Appendix 4.7
Resource and Waste Management Plan

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Resource and Waste Management Plan (RWMP)

Herbata Data Centre Campus

Naas, County Kildare
April 30, 2024
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1 Introduction

This Resource and waste management plan has been developed to accompany a planning application to Kildare County Council (KCC) for the proposed Herbata Data Centre Campus to be constructed on lands at Naas, County Kildare, which comprise of:

- 6 no. data centre buildings,
- Administration/ management building,
- Incoming gas supply compound (AGI),
- Car parking, security hut, landscaping, and all associated site works.

The current site consists of agricultural lands, residential houses, and agricultural buildings to the west of the M7 and Naas town.

The development will include loading bays at each data centre for deliveries, 210 no. car parking spaces, bicycle shelters service 52 no. spaces, smoke shelters, Internal access roads and footpaths, vehicular and pedestrian access from the R409, as well as all associated site development works, services provision, drainage works Including attenuation, landscape and boundary treatment works including mounding, hedgerow protection areas and security fencing.

2 Methodology

This Resource and Waste Management Plan (RWMP) has been prepared in accordance with the requirements of the Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction and Demolition Projects published by the EPA in 2021 (hereafter referred to as the 2021 Guidelines).

The 2021 Guidelines supersede the Best Practice Guidelines for the preparation of Waste Management Plans for Construction and Demolition Projects produced by the NCDWC in June 2006 (hereafter referred to as the 2006 Guidelines).

Section 3.1 of the 2021 Guidelines recommends thresholds for the likely scale and complexity of a RWMP. Developments are classed as either Tier 1, smaller scale or Tier 2, larger scale. Developments below the following thresholds may be classed as Tier 1 and developments above are classed as Tier 2:

- New residential development of <10 dwellings.
- Retrofit of 20 dwellings or less.
- New commercial, industrial infrastructural, institutional, educational, health and other developments with an aggregate floor area of <2000 square meters, and,
- Demolition projects generating in total <1000 cubic meters in volume of C&D waste.

This project comprises of 6 No. Data Centre Buildings, each with an aggregate floor area of approximately 27,261 square meters (including administration block and plant area) and therefore falls above the thresholds and is classed as a Tier 2 development. Accordingly, a bespoke RWMP is required and designed in accordance with the requirements for structure and content (pre-construction) set out in Appendix C of the 2021 Guidelines. This document will be updated throughout the life of the construction phase of the proposed development as set out in Appendix C of the 2021 Guidelines.

The RWMP covers the following areas:

- Introduction or Overview- to include commitments and policies of the operator, overview of relevant legislation etc.
- Project Description to include location, history, and proposed demolition (if any), material balance, project programme and description etc.
- Roles and Responsibilities assigned to manage resource efficiency and waste out.
- Design Approach- “waste out” initiatives.
- Key materials, quantities, and costs.
- Site Management and Infrastructure.
- Audits and Inspections.
- Communications with the local Authority.

3 RWMP- Overview

As outlined in the 2021 Guidelines, waste management legislation and policy have evolved towards prioritising waste prevention and life cycle thinking as waste management has evolved over time.

3.1 EU Context

3.1.1 8th Action Programme

The EU 8th Environmental Action Programme (EAP) came into force on 2nd May 2022 as the EU's legally agreed common agenda for environmental policy until 2030. It builds on the European Green Deal designed to overcome the challenges of climate change and environmental degradation and to transform the EU into a modern resource efficient and competitive economy.

The action programme reiterates the EU's long-term vision to 2050 of living well, with planetary boundaries. It sets out priority objectives for 2030 and the conditions needed to achieve these. The action programme aims to speed up the transition to a climate- neutral, resource- efficient economy, recognising that human wellbeing and prosperity depend on healthy ecosystems.

The 8th EAP has 6 inter-linked thematic priority objectives including:

Advancing towards a well-being economy that gives back to the planet more than it takes and accelerating the transition to a non-toxic circular economy where growth is regenerative, resources are used efficiently and sustainably, and the waste hierarchy is applied.

