m^3	Asphalt, tar, tar products m^3	Metals m^3	Other waste m^3
Former Cahill May Roberts Office	1,500		~1200	~60	~60	~180
Former Cahill May Roberts Warehouse	13,000		~10,400	~520	~520	~1,560
Sundry Former Warehouses / Factories	7,500		~6,000	~300	~300	~900
Existing Library	13,000		~10,400	~520	~520	~1,560
6 & 7 Rutland Street	7,000		~5,600	~280	~280	~840
Corner Patrick Street & Ellen Street	7,500		~6,000	~300	~300	~900
Add-ons to rear of Rutland/Patrick Street	200		~160	~8	~8	~24
Sundry other (say)	2,000		~1,600	~80	~80	~240
Basement excavation	40,000	~40,000				

Once the contactor has confirmed the approach to demolition, they will also identify the amounts of material which can be reused/recycled.

Waste Handling

Segregation and Storage

Wastes generated during works will be segregated and temporarily stored on site (pending collection or for re-use on site) in accordance with a pre-determined segregation and storage strategy (to be developed by the Principal Contractor as part of their SWMP).

The following minimum segregation and storage strategy requirements will be required:

- Waste streams will be individually segregated; and all segregation, storage & stockpiling locations will be clearly delineated on site drawings;
- Waste storage, fuel storage and stockpiling and movement are to be undertaken with a view to protecting any essential services (electricity, water etc.) and with a view to protecting existing surface water drains and groundwater quality boreholes (if applicable);
- Roles and responsibilities of those managing the segregation and storage areas will be identified;
- The waste storage area should contain suitably sized containers for each waste stream and will be agreed with the waste contractors in advance of the commencement of the project;
- All segregation and waste storage areas will be inspected regularly by the appointed Waste Manager;
- Waste will be stored on site, including metals, asphalt and soil stockpiles, in such a manner as to:
  - Prevent environmental pollution (bunded and/or covered storage, minimise noise generation and implement dust/odour control measures, as may be required);
  - Maximise waste segregation to minimise potential cross contamination of waste streams and facilitate subsequent re-use, recycling and recovery; and
  - Prevent hazards to site workers and the general public during construction phase (largely noise, vibration and dust).

Waste Permitting, Licences & Documentation

Under the Waste Management (Collection Permit) Regulations 2007, as amended, a collection permit to transport waste, which is issued by the National Waste Collection Permit Office (NWCPO), must be held by each waste collection contractor.

Waste may only be treated or disposed of at facilities that are licensed or permitted to carry out that specific activity (e.g. chemical treatment, landfill, incineration, etc.) for a specific waste type.

Operators of such facilities cannot receive any waste, unless they are in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments or a waste licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste permitted to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

Records of all waste movements and associated documentation should be held at the site. Records management and maintenance will be the responsibility of the Principal Contractor.

Further detail on waste documentation is provided in Section 11.

9. Soil Management

Project works will result in the excavation of soils as part of the site development.

The site has a long history of development and an intrusive site investigation was conducted 2017. Results from that investigation indicate that no localised hotspots of contamination were identified that require removal during redevelopment. It is possible that other hotspots of contaminated materials may be encountered during the construction stage.

Taking the above into consideration, the Principal Contractor will, as part of their SWMP, prepare a project-specific Soil Management Plan, which will detail the following as a minimum:

- Detail in-situ (prior to excavation) and ex-situ (post excavation) methodologies to classify waste soil for appropriate disposal, in accordance with relevant Irish and EU legislation and guidance, see Section: Excavated Soil & Materials for more detail;
- Identify reuse requirements and soils suitable for reuse on site in consultation with the design team, including assessment methodology to determine which soils are suitable for re-use onsite, see Section: Soil for Reuse on Site for more detail;
- Site management procedures, including waste minimisation, stockpile management, temporary storage procedures, waste licence requirements, see Section: Soil for removal Off-site; and
- Waste Management documentation, including waste generation record keeping, waste transfer notes and confirmation of appropriate disposal.

Excavated Soil & Materials

A Soil Waste Classification will be produced ahead of works.

The SWMP to be developed by the Principal Contractor will detail relevant procedures, including further environmental sampling, testing and assessment requirements, sampling protocols and sample density targets to supplement the existing ESA report.

