



BEST PRACTICE GUIDELINES FOR THE PREPARATION OF RESOURCE MANAGEMENT PLANS FOR CONSTRUCTION & DEMOLITION PROJECTS

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1 INTRODUCTION

Waste from Construction and Demolition (C&D) activity is the largest waste stream in the EU and represents one third of all waste produced within the EU. The quantity of C&D Waste managed nationally has shown an increasing trend in the period 2012 to 2018, with 6.2 million tonnes of C&D Waste managed in 2018. The current growth trend is expected to continue over the medium to long term in line with planned delivery of housing and infrastructure projects described in Project Ireland 2040.

The proper management of C&D waste and resources can have significant benefits in terms of sustainability and quality of life and increase demand of C&D recycled materials.

These guidelines supersede the '*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Waste Projects*' which were published by the Government in July 2006. The replacement guidelines reflect current waste legislation and policy including '*A Waste Action Plan for a Circular Economy Ireland's National Waste Policy 2020-2025*' published in September 2020. Since the publication of the 2006 guidelines, waste management legislation and policy have evolved towards prioritising waste prevention and life-cycle thinking as follows:

- An increased emphasis on waste prevention, in line with the waste hierarchy (**Figure 1-1**), through established principles such as designing out waste and the use of green procurement. Options to prevent waste are typically greater during the early stages of a project through design, planning and procurement and the guidelines for these phases highlight the primacy of prevention.
- The guidelines have also been prepared to promote more circular design and construction principles in line with the EU Circular Economy Action Plan under the EU Green Deal.¹ The circular economy model tries to avoid using unnecessary resources in the first place and keep resources 'in flow' by means of effective and smart reuse and recycling strategies reducing the use of virgin materials.

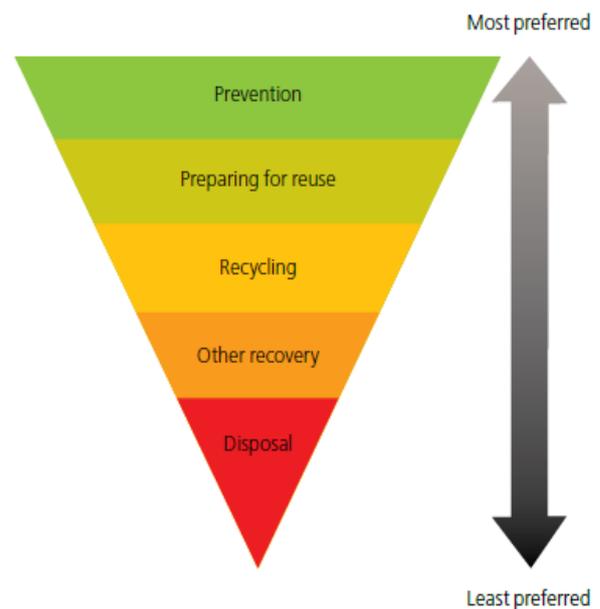


Figure 1-1: Waste Hierarchy (source: EPA)

¹ Available at: https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf

The purpose of these guidelines is to provide a practical and informed mechanism to document the prevention and management of C&D wastes and resources from design to construction or demolition of a project. They provide clients, developers, designers, practitioners, contractors, sub-contractors and competent authorities with a common approach to preparing and determining Resource and Waste Management Plans (RWMP) for the construction and demolition sector in Ireland.

The guidelines address the best practice approach for the following phases of a project:

- Prior to Construction - including the stages of design, planning and procurement in advance of works on site (**Section 4** – in the 2006 guidelines this was referred to as an outline or preliminary plan); and
- During Construction – relating to the effective management of resources and wastes during construction or demolition operations (**Section 5** – in the 2006 guidelines this was referred to as the detailed plan).

2 POLICY AND LEGISLATION

2.1 Legislative Regime

The EU Waste Framework Directive (Directive 2008/98/EC) set the basic concepts and definitions related to waste management, such as definitions of waste, recycling and recovery. It also included definitions for when waste ceases to be waste and becomes a secondary raw material (end-of-waste criteria) and how to distinguish between waste and by-product. The Directive, enacted in Ireland under the Waste Directive Regulations 2011 (S.I. No. 126 of 2011), requires Member States to undertake the following:

- Apply the waste hierarchy in waste management legislation and policy;
- Take measures, as appropriate, to promote the reuse of products and preparing-for-reuse activities, notably by encouraging the establishment and support of reuse and repair networks, the use of economic instruments, procurement criteria, quantitative objectives or other measures;
- Establish waste management plans;
- Promote the high-quality recycling of waste materials as part of the overall aim to make the EU a 'recycling society'; and
- Ensure that the preparation for reuse, recycling and other material recovery of non-hazardous construction and demolition waste (excluding naturally occurring material defined in List of Waste category 17 05 04) is a minimum of 70% by weight by 2020. The Directive specifies that this target should be achieved by preparing for reuse, recycling and other material recovery, including backfilling operations using waste to substitute other material.

The revised EU legislative framework on waste (Directive (EU) 2018/851) entered into force in July 2018 and sets clear targets for reduction of waste and establishes an ambitious and credible long-term path for waste management and recycling. This Directive has been transposed into Irish legislation through the European Union (Waste Directive) Regulations 2020 (S.I. No. 323 of 2020).

The 2018 Directive states that by the 31st December 2024, the Commission shall consider the setting of preparing for re-use and recycling targets for C&D Waste and its material-specific fractions. In this regard, the 2011 target is subject to change throughout the lifetime of these guidelines and practitioners and regulators should consult the relevant legislative portals for changes to obligations and/or targets.

In Ireland the primary waste legislation is the Waste Management Act 1996, as amended, and Article 32 of the Act places a general obligation on the holder of waste to comply with legislation and ensure all wastes are managed within the requirements of the Act. In short, the obligation to manage waste legally lies with the holder of waste which means the waste producer or the person who is in possession of the waste. At a construction site, the mandatory obligation to appropriately manage waste generated at a construction site lies with the Client and the Contractor.

Under Section 3(1) of the Act the requirements do not apply to the following materials and hence are not considered 'waste':

- *Land (in-situ) including unexcavated contaminated soil and buildings permanently connected with land – relates to land and buildings prior to any construction or demolition where material remains untouched. Once it has been excavated or otherwise removed, the material may enter into the control regime set down by the Waste Management Acts.*
- *Uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated.*

In addition, there are two important provisions within the European Union (Waste Directive) Regulations 2011-2020 that are of relevance to the construction sector and the prevention of waste and these allow for the reclassification of resources out of the waste regime as follows:

- Article 27 allows for the notification of a material as a by-product rather than a waste where certain criteria can be demonstrated by the economic operator (i.e. further use is certain, no need for further processing, produced as part of a process and further use is lawful).

- Article 28 sets out the grounds by which a material, which is recovered or recycled from waste, can be deemed to be no longer a waste and complies with a set of end-of-waste criteria (substance/object to be used for specific purposes, a market or demand exists, fulfils technical requirements and no overall adverse impact to human health or the environment).

These instruments are well established and further details are provided in **Appendix E**.

2.2 Waste Policy

Since the publication of the 2006 guidelines, waste policy in Europe has shifted from the established linear economic model to a circular economic model (**Figure 2-1**). Circular economy-inspired interventions focus not only on increasing recycling quantitatively but also on:

- Reducing the use of virgin resources;
- Keeping materials in the economy as long as possible;
- Maintaining their intrinsic value/quality as high as possible; and
- Reducing hazardous substances in products and waste.