3.1.2 European Commission Circular Economy Strategy (2015, 2018, 2020)

In December 2015, the European Commission adopted an ambitions circular economy package including revised legislative proposals on waste to stimulate Europe's transition to a circular economy. The Circular Economy Package consists of an EU Action Plan for the circular economy that establishes a programme of actions, with measures covering the whole cycle from production and consumption to waste management and the market for secondary raw materials. The proposed actions will contribute to "closing the loop" of product lifecycles through greater recycling and reuse. The circular economy is a fundamental alternative to the take-more- consume- dispose linear economic model that sill predominates. Legislative tools are among the measures developed.

Under the 2008/98/EC Waste Framework Directive (now amended), construction and demolition waste are a priority waste stream. It set the following objectives:

- By 2020, the preparing for reuse, recycling and other material recovery of non-hazardous construction and demolition waste (excluding naturally occurring material defined in category 17 05 04 in the list of waste) shall be increased to a minimum of 70% by weight.
- Promote selective demolition to enable removal and safe handling of hazardous substances and facilitate reuse and high-quality recycling by selective removal of materials and stablishing sorting systems.
- Reduce waste generation.

The 2018/851 amending Directive on Waste notes the following with regards to Construction and Demolition (C&D waste):

- Encourage the reuse of products and the setting up of systems promoting repair and re-use activities, including for electronic and electrical equipment, textiles, and furniture as well as packaging and construction materials and products.
- Reduce waste generation on processes related to industrial production, extraction of minerals, manufacturing, construction, and demolition, considering best available techniques.
- Member States shall take measures to promote selective demolition to enable removal and safe handling of hazardous substances and facilitate re-use and high-quality recycling by selective removal of materials, and to ensure the establishment of sorting systems for construction and demolition waste at least for wood, mineral fractions, metal, glass, plastic, and plaster.
- By 31 December 2024, the Commission shall consider the setting of preparing for reuse and recycling targets for construction and demolition waste and its material specific fractions.

The European Environment Agency' notes that EU countries fulfilled the 70% recovery target of 2020 with most exceeding the target by 2016. The high recovery rates are mostly achieved by using recovered waste for practices such as backfilling and low-grade recovery activities, reducing the potential to move towards a truly circular waste management. Increased waste prevention and higher and better-quality recycling can be achieved by over-coming uncompetitive pricing, lack of trust in the quality of secondary materials, lack of information in the composition of materials used in existing buildings and the long delay between implementing actions on new buildings and their effect on waste management several decades later.

3.2 National Context

A Waste Action Plan for a Circular Economy, Ireland's National Waste Policy 2020 -2025 published in September 2020 by the Department of Environment, Climate and Communications recognises that traditional waste policy focused on how waste produced is treated and how to achieve the right balance between waste recycling, recovery, and disposal. However, according to the Plan, the focus must now be broadened to encompass how resources and materials are consumed, how products are designed, how to extend the productive life of products and how we prevent waste generation and resource consumption.

The Waste Action Plan notes that from a broader circular economy perspective, it is important that "prevention and reuse is hardwired into construction activity."

According to the latest EPA figures, 9.04 million tonnes of C&D waste was generated in 2021 up from 8.2m in 2020 due to increased construction activity. The recovery rate of non-hazardous, non-soil and stone material in 2021 was 85% up from 78% in 2020.

Approximately 85% of the C&D waste generated was soil, stones, and dredged spoil. Only 2% was collected as single waste streams (wood, glass, plastic, or metal). 82% of C&D waste was backfilled, 10% went to disposal and only 7% was recycled. This mirrors the trends noted by the EEA.

3.3 Regional and Local Context

The Project is in the Local Authority area of Kildare County Council (KCC). The Eastern-Midlands Region Waste Management Plan 2015 – 2021 is the overarching regional waste management plan for the KCC area.

The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of "70% preparing for reuse, recycling and other recovery of construction and demolition waste" (excluding natural soils and stones and hazardous wastes) to be achieved by 2020. This is in line with the target set for Member States under the Waste Framework Directive 2008/98/EC.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste which includes a €75 per tonne landfill levy introduced under the Waste Management (Landfill Levy) (Amendment) Regulations 2013.