Where any hotspots of potential contamination are encountered, and prior to excavation, further assessment will be undertaken by a suitably qualified environmental scientist to determine the nature and extent of remediation required.

Soil for Reuse on Site

Although it is not currently envisaged that excavated soils will be reused on site, where the Principal Contractor proposes to reuse excavated soil within the works e.g. as backfill, and where reuse is permitted in accordance with the relevant legislation and provided that the reuse meets the engineering requirements for material used within the works, the Principal Contractor shall set out their proposal for its management, documentation and reuse. This shall include:

- Delineation of areas where excavated soil is intended for disposal off-site as waste, and where it is intended for re-use on site based on the findings of the ESA;
- Identification and recording of the location from where the soil will be excavated and its proposed re-use location and function;
- Engineering assessment to confirm its suitability for re-use;
- Any proposed treatment or processing required enabling its reuse, as well as any associated treatment permits or licences; and
- Determination of by-product or end-of-waste status with the EPA under Article 27 or Article 28, where applicable (not anticipated).

Soil for Removal Off-site

Where appropriate, excavated soil and material intended for recovery or disposal off-site shall require Waste Assessment Criteria (WAC) testing and subsequent waste classification in order to select an appropriate receiving facility for the waste. It is noted that natural soil showing no visual or olfactory signs of impact may, in certain circumstances, be classified without testing, once this has been agreed with the waste receiving facility.

Assessment of the excavated material shall be carried out with regard to the following guidance and legislation:

- 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);
- Regulation (EC) No. 1272/2008: the classification, labelling and packaging of substances and mixtures (CLP);
- Environmental Protection Agency document entitled Waste Classification; List of waste and determining if waste is Hazardous or Non-Hazardous; and
- UK Environment Agency Technical Guidance WM3: Waste Classification - Guidance on the classification and assessment of waste.

Waste soil and material intended for off-site disposal, recycling or recovery shall not be removed from site prior to appropriate waste classification and receiving written confirmation of acceptance from the selected waste receiving facility.

While waste classification and acceptance at a waste facility is pending, excavated soil for disposal shall be stockpiled in an appropriate manner, as follows:

- A suitable temporary storage area shall be identified and designated;
- All stockpiles shall be assigned a stockpile number;
- Non-hazardous and hazardous soil shall be stockpiled only on hard-standing or high-grade polythene sheeting to prevent cross-contamination of the soil below;
- Soil stockpiles shall be covered with high-grade polythene sheeting to prevent run-off of rainwater and leaching of potential contaminants from the stockpiled material generation and/or the generation of dust; and
- When a stockpile has been sampled for classification purposes, it shall be considered to be complete and no more soil shall be added to that stockpile prior to disposal.

An excavation/stockpile register shall be maintained on site showing at least the following information:

- Stockpile number;
- Origin (i.e. location and depth of excavation);
- Approximate volume of stockpile;
- Date of creation;
- Description and Classification of material;
- Date sampled;
- Date removed from site;
- Disposal/recovery destination; and
- Photograph.

10. Hazardous Materials Waste Management

A minor volume of hazardous waste may be generated during the course of the construction stage, see Table 4 in Section 8 for anticipated material types.

Where hazardous waste is generated, the Principal Contractor will undertake the following:

- Immediate notification of the nature of the hazardous waste to the design team in writing.
- Submission of a revised SWMP detailing the nature and management of the hazardous waste prior to off-site waste disposal.
- Asbestos containing materials have been identified in buildings scheduled for demolition, see Table 3 Section 8. The Principal Contractor shall establish a specific procedure for the management of asbestos wastes that may arise during demolition works. The management of such wastes shall be co-ordinated with the client and design team in accordance with the Safety and Health Plan for the overall works, in order to ensure that personnel within the construction site and the local residents are protected against exposure to asbestos. Prior to commencement of any asbestos removal works, the Principal Contractor shall identify a suitable Waste Collection Contractor with a Waste Collection Permit for the transfer of asbestos wastes from the site.
- Although not considered likely on the basis of site investigation results, should asbestos-containing materials be encountered in fill and soil during excavation works, the Principal Contractor shall establish a specific procedure for the management of asbestos wastes that may arise during excavation works. The management of such wastes shall be co-ordinated with the client and design team in accordance with the Safety and Health Plan for the overall works, in order to ensure that personnel within the construction site and the local residents are protected against exposure to asbestos. Prior to commencement of any asbestos removal works, the Principal Contractor shall identify a suitable Waste Collection Contractor with a Waste Collection Permit for the transfer of asbestos wastes from the site.