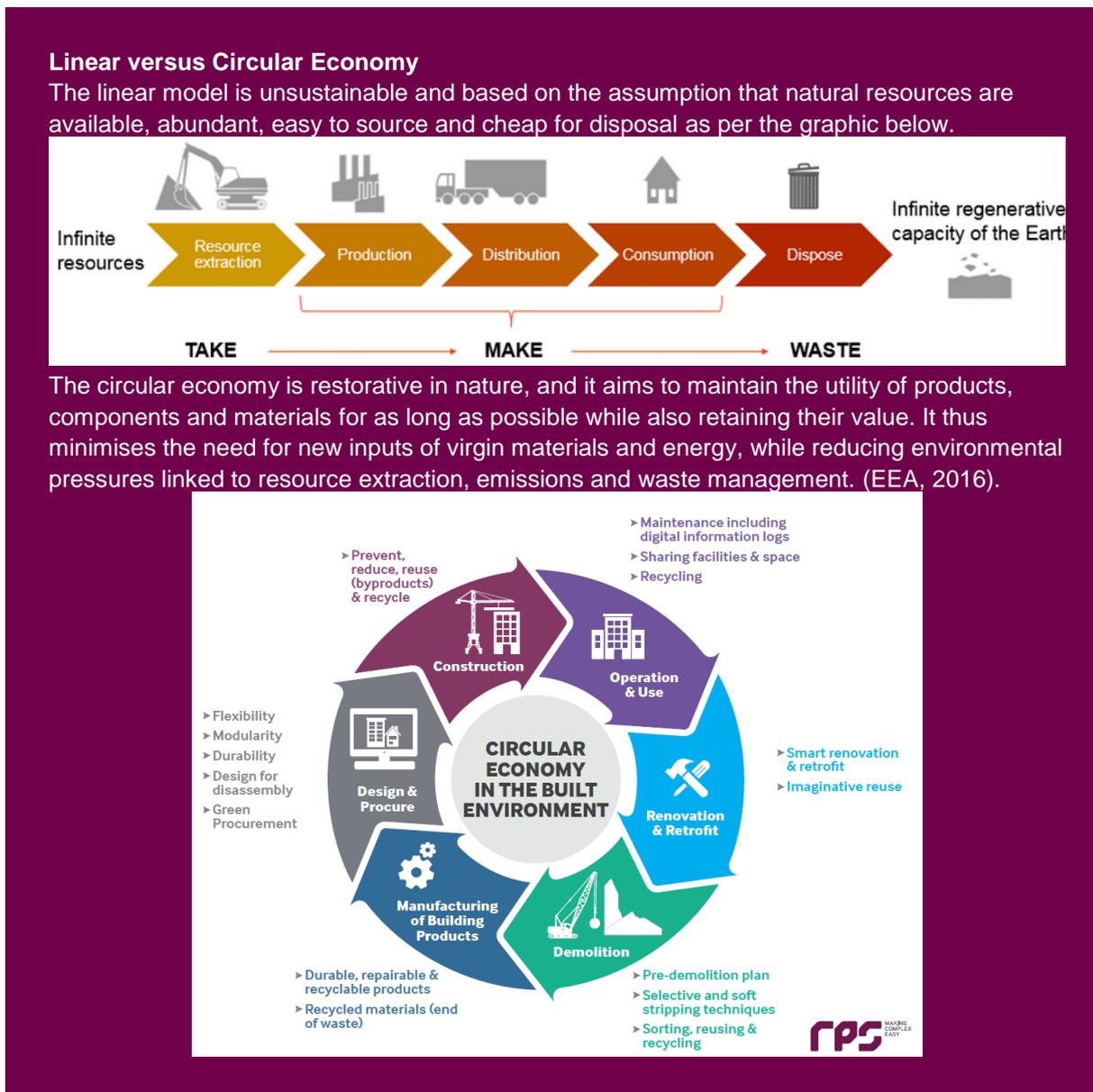


Figure 2-1: Linear Versus Circular Economy

In December 2015, the Commission adopted a Circular Economy Action Plan (COM (2015) 614) which has been updated in March 2020 (COM (2020) 98) as part of the European Green Deal. In terms of the construction sector the plan identifies the existing footprint of the sector within the EU as follows:

- The sector requires vast amounts of resources and accounts for about 50% of all extracted material;
- The sector is responsible for over 35% of the EU's total waste generation; and
- Greenhouse gas emissions from material extraction, manufacturing of construction products, construction and renovation of buildings are estimated at 5-12% of total national GHG emissions.

In response the Commission is proposing a new comprehensive '*Strategy for a Sustainable Built Environment*' to be published in 2021. This Strategy will ensure coherence across the relevant policy areas such as climate, energy and waste and will promote circularity principles throughout the lifecycle of buildings through:

- Revision of the Construction Product Regulation (CPR) including the possible introduction of recycled content requirements for certain construction products;
- Promoting measures to improve the durability and adaptability of built assets in line with the circular economy principles for buildings design and developing digital logbooks for buildings;
- A revision of the public procurement rules, in order to include requirements to use a green public procurement tools and life-cycle costing/assessment;
- A revision of material recovery targets set in EU legislation (i.e. the Waste Framework Directive 2008/98/EC) for construction and demolition waste and its material-specific fractions; and
- Promoting initiatives to reduce soil sealing, rehabilitate abandoned or contaminated brownfields and increase the safe, sustainable and circular use of excavated soils.

Furthermore, the '*Renovation Wave*' initiative announced in the European Green Deal will lead to significant improvements in energy efficiency in delivering energy efficiency improvements in public and private buildings in the EU. This initiative will be implemented in line with circular economy principles, including optimised lifecycle performance and longer life expectancy of build assets. As part of the revision of the recovery targets for construction and demolition waste, the Commission will pay special attention to insulation materials, which generate a growing waste stream.

Future EU policy of C&D wastes and resources will be fully integrated with other sectoral issues such as climate and energy and will drive future decision making on projects through the full life cycle.

Ireland's national waste policy is '*A Waste Action Plan for A Circular Economy – Ireland's National Waste Policy 2020 – 2025*²'. The policy, published September 2020, is intended to move Ireland toward a circular economy in which focus is shifted away from waste disposal, favouring circularity and sustainability by identifying and maximising the value of material through improved design, durability, repair and recycling. By extending the time resources are kept within the local economy, both environmental and economic benefits are foreseen. This waste policy action plan will be supported by an '*All of Government Circular Economy Strategy*' to be published in 2021. The key elements for C&D Waste in the Waste Action Plan are listed in the text box below.

² Available at: <https://www.gov.ie/en/publication/4221c-waste-action-plan-for-a-circular-economy/>

Waste Action Plan 2020 - Measures Targeting Construction & Demolition Waste

The headline points on C&D Waste in the Waste Action Plan 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.
- 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 for construction and demolition waste will be revised to improve the Preparation of Waste Management Plans for Construction and Demolition Waste Projects.
- Utilisation of Green Public Procurement thresholds to encourage the use of recycled materials in construction projects.

3 PREPARING A RESOURCE & WASTE MANAGEMENT PLAN

This section describes good practice approaches to prevent waste, reuse materials, reduce waste and better manage C & D wastes that cannot be prevented on development projects. Project developers are to implement these practices and document these activities into a project RWMP which will develop as the development progress from design through to construction. The structure of the plan is flexible and proportionate so it can be applied to projects of different scales. The approaches presented are based on international principles of optimising resources and reducing waste on construction projects through:

- Prevention;
- Reuse
- Recycling;
- Green Procurement principles;
- Off-Site Construction;
- Materials Optimisation;
- Flexibility and Deconstruction;

These principles are applied to the RWMP through both the pre-construction phase (**Section 4**) and the construction phase (**Section 5**). The evolution of a single plan through a project lifecycle is recommended to ensure preventative and resource efficiency initiatives, measures and targets are captured and measured throughout the project. The evolution of the plan through the project from initial pre-construction phase (in green) followed by implementation at construction phase (in orange), is shown in **Figure 3-1**.

3.1 Thresholds

It is recommended that planning authorities stipulate that a RWMP is mandatory for all construction and demolition projects as best practice to inform the planning consent process. The level of detail presented in the RWMP should be reflective of the scale and complexity of the project and the following tiers are recommended:

- **Tier 1:** Smaller scale projects, below the thresholds presented in **Text Box 1**. For such developments the requirements are for a simplified RWMP. The template structure and contents for such plans is provided in **Appendix B**.
- **Tier 2:** Larger scale projects, above the thresholds presented in **Text Box 1**, require a bespoke RWMP which follows the requirements set out in **Sections 4 and 5** of these guidelines and meet the minimum content requirements set out in **Appendix C**.

These thresholds are based on the principle of proportionality to ensure larger projects with larger potential resource footprints are required to more actively manage resources relative to smaller scale projects.

Text Box 1: RWMP Thresholds

Developments below the following thresholds may be classed as Tier 1 development:

- New residential development of less than 10 dwellings;
- Retrofit of 20 dwellings or less;
- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m²;
- Retrofit of commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 2,000m²; and
- Demolition projects generating less than 100m³ in volume of C&D waste.

Developments above these thresholds are classed as Tier-2 projects.

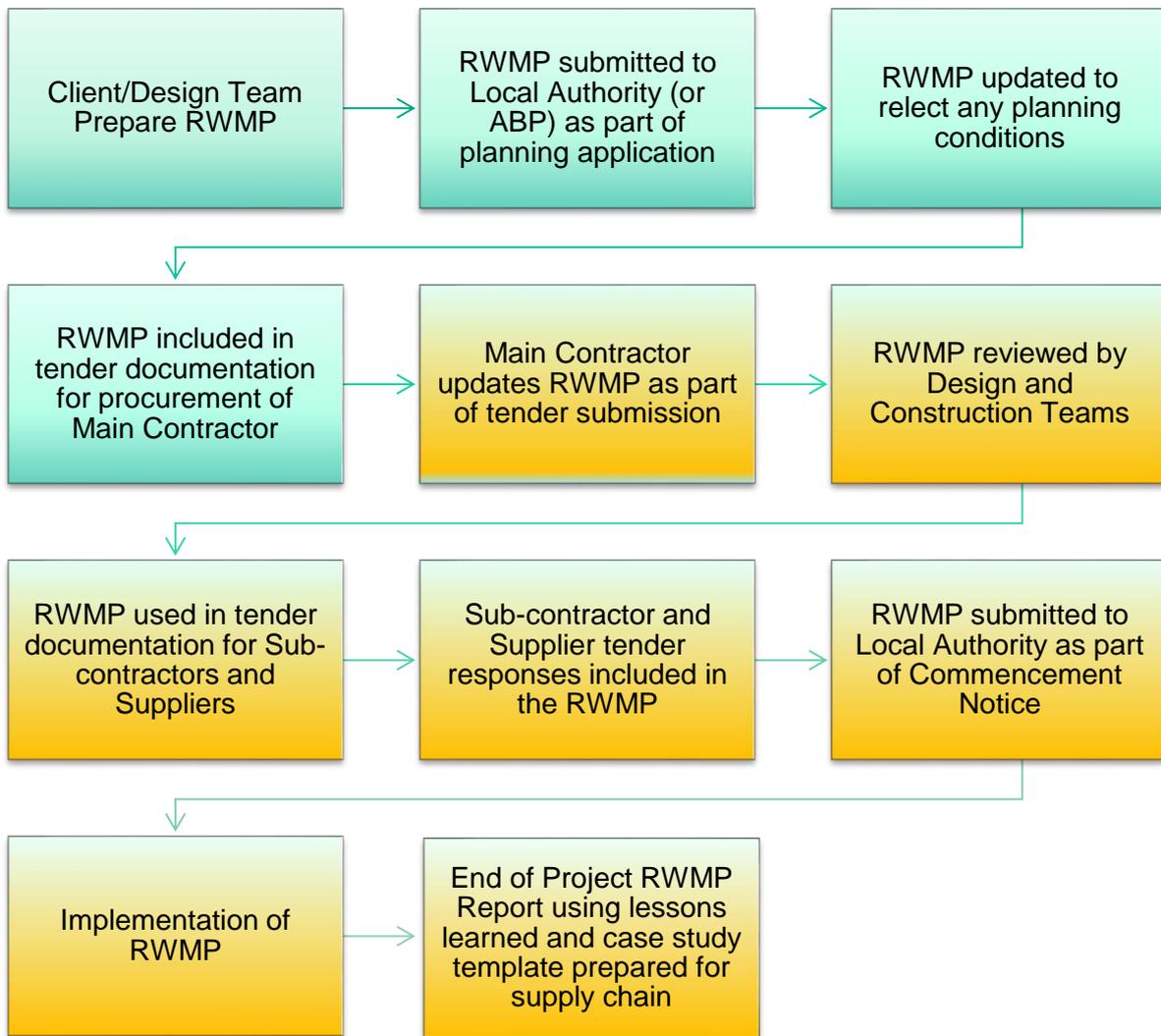


Figure 3-1: Project Life Cycle of the RWMP

3.2 Roles and Responsibilities

There are many stakeholders with responsibility for the development of an effective RWMP through the project life cycle as outlined in **Figure 3-1**. The key stakeholders and their relevant responsibilities are presented in the following sections.