The Kildare County Development Plan 2023-2029 Chapter 6, Infrastructure and Environmental Services sets out the following relevant policies and objectives in Section 6.8.1 Waste Management:

POLICY: IN P6

Implement European Union, National and Regional waste related environmental policy, legislation, guidance, and codes of practice, to support the transition from a waste management economy towards a circular economy.

OBJECTIVE: IN O39

Encourage a just transition from a waste economy to a green circular economy in accordance with 'A Waste Action Plan for a Circular Economy 2020-2025' and the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less'.

OBJECTIVE: IN O40

Provide, promote, and facilitate high quality sustainable waste recovery and disposal infrastructure / technology in keeping with the EU waste hierarchy to cater for anticipated population growth and the business sector in the County.

OBJECTIVE: IN O44

Encourage waste prevention, minimisation, re-use, recycling, and recovery as methods for managing waste.

The Naas Local Area Plan (LAP) 2021 – 2027 refers to protecting and enhancing the environment through implementation of European, national, and regional policy and legislation relating to waste management. Objectives of the Council are to maintain existing recycling facilities, secure the provision of additional recycling facilities as required, support the development of a green waste composting site including in conjunction with new developments and to support local schools, town and community groups through education and awareness programmes.

3.4 RWMP Purpose and Project Specific Targets

The guiding principles for this RWMP mirrors the latest policies to use resources efficiently and to ensure that the waste hierarchy for waste management as indicated in Figure 3-1 below is adhered to during pre-construction design and during all phases of site development and construction.

Figure 3-1. Waste Hierarchy for Waste Management (source: European Commission)

Herbata Ltd are committed to fulfilling the requirements of the guidelines and adhering to the prioritisation of waste prevention and life cycling thinking.

At a minimum, the preparing for re-use, recycling and other material recovery of non-hazardous construction and demolition waste (excluding naturally occurring material defined in category 17 05 04 in the list of waste) shall be a minimum of 70 % by weight. This target is subject to review pending the publication of any new targets by the EU in 2024 as noted in EU Directive 2018/851 on waste.

Other project specific targets include:

- Waste benchmarks as set out in BREEAM (Building Research Establishment Environmental Assessment Methodology) will be applied for the Project construction phase. A value of ≤13.3 m^3 or 11.1 tonnes/100m^2 development is applied (excluding soils and stones).
- The amount of natural material (soils and stones) requiring recovery off-site will be minimized.

4 Project Description

4.1 Site Location

The site is located outside of Naas, County Kildare. The subject site indicated in the red site boundary line in Figure 4-1 is approximately 37.5 hectares for the planning application.

Figure 4-1. Subject site

The subject site currently consists of agricultural lands, residential dwellings, and agricultural buildings to the west of the M7 and Naas town. This does not include the ESB Substation which forms part of a separate SID application (3.15 ha).

The site is bounded to the south by the M7 Business Park, to the east by the M7, to the north by Osberstown Business Park and to the west by agricultural and one-off housing.

There are 3 no. existing dwellings, and agricultural buildings located on the site that are to be demolished as part of the proposed works. To the north and south of the site, the lands are mainly used for commercial/industrial purposes (M7 Business Park and Osberstown Business Park) and agricultural uses. A 2-storey house and farm buildings are located approx. 200m to the west of the site, whilst some bungalow and 2 storey houses are located approx. 250m to the south of the site. There is a bungalow immediately to the north of the site, across the R409.

According to the National Monument Service, a fulacht fiadh (an ancient Irish cooking pit) is located on the south-east part of the site. Its approximate location is highlighted with a 20m exclusion zone surrounding it.

4.2 Existing Site Description

The site shown in Figure 4-1 straddles the townlands of Halverstown, Jigginstown and Newhall. The site is located approximately 3km to the west of Naas town centre in County Kildare, with grid reference SF 85914 79594. The site is bounded to the North by the R409 Regional Road, to the east by the M7 motorway, to the south by the Bluebell Stream and the M7 Business Park beyond and to the West by adjacent farmland. The existing site is approximately rectangular measuring circa 37.51 hectares.

Access to site is via the R409 which currently has an existing entrance leading to a dwelling and an existing agricultural building. Existing dwellings along the R409 also have separate private entrances off the R409. There are a number of other gates agricultural accesses from the R409 road. The site in level varies between +85.500m AOD and +77.500 AOD, and slopes generally from North to South. The Northeast corner slopes towards the eastern boundary.