11. Waste Management Documentation

A Waste Documentation System will be prepared by the Principal Contractor and included in their SWMP.

The Principal Contractor will be responsible for implementation and auditing the Waste Documentation System on a regular basis.

The documentation to be maintained, as a minimum, shall be the following:

- The names of the agent(s) and transporter(s) of the wastes;
- The name(s) of the person(s) responsible for the ultimate recycling, recovery or disposal of the wastes;
- The ultimate destination(s) of the wastes;
- Written confirmation of the acceptance and recovery, recycling or disposal of any waste consignments;
- The tonnages and LoW code for all waste materials;
- Details of any rejected waste consignments;
- Waste Transfer Forms (WTF) for hazardous wastes transferred from site and associated appendices;

- Completed Transfrontier Shipment Forms (TFS) for hazardous wastes transferred abroad
- Written documentation of waste classifications, including any related analyses; and
- Certificates of Recycling, Recovery, Re-Use or Disposal for all wastes transferred from the site.

All waste records will be maintained for at least a period of 3 years and must be subject to verification and validation.

All waste documentation will be maintained by the Principal Contractor in a safe place, preferably on site, during the project implementation phase. Electronic records will be placed on a secure server that is backed up regularly.

Allowance of time and resources will be made to collate outstanding waste records once the project implementation phase has been completed.

12. Financial Issues of Waste

An outline of the costs issues associated with different aspects of waste management is provided below.

The total cost of implementation of the CDWMP will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

Reuse/ Recovery

By reusing materials on site, there will be a reduction in the transport and disposal costs associated with the requirement for a waste contractor to take the material away to landfill. Clean and inert soils, gravel, stones etc. which cannot be reused on site may be classified as a by-product (under Article 27 of the 2011 Waste Directive Regulations), used as capping material for landfill sites, or for the reinstatement of quarries etc. subject to approvals by EPA. This material is often taken free of charge for such purposes, or when used as capping in landfills will not attract the landfill tax levy, thereby reducing final waste disposal costs.

Recycling

Salvageable metals will earn a rebate which can be offset against the cost of collection and transportation of the skips. Clean, uncontaminated cardboard and certain hard plastics can be recycled. Waste contractors will charge considerably less to take segregated wastes such as recyclable waste from a site than mixed waste. Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes, such as timber from a site than mixed waste.

Disposal

Landfill charges are currently at approximately €160/tonne (includes a €75 per tonne landfill levy introduced under the Waste Management (Landfill Levy) (Amendment) Regulations 2012) for non-hazardous waste and €25/tonne for inert waste.

In addition to disposal costs, waste contractors will also charge a collection fee for skips. Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc. is also used as fill/capping material wherever possible.

13. Waste Audits

Details of the inputs of materials to the project site and the outputs of wastage arising from the Project will be investigated and recorded in a Waste Audit undertaken by the Principal Contractor.

This audit will identify the amount, nature and composition of the waste generated on the site. The Waste Audit will examine the manner in which the waste is produced and will provide a commentary highlighting how management policies and practices may inherently contribute to the production of demolition waste.

The Principal Contractor will be responsible for undertaking regular waste auditing. The Design team may review the findings of the waste audits during the course of the construction stage.

14. Waste Management Plan Awareness & Training

Copies of the CDWMP and the Principal Contractor's Site Waste Management Plan will be made available to all personnel on site.

All site personnel and sub-contractors will be instructed about the objectives of these plans and informed of the responsibilities which fall upon them as a consequence of its provisions. Where source segregation and selective material reuse techniques apply, each member of staff will be given instructions on how to comply with the CDWMP.

Posters will be designed to reinforce the key messages within the CDWMP and will be displayed prominently for the benefit of site staff. Specialist training as may be required (e.g., asbestos containing materials handling) will be assessed or provided as required.

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