3.2.1 Client

The **Client** is typically the party that finances the project and is responsible for the following:

- Establishing the ambition and the performance targets for the project – refer **Section 3.3**;
- Set out these commitments and targets in relation to prevention and minimisation in the project brief, tendering documentation including pre-qualification requirements, invitation to tender, etc.;
- Require the preparation and submission of an RWMP as part of the design and planning submission, even if not requested by the planning authority for planning;

- Require the preparation and submission of an updated RWMP as part of the construction tendering process;
- Ensure that the RWMP is agreed and submitted to the Local Authority prior to commencement of works on site; and
- Request the end-of-project RWMP from the Contractor.

3.2.2 Client Advisory Team (Design Team)

The **Client Advisory Team** (engineers, architects, consultants, etc.) is procured by the Client and is responsible for the following:

- Drafting and maintaining the RWMP through the design, planning and procurement phases of the project;
- Appointing a Resource Manager (RM) to track the design process, inform the Design Team and prepare the RWMP;
- Include details and estimated quantities of all projected waste streams. This should also include data on prevention mechanisms (such as by-products) to illustrate the positive circular economy principles applied by the Design Team;
- Incorporate relevant conditions imposed in the planning permission into the RWMP;
- Handover of the RWMP to the Contractor at commencement of construction for the development of the RWMP in a similar fashion to how the safety file is handed over to the Contractor; and
- Work with the Contractor as required to meet the performance targets for the project.

3.2.3 Local Authority

The **Local Authority** (or An Bord Pleanála) as the planning regulator is responsible for the following tasks:

- Ensure that the requirement for an RWMP for C&D Projects (as specified in these guidelines) is required for all planning applications (through setting this requirement as an objective of the County Development Plan or local planning policy) for development where construction or demolition is proposed;
- Ensuring that any RWMP submitted with planning compiles with the requirements of these guidelines;
- Setting appropriate planning conditions as required in line with the requirements of Section 34(4)(l) of the Planning and Development Acts, as amended. A sample wording of a condition is included in **Text Box 2**; and
- Ongoing enforcement of these conditions through the construction phase.

Text Box 2: Sample Planning Condition

Condition: Prior to the commencement of development, the developer or any agent acting on its behalf shall prepare a Construction and Demolition Resource Waste Management Plan (RWMP) as set out in the Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for C&D Projects (2021) including demonstration of proposals to adhere to best practice and protocols. The RWMP shall include specific proposals as to how the RWMP will be measured and monitored for effectiveness, these details shall be placed on the file and retained as part of the public record. The RWMP must be submitted to the planning authority for written agreement prior to the commencement of development.

Reason: In the interest of proper planning and sustainable development.

3.2.4 Contractor

The **Contractor** procured by the Client to undertake the construction operations is responsible for the following:

- Preparing, implementing and reviewing the RWMP through construction (including the management of all suppliers and sub-contractors) as per the requirements of these guidelines;
- Identifying a designated and suitably qualified Resource Manager (RM) who will be responsible for implementing the RWMP;
- Identifying all hauliers to be engaged to transport each of the resources / wastes off-site. Note that any resource that is legally a 'waste' must only be transported by a haulier with a valid Waste Collection Permit (refer to **Appendix F** for a resource to find a suitably permitted local haulier);
- Identifying all destinations for resources taken off site. As above, any resource that is legally a 'waste' must only be transported to a facility a valid Cert of Registration, Waste Permit or Waste/Industrial Licence (refer to **Appendix F** for a resource to find a suitably authorised facility);
- Maintaining full records of all resources (both wastes and other resources) should be maintained for the duration of the project; and
- Preparing a RWMP Implementation Review Report at project handover.

3.3 Targets

The EU Waste Framework Directive C&D recovery target is designed for national statistics and is not an appropriate target for individual projects. Setting a project specific target will however establish the overarching resource management objectives for a project. In addition, target setting will inform the setting of project specific individual benchmarks to track target progress. Typical Key Performance Indicators (KPI) that may be used to set targets may include:

- Weight (tonnes) or Volume (m³) of waste generated per construction value;
- Weight (tonnes) or Volume (m³) of waste generated per construction floor area (m²);
- Fraction of resource reused on site;
- Fraction of resource used which was recycled material;
- Fraction of waste segregated at source before being sent off site for recycling/recovery; and
- Fraction of waste recovered; fraction of waste recycled of fraction of waste disposed.

The responsibility for setting any project target lies with the Client who may dictate the appropriate performance specification for the project through imposing mandatory contractual obligations on the Contractor. This is a critical step in developing a RWMP as such an approach obliges the Contractor to achieve the Client's project ambition and manage all resources and wastes in line with the Client imposed target.

A number of building design certification schemes identify general and sector specific targets for waste management that may be employed in the design of a project to gain building certification credits. A series of examples are described in **Text Box 3**.

Clients and Design Teams are recommended to reference the relevant industry practice, design standards and certification schemes in setting any project specific target for the Contractor.

Text Box 3: Resource Management and Building Design Certification

Building certification systems such as LEED (US) and BREEAM (UK) offer incentives to designers to design out waste through a broader incentive to achieve a certain level of environmentally-conscious design. Both systems offer credits to the design team to prevent waste or to achieve certain benchmarks for resource managements on projects.

Within LEED the requirement is to develop and implement a construction and demolition waste management plan:

- Establish waste diversion (from landfill) goals for the project by identifying at least five materials (both structural and non-structural) targeted for diversion. Approximate a percentage of the overall project waste that these materials represent.
- Specify whether materials will be separated or co-mingled and describe the diversion strategies planned for the project. Describe where the material will be taken and how the recycling facility will process the material.

The design team is required to provide a final report detailing all major waste streams generated, including disposal and diversion rates. In addition to the pre-requisites, LEED offers up additional credits for Building Product Disclosure and Optimization such as environmental product declarations (EPD), sourcing of raw materials, material ingredients and waste management (specifically a diversion of 75% of wastes).

Within BREEAM, credits are offered for a series of resource efficiency benchmarks for generation of non-hazardous construction waste (excluding demolition and excavation waste) generated by the building's design per internal floor area as follows:

BREEAM credits	Amount of waste generated per 100m ² (gross internal floor area)	
	m ³	tonnes
1	≤ 13.3	≤ 11.1
2	≤ 7.5	≤ 6.5
3	≤ 3.4	≤ 3.2
Exemplary Level	≤ 1.6	≤ 1.9

Note - Volume (m³) is actual volume of waste (not bulk volume)

4 DEVELOPING THE RWMP PRIOR TO CONSTRUCTION

4.1 Overview

This section sets out the minimum content requirements for developing a Tier 2 RWMP at project level in advance of construction covering the following phases:

- Design phase including the project conception, preliminary, outline and detailed design phases, as applicable;
- The statutory planning phase under the Planning and Development Act 2000 (as amended); and
- Procurement of contractor services and materials.

The information is presented as a series of recommendations for application through the design, planning and procurement stages. The guidance is accompanied by a series of prompts and case studies to illustrate the values for selected options. At this stage the purpose of the RWMP is to document the measures implemented at feasibility/preliminary design stage and set out the RWMP plan for the construction stage. Early consideration of resources and documenting related design decisions will help to realise better approaches and outcomes as the project progresses.

4.2 Contents of the RWMP

The recommended structure and content of the Tier 2 RWMP is listed below and set out in detail in Appendix C with content areas cross-referenced to specific sections of these guidelines. The plan is set out across seven sections to document project targets and commitments, design decisions made to manage resources and the framework for resource and waste planning in advance of construction.

- 1 Introduction
- 2 Project Description
- 3 Roles and Responsibilities
- 4 Design Approach
- 5 Key Materials, Quantities and Costs
- 6 Site Management
- 7 Site Infrastructure

It is anticipated that some sections will be largely completed during the design phase as the information required will be readily available at that point (e.g. commitments, target setting, project description, design approach and designing out waste strategies).

Other sections will be presented as a framework for the Contractor at construction phase (**Section 4**) whereby the commitment to responsibilities, auditing, training, reporting, tracking, supply chain, etc., will be set up and these sections will be further refined at construction phase. These sections are included in the design phase for full transparency and commitment through the planning and procurement phases.

The key element for consideration at this phase is the identification of opportunities to design out and prevent waste and document same in the plan. In this regard, Section 4 of the plan is to include the design decisions made to manage resources and a series of measures for consideration to support this task are included in **Section 3.3** of these guidelines. Design Teams are directed to consider these in collaboration with the client at design workshops to ensure consideration of best practice design principles.

It is imperative at the design phase is to appoint a Resource Manager (RM) or appropriate responsibilities in the Design Team who is tasked with tracking the design process, identifying waste avoidance solutions and developing the RWMP through the phase.

4.3 Guide to Designing Out Waste

These guidelines have set out a design process that is in line with the international best practice principles to firstly prevent wastes, reuse where possibly and thereafter sustainably reduce and recover materials. These principles can be integrated into the design workshops and review processes to identify and evaluate resource reduction measures and their impact on cost, time, quality, buildability, second life and management post demolition.

4.3.1 Design for Reuse and Recycling

At the outset and during project feasibility and evaluation the Client and Design Team are to consider:

1. Establishing the potential for any re-usable site assets (buildings, structures, equipment, materials, etc.).
2. The potential for refurbishment and refit of existing structures or buildings rather than demolition and new build.
3. Assessing any existing buildings on the site that can be refurbished either in part or wholly to meet the Client requirements.
4. Enabling the optimum recovery of assets on site.

Any decision making and/or consensus between the Client and the Design Team on the above measures are to be recorded in the RWMP by the RM. Any decisions on the design regarding the materials to be used in the build which have the potential to prevent waste and/or use less hazardous materials should also be documented.

4.3.1.1 Reuse the Site

The initial determination of the extent of ground contamination, if any, of a development site needs to be fully established to inform the RWMP. For brownfield sites or sites where the site history is unknown, activities to undertake include:

1. Implementing appropriate site investigations to determine site conditions and identify any potential contamination and related issues.
2. Establishing the possibility for reuse of the existing brownfield site in its current form.
3. Adapting the brownfield site for reuse, i.e. use the existing topography where possible to minimise the need for excavation or review the site layout and levels to minimise excavations and the need for the import or export of materials.
4. Evaluating potential remediation strategies and ground improvement techniques (of contaminated sites) to assess site reuse options, e.g. stabilisation, hydraulically bound materials (HBM), geosystems, etc., and agree remediation plans with the relevant regulatory bodies.

The EPA has published '*Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites*'³. This can be applied to sites to assess the risk of ground contamination and advise on suitable corrective actions. Other international guidance may also be referenced, and the following standard methods can be applied to work undertaken:

- *BS 10175: Investigation of potentially contaminated sites – code of practice;*
- *BS 5930: Code of practice for ground investigations; and*
- *BS EN ISO 16133: Soil quality - guidance on the establishment and maintenance of monitoring programmes.*

The output of this exercise should include a report presenting the information collected and a conceptual model of the site along with a risk assessment and potential options for reuse and remediation strategies.

³ Available at: <https://www.epa.ie/pubs/advice/waste/contaminatedland/contaminatedland/>

4.3.1.2 Excavation Works

One of the main types of C&D wastes (and waste costs) generated from construction sites is soil and stone removed from site excavations. It is imperative that the Design Team considers this element at the outset with a view to preventing generation of this stream in so far as possible. The following should be considered as part of this process:

1. Balance cut and fill on site to minimise the import and export of materials (topsoil) for site works and facilitate the use of excavated materials on site.
2. Revise site layout and levels to minimise excavation work, i.e. use the existing topography where possible to minimise the need for excavation.
3. Utilise split level design on sloping sites.
4. Reuse excavated materials on site where possible, e.g. reuse excavated rock for drainage layers, landscape fill, planting features or reuse excavation materials directly as spoil to level the site.
5. Set aside good quality and high value materials from existing hard and soft landscaping for reuse on site, e.g. use of concrete paving, flagstones for new landscape areas, reuse tarmac and asphalt for landscape fill, produce compost from soft vegetation.
6. Use excavated materials off-site, i.e. on other projects but only if this complies with the relevant legislation.
7. Recycling excavated materials off-site for use, i.e. as aggregate or manufactured topsoil but, as above, only if this complies with the relevant legislation.

As noted, any proposal to recover excavated material at off-site locations are subject to regulatory constraints. Legally this material is a 'waste' and needs to be managed under the requirements of the waste legislation (i.e. taken off site by a haulier with a waste collection permit to a suitably registered, permitted or licensed facility).

There are two mechanisms within the European Union (Waste Directive) Regulations 2011-2020 that allow for the reclassification of these resources out of the waste regime that are relevant to planned excavation as follows:

- Article 27 allows for the notification of a material as a by-product rather than a waste where certain criteria can be demonstrated by the economic operator (i.e. further use is certain, no need for further processing, produced as part of a process and further use is lawful). This instrument is well established for soil and stone but is also open to other materials. The benefit of classifying a material as a by-product and not as a 'waste' negates the handling requirements of waste legislation while also providing significant economic and environmental benefits in line with circular economy principles.
- Article 28 sets out the grounds by which a material, which is recovered or recycled from waste, can be deemed to be no longer a waste and complies with a set of end-of-waste criteria (substance/object to be used for specific purposes, a market or demand exists, fulfils technical requirements and no overall adverse impact to human health or the environment).

These mechanisms are described in greater detail in **Appendix E**. For both mechanisms the government policy document '*A Waste Action Plan for A Circular Economy – Ireland's National Waste Policy 2020 – 2025*', published in September 2020, commits to streamlining the process and the introduction of an appropriate fee to fund the EPA function. In addition, there is a commitment to establishing a working group to develop national end-of-waste applications for identified priority waste streams to supplement the existing approach of individual operator applications.

By-product Case Study

As part of a significant extension to manufacturing capacity on a greenfield section of a multinational's Irish base, ground excavations were estimated to produce circa 500,000 m³ of bedrock and subsoils. Early in the process, the design team provided a series of by-product notifications to the EPA to allow for this material to be used as infill for the restoration of a nearby quarry which held planning permission for restoration of this quarry with clean soil and stone. This process allowed both parties to legally fulfil their planning and construction requirements outside of the waste management legislation and at a significantly reduced cost and enabling restoration of the quarry.

4.3.1.3 Demolition Works

Traditionally demolition works generate high volumes of wastes that require significant resources to manage, at substantial cost. Demolition materials may range from whole assemblies (i.e. structural steel frames or steel portal frames), to elements (i.e. columns, beams, portal frames, curtain walling, etc.) to materials (i.e. floor finishes, doors, bricks, slate, roofing tiles, concrete blocks, etc.). Careful consideration of any planned demolition works can significantly reduce the volume of residual material to be managed. Steps to follow are:

1. Prepare a pre-demolition audit detailing resource recovery best practice, i.e. deconstruction and disassembly where feasible and practicable.
2. Reuse and recycle deconstructed components, elements and materials within the new build if in compliance with functionality, regulatory and performance requirements.
3. Reuse and recycle deconstructed components, elements and materials from other projects off-site if in compliance with functionality, regulatory and performance requirements.

It is recommended that demolition is informed by the EU '*Guidelines for the waste audits before demolition and renovation works of buildings*'⁴ (May 2018). This document provides best practice guidelines for the assessment of waste streams prior to demolition or renovation through pre demolition audits. The aim of the guidance is to facilitate and maximise recovery of resources from demolition for beneficial reuse and recycling.

4.3.1.4 Site Preparation

In designing the site layouts for future enabling and main works, the design should have due consideration for the following:

1. Avoid designing for excessive temporary works, e.g. site roads, site offices/foundations.
2. Reuse existing buildings for site accommodation, welfare facilities and materials storage.

4.3.1.5 Reuse Existing Assets: Buildings, Elements and Materials

Frequently, existing assets and resources at a site have an inherent value and good practice is to carry out an assessment of the inventory of existing assets to assess the potential for reuse on site as follows:

1. Assess if there are any existing buildings on the site that can be directly reused and/or refurbished either in part or wholly to meet the Client requirements.

⁴ Available at: <https://ec.europa.eu/docsroom/documents/31521>

2. Adapt and reuse existing buildings where feasible, considering the existing building(s) in terms of structure, services, equipment, external facade, durability, performance, quality and regulations.
3. Consider potential to reuse materials and/or components on other projects, i.e. steel portal frames used for warehousing and distribution centres with short lifespans (<20 years or less) to be reused for other building designs.
4. Consider potential to reuse materials and/or components from other projects and this especially applies to heritage and refurbishment works.
5. Identify materials that can be directly reused on site, considering functional, regulatory and performance requirements, e.g. existing foundations, floor slabs, floor finishes, doors, windows, bricks, stonework, roofing tiles and slates, etc.
6. Identify materials that can be directly reused off site at their highest utility, considering functional, regulatory and performance requirements, e.g. floor finishes, doors, windows, bricks, stonework, roofing tiles and slates, etc.

Reuse Case Study

For the multi-million euro retrofit of a major existing commercial development, significant emphasis was placed on material sustainability and the reuse of existing materials. Material reuse was prioritised over purchasing new materials which helped to avoid producing unnecessary waste and saved in excess of €1 million for the project as a whole through the following:

1. 100% of existing ceiling tiles were re-used and set into a replacement ceiling grid;
2. 100% of the raised floor access was re-used; and
3. 100% of the carpet tiles were segregated onsite to be used by charities for re-use or recycling.

4.3.1.6 Recycling

Similar to reuse, the recycling of resources on site offers a reduction in off site management and associated cost reductions from transporting and processing these resources. There should also be consideration of the import and use of recycled materials or materials which contain a recycled content from other sites.

1. Avoid specifying primary material unnecessarily where an equivalent recycled material will serve the same purpose, e.g. use of recycled aggregates which have achieved end-of-waste status as a replacement for natural aggregates.
2. Assess existing materials that will be recycled for use on site and estimate quantities, e.g. the use of roof tile and/or brick offcuts as a crushed rock sub-base under driveways.
3. Review availability of recycled aggregates and other materials in the local area and decide on the most sustainable options, for example, the use of on-site crusher for recycling of residual concrete to generate aggregates for use on site (subject to the appropriate waste consent and once processing is industry standard practice).
4. Consider design approaches that will facilitate material reuse and recycling at the end of the buildings' life.
5. Specify 'new' materials, which contain a recommended percentage of recycled content if they meet the functional, performance and regulatory requirements and are available locally at a reasonable cost.
6. Specify materials with lower environmental impact, including reduced content of hazardous substances
7. Assess existing materials that will be recycled for use off site, tracking to their final end-use.

Recycling Case Study

The planned decommissioning of a large power station identified potential cost savings of **€250,000** from the recycling of demolition materials if used as recycled aggregates on site. In addition, materials recovered from the demolition works were estimated to have a market value of over **€450,000** (steel and non-ferrous materials).

4.3.2 Design for Green Procurement

Green procurement facilitates the ability to use specifications and the procurement process to prevent and reduce waste. Early engagement and collaboration with the relevant actors in the supply chain will help to realise significant opportunities and better resource management. For the public sector, procurement policies are set out in the government's green procurement policy as summarised in **Text Box 5**, but these principles can equally apply to the private sector.

When selecting suppliers, it is essential to assess the technical capabilities required for the products or services being procured. This is valuable from the buyer's point of view as suppliers that can clearly not meet the requirement will be eliminated. In addition, it is also useful for the suppliers to get a clear understanding of how serious the Client is about sustainability and what will be essential for any submission to be successful. Some further considerations for procurement are listed as follows:

1. State the Client corporate policy and targets in relation to waste prevention and reduction in all design-phase documentation and tender documentation (the importance of which are highlighted in **Section 3.3**).
2. Include resource prevention and reduction capability and competence questions in the contract pre-qualification questionnaires.
3. Secure contractual agreement to implement the initiatives outlined in the commitments, policies and any RWMP as part of the contract.
4. Include gateway reviews during the design process to monitor compliance with designing out waste principles.
5. Material specifications for the project need to be flexible enough to allow for the variations in reclaimed materials. Specifications should outline the essential performance properties required of a material but not over define the details.
6. Employ a waste specialist consultant/contractor with expert knowledge in waste prevention and minimisation.
7. Discuss methods of waste prevention and minimisation with potential contractors, subcontractors and suppliers at an early stage (pre-procurement). Discuss proposed design solutions, encourage innovation in tenders and incentivise competitions to recognise sustainable approaches.
8. Select procurement route that minimises unnecessary packaging. Discuss options for packaging reduction with subcontractors and suppliers using measures such as '*Just-in-Time*' delivery.
9. Use ordering procedures that avoid waste, i.e. no over-ordering, take-back schemes for both material surplus and offcuts.
10. Include within the tender documents, the requirement to sign off '*the waste per work package*', where waste must not exceed a contractually agreed limit.

Text Box 5 - Green Public Procurement (GPP)

Chapter 6 of '*The Green Tenders - An Action Plan on Green Public Procurement*', presents best practice guidance for green public procurement for the construction sector. In relation to the procurement of design teams and materials the plan states the following:

The procurement procedures for consultants, including architectural and engineering design services, should include both qualitative and quantitative assessment criteria and demonstration of consultants' environmental design experience and/or qualifications. The assessment criteria should be proportionate to the nature, size and complexity of the project. All buildings shall be designed and constructed to comply with all Parts of the Building Regulations.

All materials used in construction should be assessed for environmental impacts over the appropriate appraisal period for the project. Pending further research, including at EU level, and stakeholder engagement on methodologies for doing so, public procurers should consider the manufacture, construction, maintenance and disposal impacts of the most commonly used materials, but should be satisfied that appropriate methodologies are used. These include embodied energy (and associated CO₂ and other pollutants), resource use, responsible sourcing, construction wastage, durability, recyclability and disposal. Public procurers should ensure that the environmental advantages claimed by material suppliers can be verified.

'Green Procurement: Guidance for the Public Sector'⁵ sets out core GPP criteria focusing on demonstrating technical and professional capability including the following waste reduction initiatives:

1. The contractor should prepare an outline construction environmental plan, which will include a C&D waste management plan;
2. An environmental management training plan must be developed to cover waste minimisation, management and selective waste collection strategies; and
3. Secondary aggregate and recycled materials should be specified in place of virgin materials.

Note that there is increased ambition for Green Public Procurement under the European Commission's EU Green Deal, and nationally through specific GPP actions under the Climate Action Plan (2019) and the Programme for Government. These include training on GPP and monitoring and reporting on GPP.

Further information on GPP is available at: <https://www.gov.ie/en/publication/efa12-green-public-procurement-gpp/>.

4.3.3 Design for Off-Site Construction

Use of off-site manufacturing has been shown to reduce residual wastes by up to 90% (volumetric building versus traditional). The decision to use offsite construction is typically cost led but there are significant benefits for resource management. Some further considerations for procurement are listed as follows:

1. Use of steel and timber framed modular buildings can displace the use of concrete and the resource losses associated with concrete blocks such as broken blocks, mortars, etc.
2. These steel and timber framed modular buildings are typically pre-fitted with fixed plasterboard and installed insulation eliminating these residual streams from site.
3. Use of pre-cast structural concrete panels can reduce the residual volumes of concrete blocks, mortars, plasters, etc.
4. The use of prefabricated composite panels for walls and roofing can also reduce residual volumes of insulation and plasterboards.
5. Using pre-cast hollow-core flooring instead of *in-situ* ready mix flooring or timber flooring can reduce the residual volumes of concrete/formwork and wood/packaging, respectively.
6. In general, designing for the preferential use of offsite modular units eliminates offcuts and if handled correctly, onsite breakages are reduced as modular units are often more resistant to damage.
7. Manufacturers can also produce modular construction sets that are made to measure with components numbered for assembly, eliminating over-ordering and wasting of materials.

⁵ Available at: <http://www.epa.ie/pubs/reports/other/corporate/olg/GreenPublicProcurementfinalwebv2.pdf> . This guidance is under review by the Environmental Protection Agency and revised guidance will be published in Q2 2021.

4.3.4 Design for Materials Optimisation

The key design principle for this step is to ensure manufacturers and construction companies adopt lean production models, including maximising the reuse of materials onsite. This helps to reduce the environmental impacts associated with transportation of materials and from waste management activities. This includes investigating the use of standardised sizes for certain materials to help reduce the amount of offcuts produced on site, focusing on promotion and development of off-site manufacture. Some further considerations for procurement are listed as follows:

1. Reduce the overall material use in the design of structures, reduce the weight of structures to lower the loading allowing for thinner structural members and foundations, which will require less concrete and less reinforcement.
2. Simplify the design, layout, building form, structural system, building services and construction sequencing where appropriate and feasible.
3. Standardise design details, specified materials and reduce the number of materials specified where appropriate to facilitate process repeatability and minimise the number of variables and bespoke elements to enable manufacturing and installation efficiencies.
4. Design material dimensions using appropriate structural and planning grids where appropriate, considering manufacturer's product sizes. If standards sizes do not work, contact the manufacturers and suppliers to ensure materials are pre-sized and pre-cut to specific design specifications and requirements.
5. Coordinate the design, i.e. structural and service zones, to prevent cutting and jointing of materials, which create offcuts.
6. Use Building Information Modelling (BIM) to carry out 3D design coordination analysis to prevent dimensional conflicts through clash detection.
7. Introduce design 'freezes' to encourage clear Client design briefs and early engagement of the supply chain, i.e. main Contractor, specialist sub-contractors, manufacturers and suppliers.
8. Careful cut and fill analysis can ensure ground excavated from cuttings can be used as fill material elsewhere in the project, e.g. within embankments, with no waste sent to landfill and no need to import fill. An optimum cut and fill balance can be achieved by including a degree of flexibility in the design to allow for site issues.

4.3.5 Design for Flexibility and Deconstruction

The objective of this principle is to ensure that all products (including buildings) only contain materials that can be recycled and are designed to be easily disassembled. The consideration of material efficiency for the duration and end of life of a building project; flexible, adaptable spaces that enable a resource-efficient, low-waste future change of use; durability of materials and how they can be recovered effectively when maintenance and refurbishment are undertaken and during disassembly/deconstruction.

For example, the use of removable partitions within a structure allow spaces to be reconfigured following the end of the buildings original purpose. This principle has less relevance for the development of an RWMP but the concept of designing for flexibility and deconstruction are good practice principles that should be adopted for resource management through a building life cycle.

4.4 Key Materials, Quantities and Costs

One of the key outputs of the RWMP at this phase will be an inventory of the predicted nature and quantity of resources and wastes generated from the project following the design process. This serves the dual purpose of highlighting the design decisions in relation to prevention as well as identifying the proposed resource/waste volumes that will be subject to reuse, recycling, energy recovery, backfilling or other recovery and disposal to inform the planning consent process.

At a minimum this inventory is to be presented in line with the template provided in **Appendix D**. While the template shows a typical list of C&D resource streams, the inventory generated for the RWMP is to reflect the nature and complexity of the project and contain other relevant non-construction streams such as food,

electrical, paper, packaging, etc. as appropriate. Where exact quantities of any stream are unknown reasonable estimates may be provided.

The completed template is to include key prevention mechanisms (such as by-product or end of waste) to illustrate how these mechanisms have been employed to mitigate residual resource generation at the site. A description of each resource stream is to be included along with the following information:

- The source of the resource generation on site (e.g. site clearance, demolition, landscaping, etc.);
- Options considered for resource management (e.g. possible prevention, reuse on site or off site, etc.); and
- Proposed management option including transport options and destination sites. Note that it is understood that such options may be flexible at planning stage to allow for Contractor change but while a single option may not be feasible, as a minimum the various options for management must be presented.

It is also imperative that the estimated costs for resource management are included in the inventory table. These costs will illustrate the co-benefits of resource and cost for higher level management options, such as prevention, relative to the lower level options, such as disposal which will incur a higher cost. The costs will also allow the Contractor full transparency in the tendering process and may encourage initiative for value engineering to reduce residual management costs. Note unit cost rates established from known waste operators and brokers to ensure a robust assessment of cost.

5 UPDATING THE RWMP DURING SITE WORKS

5.1 Overview

This section sets out the best practice recommendations for the construction stages of a Tier 2 development and includes the following phases:

- Preconstruction including site clearance, enabling works, demolition, etc.; and
- Construction stage to handover.

The guidelines are designed to build on the plan developed through design and planning, presented in **Section 3**, but may also be used to develop a stand-alone RWMP. **Appendix C** sets out the recommended structure and content of the plan developed at construction stage. Some sections (such as the project description and design approach) may have little amendment from the RWMP developed at design and planning. Other sections will require significant additional detail, such as the responsibilities of specified Contractor personnel as well as Contractor work practices for training, auditing and reporting and details of site layouts and infrastructure.

5.2 Site Management

The Contractor will ultimately be responsible for the management of resources on a project and the following tasks are recommended in relation to site management:

1. Agree and revise as necessary any commitments or targets included in the RWMP developed at design/planning with the Client for acceptance and adoption in the RWMP for construction.
2. Allocate responsibility for resource management to one or more individuals of sufficient seniority to put the relevant procedures into practice. Nominate a suitably qualified Resource Manager (RM) with expertise in waste and resource management to implement the RWMP.
3. The RM will be required to update the plan as required to reflect new resource streams, work practices, suppliers or resource management options as required.
4. The RM will be responsible for delivery of all training and induction in relation to resource management.
5. The RM will be responsible for ensuring site infrastructure is supplied and maintained as fit for purpose.
6. The RM will be responsible for conducting all internal site audits including audits of sub-contractor operations.
7. The RM will be available as required for any Local Authority or other audits undertaken.
8. The RM will be responsible for maintaining site records for waste and resources exported off site and ensuring these are undertaken by suitably permitted operators to suitably permitted sites.
9. The RM will be engaged with relevant individuals who have access to ordering and stock-control records to ensure supply chain initiatives have been adopted.

5.3 Site Infrastructure

This section of the RWMP relates to on-site signage, separation and storage (covered area for storage of material to be used on site, dedicated skips, etc.) for handling and managing waste and resources.

1. Prior to construction, the site layout should be reviewed to ensure that the proposed Waste Storage Areas (WSA) have adequate space for storage and handling.
2. WSA may include stockpiles (for soil and stone, aggregates, etc.), skips (for metals, wood, glass, etc.) or secure containers for hazardous materials. All WSA should be assessed as fit for purpose and should be suitably contained, banded or defined as required.

3. The WSA should be set out to reduce any potential for impact on sensitive human (e.g. residential) or natural (water courses, ecological sites, etc.) and a suitable buffer should be applied to mitigate any impact.
4. Labelling and signage shall be used on site to inform personnel of key WSA requirements and restrictions with clear signage provided on all WSAs.
5. Signage is also required to provide information to assist good resource practice across the site.

In relation to resource storage, the Waste Management Act 1996, as amended, allows for the temporary storage of resources defined as 'waste' at the site where it was produced. The Act defines the phrase '*the temporary storage of waste*' limiting it to having a six-month duration. As such, it is acceptable to store waste on the site of generation for up to six months without the need for any further waste permit/licence.

5.4 Training

Training of site personnel will be the responsibility of the Contractor's RM and, as such, waste training is recommended. This can be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

All project personnel (including sub-contractors and other parties working on site) are to receive an environmental induction before commencing work on the project that will include a module on resource management and the RWMP. As a minimum the following will be included in the induction:

- Scope and content of the RWMP;
- Project commitments and targets;
- List of anticipated resources and wastes and volumes to be generated;
- Procedures for the proper identification and segregation of resources and wastes;
- Temporary storage and the location of the Waste Storage Areas (WSAs).
- Clear instruction on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste.

The environmental induction shall be provided and delivered by the Contractor and be tailored to suit the tasks and responsibilities of site personnel from management and supervisory level through to site operatives.

Toolbox talks on resource management should be provided on a continuous basis. Regular toolbox talks shall ensure site staff are aware of the resource management practices associated with their work and the appropriate control measures that are required to carry out their work in compliance with the RWMP.

5.5 Supply Chain

The RM will engage with team or individuals tasked with procurement of materials and services to ensure best practice procedures are employed to prevent residual resources at the site. A range of good practice measures may include the following:

1. Select procurement routes to minimise unnecessary packaging – for example applying 'Just-in-Time' (JIT) delivery processes to minimise material spoilage.
2. Use of 'consolidation centres' to support JIT delivery – these are strategically-located storage and distribution facilities where materials can be stored prior to just-in-time delivery to sites.
3. Implement ordering procedures and supply chain systems that avoid waste, i.e. no over-ordering, use of take-back schemes for packaging, material surplus and offcuts.
4. Select procurement routes that minimise unnecessary packaging.
5. Plan the work sequence to reduce the potential for on-site residual resource generation.

5.6 Auditing

The appointed RM will be responsible for conducting ongoing resource audits at the site during the project construction phase. These audits will cover work practices record keeping and off-site tracking as follows:

1. The RM will undertake periodic audits and inspections of work practices to assess compliance with the RWMP. The audit protocol will be risk based and focus on key issues of concern but will include as a minimum:
 - Adequacy of site signage and need for any repairs or upgrades;
 - Adequacy of storage infrastructure and need for any repairs or upgrades;
 - Compliance with resource segregation protocols and observed contamination in any resource streams;
 - Assessment of observed Contractor and Sub-contractor work practices for compliance with the RWMP;
2. The RM will undertake a review of all records of wastes and resources generated on-site and transported off-site periodically through the project. If waste movements are not accounted for, the reasons for this are to be established to understand why the record keeping system has not been maintained and implement corrective actions if needed.
3. The resource records will be compared with established targets for the site (e.g. reuse of resource target or recycling of waste target).
4. Examining material management on-site to determine where the largest percentage residual waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how project contract targets can be achieved.
5. Issue corrective actions (training, penalties, etc.) as required to site operatives where deviations of the RWMP are observed.

5.7 Tracking and Tracing

The RM is required to maintain records for all resource material which is used on site and leaves the site, either for reuse, recycling, energy recovery, backfilling or other recovery or disposal on third party sites. A recording system must be put in place to record residual waste and resources generated on site and a sample recording table is provided in **Appendix D**. This table can be employed as a daily log to update resource movements off site on a given day and compiled into a database as part of the RWMP files. The type of information to be recorded in the site tracking system is described below.

1. For each movement of resource off-site, a signed docket/invoice will be obtained by the Resource Manager from the haulier/contractor detailing the following:
 - A description of the resource stream;
 - List of Waste (Low) Code for each stream (where applicable);
 - Validated quantity of material moved off site by the haulier/contractor (typically reported in tonnes);
2. The name and authorisation of the haulier to transport the material - in the case of a 'waste' this requires a valid Waste Collection Permit (WCP). In the case of by-product or other materials that are not a waste, no WCP is required. In both cases the vehicle registration number should also be recorded for each load of material removed from site.
3. The name and authorisation of the destination site for the resource – again for a 'waste' this requires a valid Cert of Registration, Waste Permit or Waste Licence and in the case of by-product the relevant by-product determination.
4. The waste contractors must be required to provide details of end-use or waste treatment in waste reports.
5. This recording will be carried out for each resource type and the system will also be linked with the delivery records. In this way, the percentage of residual resource generated for each material can be determined.

6. The system will allow the comparison of these figures with the targets established for the prevention, reuse and recovery of resources to highlight the successes or failures against these targets.

It is the obligation of the RM to ensure that all resources taken off site are in line with the relevant legislation and the key area relates to ensuring that hauliers and collection sites have the appropriate authorisations.

Some key considerations include:

- Checking the expiry date of the authorisation relative to the duration of the works and whether any review of the permit is required over that period (e.g. WCP have a maximum life of five years and review applications need to be lodged before expiry).
- Checking that the waste consent i.e. permit/licence has the authorisation for the resource stream proposed (e.g. for Waste Permits and Waste Licences only permit an operator to accept specific waste streams).
- Checking the waste consent i.e. permit/licence has the authorisation for the resource management operation proposed (e.g. for Waste Permits and Waste Licences only permit an operator specific recovery or disposal codes).
- Check that any waste acceptance limits expressed in the permit/licence for material acceptance are known and that on site sampling has indicated that the residual resource complies with these limits (for example a licenced soil recovery facility can only accept inert material which meets the limits set out in the Landfill Directive Waste Acceptance Criteria and cannot accept contaminated soils).

5.8 Communications

The following communication tasks are recommended for the RM through the construction phase:

1. Internal reporting of resource statistics to the Client and the Contractor management. This includes performance relative to agreed targets and objectives which should be included as an agenda item at site meetings.
2. Engaging with relevant local authority on any site inspection or enforcement audits undertaken at the site. All follow up actions and corrective actions should be logged and reported to the local authority.
3. Engaging with other stakeholders (EPA, public, etc.) as appropriate in relation to the resource management on site.
4. Upon completion of construction, the RM will prepare a final report summarising the outcomes of resource management processes adopted and the total reuse and recovery figures. This report will be issued to the Client, Contractor Management and the local authority.

6 CLOSING STATEMENT

These guidelines revise and update the original 2006 guidelines, to reflect current policy and legislation around the prevention and management of construction & demolition waste. In line with EU and national policy ambitions, the emphasis is on moving the construction sector towards a circular economy in which focus is shifted away from waste disposal, and favouring prevention, reuse and recycling.

Implementation of these best practice guidelines by the relevant actors will help Ireland prevent C&D wastes through design stage to construction stage, encourage reuse of materials where possible and thereafter sustainably reduce and recover materials.

Responsibility for successful implementation of these guidelines will rest with a wide variety of stakeholders including clients, developers, designers, construction practitioners (architects, quantity surveyors, contractors and sub-contractors), local authorities (in particular planning departments), An Bord Pleanála and other government bodies.

Appendix A Glossary

Backfilling	Means any recovery operation where suitable non-hazardous waste is used for purposes of reclamation in excavated areas or for engineering purposes in landscaping. Waste used for backfilling must substitute non-waste materials, be suitable for the aforementioned purposes, and be limited to the amount strictly necessary to achieve those purposes.
By-Product	<p>A substance or object resulting from a production process the primary aim of which is not the production of that substance or object is considered not to be waste, but to be a by-product if the following conditions are met:</p> <ul style="list-style-type: none"> • further use of the substance or object is certain; • the substance or object can be used directly without any further processing other than normal industrial practice; • the substance or object is produced as an integral part of a production process; and • further use is lawful in that the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.
Brownfield Land	Land previously developed e.g. used for industrial, commercial or residential uses, where such land may be contaminated with hazardous substances or anthropogenic or man-made substances that are not natural to the environment
C&D	Construction and demolition
Construction and demolition waste	Waste generated by construction and demolition activities.
End of Waste	<p>Waste which has undergone a recycling or other recovery operation is considered to have ceased to be waste if it complies with the following conditions:</p> <ul style="list-style-type: none"> • the substance or object is to be used for specific purposes; • a market or demand exists for such a substance or object; • the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and • the use of the substance or object will not lead to overall adverse environmental or human health impacts.
Hazardous Waste	Waste which displays one or more of the hazardous properties listed in Annex III of Directive 2008/98/EC.
Inert Waste	Waste that does not undergo any significant physical, chemical or biological transformations (e.g. concrete, bricks, masonry, tiles). Inert waste will not dissolve, burn or otherwise react physically or chemically, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health.
JIT	Just in time

LoW	List of Waste
Non-hazardous Waste	Waste which is not covered by the definition of hazardous waste.
Pre-demolition Audit	A preparatory activity with the purpose of <ul style="list-style-type: none"> • collecting information about the qualities and quantities of the C&D waste materials that will be released during the demolition or renovation works; and • giving general and site-specific recommendations regarding the demolition process.
Prevention	Means measures taken before a substance, material or product has become waste, that reduce: <ul style="list-style-type: none"> • the quantity of waste, including through the re-use of products or the extension of the life span of products; • the adverse impacts of the generated waste on the environment and human health; or • the content of hazardous substances in materials and products.
Re-use	Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.
Recycling	Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.
Recovery	Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy.
RM	Resource Manager
RMWP	Resource and Waste Management Plan
TFS Regulation	Regulation (EC) No. 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste.
Waste	Any substance or object which the holder discards or intends or is required to discard.
Waste Holder	Waste producer or the natural or legal person who is in possession of the waste.
Waste Treatment	Recovery or disposal operations, including preparation prior to recovery or disposal.
WCP	Waste Collection Permit
WSA	Waste Storage Area

Appendix B
Tier 1 Projects - Template Resource and Waste Management Plan

Section	Content
Project Details	<p>As a minimum this section should provide the following information:</p> <ul style="list-style-type: none"> • Name of the Contractor / Developer; • Name of the Site Manager; • Address of Contractor / Developer; • Address of Development; • Planning Register Reference; • Name of the Person responsible for Implementation of this Plan (Resource Manager); • Site Telephone Number; • Mobile Phone Number; • E-mail address.
Project Description	<p>As a minimum this section should provide the following information:</p> <ul style="list-style-type: none"> • Site Location; • Site description to include details of the existing site layout; • Details of any proposed site clearance and/or demolition; • Description of the development (as a minimum this should include the description included in the planning permission); • Description of the main construction elements including all new structures, roads, drainage or other infrastructure; • Any designing out waste initiatives adopted; • Identification of waste prevention mechanisms implemented.
Key Materials, Quantities and Costs	<p>Provide an estimated waste inventory in line with the template provided in Appendix D including the following:</p> <ul style="list-style-type: none"> • Identification of each waste stream generated; • The List of Waste (LoW) Code for each stream; • The predicted quantity of material generated (in tonnes); • The identified resource management route from prevention, reuse of resources and, recycling, energy recovery, backfilling or other recovery and disposal for each waste material; • The estimated cost of resource management.

Appendix C
**Tier 2 Projects – Minimum Contents for Resource and
Waste Management Plan**

Section	Pre-Construction Phase Content	Construction Phase Content
1 Introduction	<p>As a minimum this section should provide the following information:</p> <ul style="list-style-type: none"> • Overview of the purpose of the RWMP; • Commitment to adherence to these Guidelines; • Environment and waste policy of the Client; • Relevant EU, national and local waste policy and legislation; • Outline the project specific resource targets which should be set by the Client at the outset to the project – refer to Section 3.2 for more information; • Identify any complementary documents, i.e. Environmental Management Plan, Health and Safety Plan, etc. 	<p>This section should be updated to include the following if relevant:</p> <ul style="list-style-type: none"> • Environment and waste policy of the Contractor; • Any amendment to the project specific resource targets; • Identify the Contractor's complementary documents, i.e. Environmental Management Plan, Health and Safety Plan, etc.
2 Project Description	<p>As a minimum this section should provide the following information:</p> <ul style="list-style-type: none"> • Site Location, including site location map and site layout maps; • Site description to include site area, topography, description of existing structures, site access, adjoining land uses, sensitivity of the environment, etc.; • Site history including any details of previous land uses – in particular, potential for residual ground contamination from previous uses such as fuel/material storage, industrial operations (gas works, foundries, collieries, etc.). • Details of any proposed demolition including descriptions of scale and building fabric of all structures; • Details of any site clearance including vegetation removal, topsoil stripping or other excavations to enable works including estimations of potential volumes; • Description of construction elements including all new structures, roads, drainage or other infrastructure; • Material balance for the site indicating the cut/fill requirements for development and estimates for all other material imports; • Details of project programme and phasing; • In the event that Asbestos Containing Material (ACM) is present on site, details of the volume, nature and condition of all material. Confirm if an ACM inventory for the site is available; 	<p>This section should be updated to include the following if relevant:</p> <ul style="list-style-type: none"> • A summary of any significant design changes imposed since the Design Stage RWMP through mechanisms such as value engineering or other; • Details of planning permission (if relevant) and in particular any conditions imposed in relation to resource management. • Any issues related to ground contamination which were identified during the construction phase

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	<ul style="list-style-type: none"> If there is known or suspected ground contamination on the site or adjoining lands, provide details of the nature and scale of contamination. This should include a gridded map of the site highlighting areas of contamination; For any brownfield development or development where there is known or suspected ground contamination, a remediation plan should be prepared to present the scale and nature of the contamination and the proposed approach to remediation, i.e. full excavation and off site treatment, <i>in-situ</i> treatment, etc.; Details of any other hazardous materials known on site. 	
3 Roles and Responsibilities	<p>As a minimum this section should provide the following information:</p> <ul style="list-style-type: none"> Overview of the Design Team; Description of the role of the named Client and key personnel; Description of the role of the named Architect and key personnel; Description of the role of the named Engineer and key personnel; Description of the role of the named Resource Manager (RM) appointed to the Design Team to manage the RWMP through the design process; Description of the role of the other parties and key personnel in the Design Team such as quantity surveyors, environmental consultants, etc.; Description of the future role of the Contractor (unnamed). 	<p>As a minimum this section should provide the following information:</p> <ul style="list-style-type: none"> Overview of the Construction Phase roles including Client, Client's Representative, Contractor, Sub-Contractors, etc.; Description of the role of the named Client and key personnel; Description of the role of the Contractor's Project Manager; Description of the role of the Contractor's Site Manager; Description of the role of the Contractor's nominated Resource Manager (RM); Description of the role of the Quantity Survey on procurement and purchasing; Description of the role of the named Sub-Consultants and Suppliers. <p>Further details on the site management roles are presented in Section 5.2.</p>
4 Design Approach	<p>As a minimum this section should provide the following information to show how primarily prevention and then management of streams have been considered:</p> <ul style="list-style-type: none"> Scope, attendees, agenda and dates of any design out waste workshops; Document design initiatives adopted for Reuse and Recycling – refer Section 4.3.1; Document design initiatives adopted for Green Procurement – refer Section 4.3.2; Document design initiatives adopted for Off-Site Construction – refer Section 4.3.3; 	<p>This section of the RWMP will only require update to reflect any significant design changes that have implications for resource management.</p>

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	<ul style="list-style-type: none"> Document design initiatives adopted for Materials Optimisation – refer Section 4.3.4; Document design initiatives adopted for Flexibility and Deconstruction – refer Section 4.3.5. 	
5 Key Materials Quantities and Costs	<p>Provide a post design resource and waste inventory of all residual resources in line with the template provided in Appendix D listing the following:</p> <ul style="list-style-type: none"> Description of each residual resource stream predicted; The List of Waste (LoW) Code for each stream; The predicted quantity of material generated (in tonnes); The identified resource management route options from prevention, reuse, recycling, recovery and disposal for each material; The estimated cost of resource management. <p>Further details for this section are included in Section 4.4.</p>	<p>Update the resource inventory in Appendix D listing the following:</p> <ul style="list-style-type: none"> Any changes to the generation volumes presented in the Design Phase Inventory; Any changes to the management routes presented in the Design Phase Inventory; The nominated permitted haulier who will be employed for each stream must be named along with the relevant permissions; The nominated destination site for all streams must be provided along with the relevant permissions. <p>Further details on this tracking are provided in Section 5.7.</p>
6 Site Management	<p>Specify the following outline requirements that must be adopted by the Contractor at construction stage:</p> <ul style="list-style-type: none"> Need for a specified Resource Manager (RM) of the RWMP with responsibility for implementation at construction phase; Requirements to include the RWMP in site induction training; Requirements for tool box talks and all other training on the RWMP; Procedures for identifying suitably permitted waste collection operators and waste destination sites – a resource for this task is included in Appendix F; Requirements for resource efficient supply chains; Procedures for record keeping and reporting of all off site export of resources; Procedures for record keeping and reporting of all on site resource uses – this may include measures such as the use of an on-site a mobile crusher for producing aggregate from suitable residual concrete (subject to the appropriate waste consent); Requirements for communications with the local authority and other stakeholders; 	<p>Specify the following requirements that must be adopted at construction stage:</p> <ul style="list-style-type: none"> Need for a named Resource Manager with responsibility for implementation of the RWMP - further details are provided in Section 5.2; Requirements to include the RWMP in site induction training and tool box talks and all other training on the RWMP - further details are provided in Section 5.4; Implementing procedures for record keeping and reporting of all off site export of resources as per Section 5.7; Procedures for resource efficient procurement in the supply chain – further details are provided in Section 5.5; Procedures for audits and inspections of resource management practices - further details are provided in Section 5.6; Requirements for engagement with the Local authority and other stakeholders - further details are provided in Section 5.8; Requirements for a final report summarising the outcomes of resource management processes adopted and the final inventory and cost for the project - further details are provided in Section 5.8.

Section	Pre-Construction Phase Content	Construction Phase Content
	<ul style="list-style-type: none"> Procedures for audits and inspections of resource management practices. 	
7 Site Infrastructure	<p>Specify the following infrastructure requirements that must be adopted by the Contractor at construction stage:</p> <ul style="list-style-type: none"> Minimum requirements for site signage on resource management; Minimum requirements for resource storage (dedicated skips, hazardous materials storage, stockpile management, etc.); Note there are specific requirements on stockpiling more than 50kg of certain persistent organic pollutants (from a construction perspective these may include some chlorinated hydrocarbon contaminants in ground contamination, EPS/XPS insulation building material containing brominated flame retardant (HBCDD) or polychlorinated biphenyls from removal of electrical equipment) under Article 5 of EU Regulation (EU) 2019/1021. Handling and export of resources. 	<p>Specify the following infrastructure requirements that must be adopted:</p> <ul style="list-style-type: none"> Minimum requirements for site signage on resource management; Minimum requirements for resource storage (dedicated skips, hazardous materials storage, stockpile management, etc.); Handling and export of resources. <p>Further details are provided in Section 5.3.</p>

Appendix D
Resource and Waste Inventory Template

LoW Code	Description	Volume Generated (tonnes)	Prevention (tonnes) (non-waste)	Reused (tonnes) (non-waste)	Recycled (tonnes) (waste)	Recovered ⁶ (tonnes) (waste)	Disposed (tonnes) (waste)	Unit Cost Rate (€/tonne)	Total Cost (€)
17 01 01	Concrete								
17 01 02	Bricks								
17 01 03	Tiles and Ceramics								
17 02 01	Wood								
17 02 02	Glass								
17 02 03	Plastic								
17 03 02	Bituminous mixtures								
17 04 01	Copper, Bronze, Brass								
17 04 02	Aluminium								
17 04 03	Lead								
17 04 04	Zinc								
17 04 05	Iron and Steel								
17 04 06	Tin								
17 04 07	Mixed Metals								
17 04 11	Cables								
17 05 04	Soil and Stone								
17 06 04	Insulation Material								
17 08 02	Gypsum								
17 09 04	Mixed C&D Waste								
17 01 06*	<i>Mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing hazardous substances</i>								

⁶ Recovered here includes energy recovery, backfilling and other recovery.

Appendix E

By-Product and End of Waste Mechanisms

Article 27 By-product

Where an 'economic operator' can demonstrate that a substance or object produced can meet all conditions under Article 27 of the European Union (Waste Directive) Regulations 2011-2020, that substance or object may be treated as a by-product and not as a 'waste'. These conditions include:

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

Should an 'economic operator' seek to pursue this by-product approach for a substance or object, the operator must notify the EPA to allow the EPA to make a determination if the 'economic operator' decision was correct. During the determination process, the EPA is obliged to consult with the relevant local authority. The EPA is required to maintain a register of all notified decisions which can be found here:

<http://web.epa.ie/Article27Register/>.

While this mechanism is open to all materials, the predominant current use in Ireland is for soil and stone from excavations during construction. As a consequence, the EPA has published guidance for this stream entitled *Guidance on Soil and Stone By-products in the context of Article 27 of the European Communities (Waste Directive) Regulations 2011, Version 3; June 2019*. This guidance can be found at the following link: https://www.epa.ie/pubs/advice/waste/product/Guidance_on_Soil_and_Stone_By_Product.pdf

Under the soil and stone guidance, the EPA advises waiting at least **ten weeks** prior to moving the material as a by-product. To ensure that the EPA assessment process is as efficient as possible, it is recommended that a full set of declaration documents are prepared by the economic operator at lodgement. Any incomplete notification will likely increase the EPA review period.

If, within the ten-week period, the EPA decides that a detailed consideration of the notified decision is warranted, it will inform the economic operator of this and will initiate a consultation process. In that case the 'economic operator' is advised not to move the material until the EPA has made a determination. Therefore, it is advised that early consideration of the by-product mechanism is undertaken during the design phase to reap benefits as there are timing and organisational measures required.

Should the 'economic operator' decide not to wait for the EPA determination prior to moving the notified material and the EPA subsequently determine that the material is not a by-product but a waste, the 'economic operator' will have an unauthorised deposit of waste where the full waste regulatory regime will be available to the relevant enforcement authority, which may include site restoration.

Further by-product guidance for all waste streams has been published as draft for consultation by the EPA in June 2020 and is available at: https://www.epa.ie/pubs/advice/waste/product/ByProduct_Guidance.pdf

Article 28 End of Waste

Article 28 sets out the grounds to determine the point waste which has undergone a recycling or other recovery operation is considered to have ceased to be waste if it complies with the following conditions:

- *the substance or object is to be used for specific purposes;*
- *a market or demand exists for such a substance or object;*
- *the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and*
- *the use of the substance or object will not lead to overall adverse environmental or human health impacts.*

At EU level there are existing regulations governing end-of-waste criteria for:

- Iron, steel and aluminium scrap (Council Regulation (EU) No 333/2011)
- Glass cullet (Commission Regulation (EU) N° 1179/2012)
- Copper scrap (Commission Regulation (EU) N° 715/2013)

In the absence of end-of-waste criteria set at EU level, Article 28(3) of the Regulations allows the EPA to decide, on a case-by-case basis, whether certain waste has ceased to be waste in accordance with the end-of-waste conditions. Applications for end-of-waste status must come from industry and be funded by industry.

You should be aware that the making of an end-of-waste proposal to the EPA will be a complex process for most materials given a range of factors such as the variety of sources, presence of contaminants, intended end uses, quality control, etc.

Draft End-of-Waste guidance has been prepared by the EPA in two parts as follows:

- Part 1 - Understand the concept of end-of-waste and consider whether to apply for end-of-waste status for your recovered/recycled material(s) and available at:
http://www.epa.ie/pubs/advice/waste/product/End_of_Waste_Guidance_Part1.pdf
- Part 2 - Make a good quality application to the Environmental Protection Agency, if you decide that it is appropriate to apply for end-of-waste status and available at:
<http://www.epa.ie/pubs/advice/waste/product/draftend-of-wasteguidancepart2.html>

In addition, a standard end-of-waste application form is now available at:

<https://www.epa.ie/pubs/forms/lic/by-productandend-of-wasteforms/end-of-wasteapplicationform.html>

Further details on previous end of waste decisions are available at the following link:

<http://www.epa.ie/waste/wastereg/art28>

Appendix F

Authorised Waste Collectors and Waste Disposal/Recovery Sites

F.1.1 Waste Collection

All residual resource legally classified as a 'waste' moved off site, including soil and stone must be collected by authorised waste collectors (as authorised by the National Waste Collection Permit Office).

A list of currently authorised waste collectors is available on the following website:

<https://www.nwcpo.ie/permitsearch.aspx>

For further details contact:

National Waste Collection Permit Office

Áras an Chontae,

Charleville Road,

Tullamore,

Co. Offaly

Telephone: 057 9357428

F.1.2 Waste Disposal/Recovery

All residual resource legally classified as a 'waste' taken from site must be sent to suitably authorised waste facilities for disposal or recovery. The following authorisations are applicable:

- Certificates of Registration (CoR) from the Local Authority (issued to private sector)
- Certificates of Registration (CoR) from the EPA (issued to Local Authority)
- Waste Facility Permit (WFP) from the Local Authority
- Waste or Industrial Emissions Licence from the EPA

A list of currently authorised (CoR or WFP) waste sites in each Local Authority is available on the following website:

<http://facilityregister.nwcpo.ie/>

A list of sites currently licensed by the EPA (Industrial Emissions or Waste Licence) is available on the following website:

<http://www.epa.ie/terminalfour/waste/> (for Waste Licensed sites)

<http://www.epa.ie/terminalfour/ippc/> (for Industrial Emission Licensed waste facilities)

Section 32 of the Waste Management Act (as amended) places the obligation on the producer of waste to ensure that waste passes only to an organisation that is authorised to undertake its collection or its recovery or disposal. It is your legal obligation to ensure that all waste taken from your site is undertaken by a suitably authorised operator as listed above and it is an offence to use an unauthorised waste collector or to dispose of your waste at an unauthorised location.