4.3 Proposed Development Description

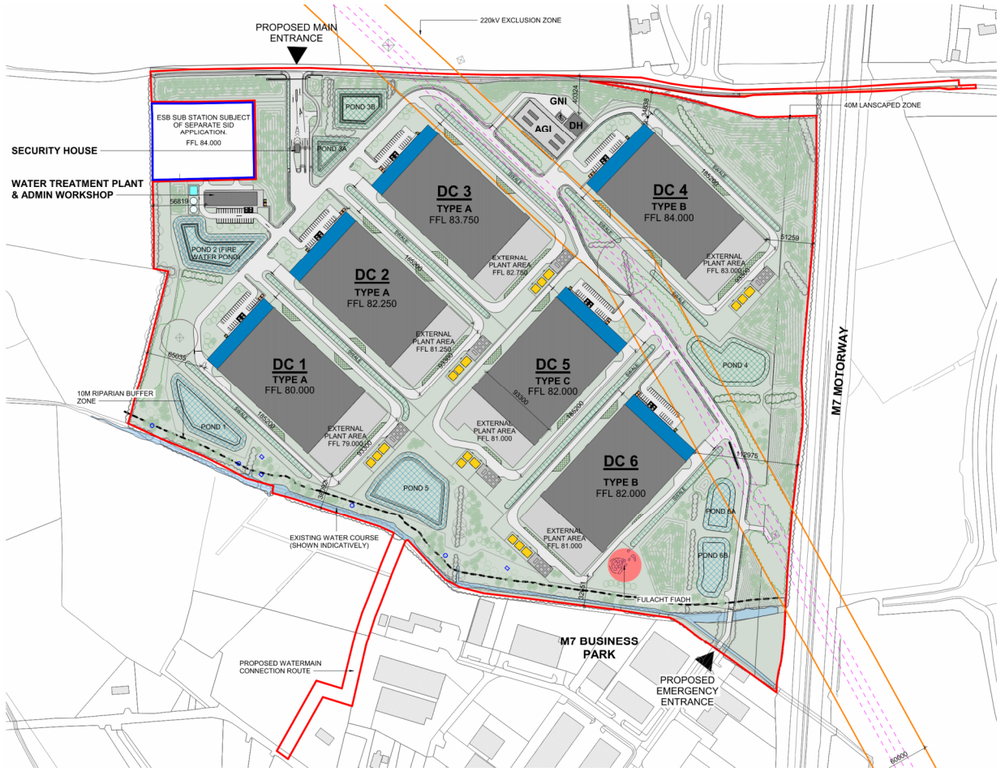
- 6 no. data centre buildings,
- Administration / management building,
- Incoming gas supply compound (AGI),
- Car parking, security hut, landscaping, and all associated site works.

The subject site indicated in the red line comprises c37.51 ha for the planning application. This does not include the ESB Substation which forms part of a separate SID application (3.15 ha).

The development will include loading bays at each data centre for deliveries, 210 no. car parking spaces, bicycle shelters serving 52 no. spaces, smoke shelters, internal access roads and footpaths, vehicular and pedestrian access from the R409, as well as all associated site development works, services provision, drainage works including attenuation, landscape and boundary treatment works including mounding, hedgerow protection areas and security fencing.

The main access to the site will be from the R409, with a secondary emergency access point from the M7 Business Park to the south of the site.

Figure 4-2. Proposed site layout



4.4 Main Construction Elements

The site development and construction phases are expected to comprise 3 no. phases over 96-98 months in total. There will be an overlap between phases to complete the development within the envisaged timeframe.

Table 4-1. Proposed construction timetable.

Phases	Description	Timing (months)
1	Site Development and associated car parking for DC1 and DC2. Construction of DC1 and DC2. Construction of Pond 1, 2, 3A, 3B, 5 and 6. Access Through Road Construction	45
2	Site Development and associated car parking for DC3 and DC5. Construction of DC3 and DC5.	39
3	Site Development and associated car parking for DC4 and DC6. Construction of DC4 and DC6, final site development and final landscaping	82
	Total	166*

*Note: * there will be overlap between phases.*

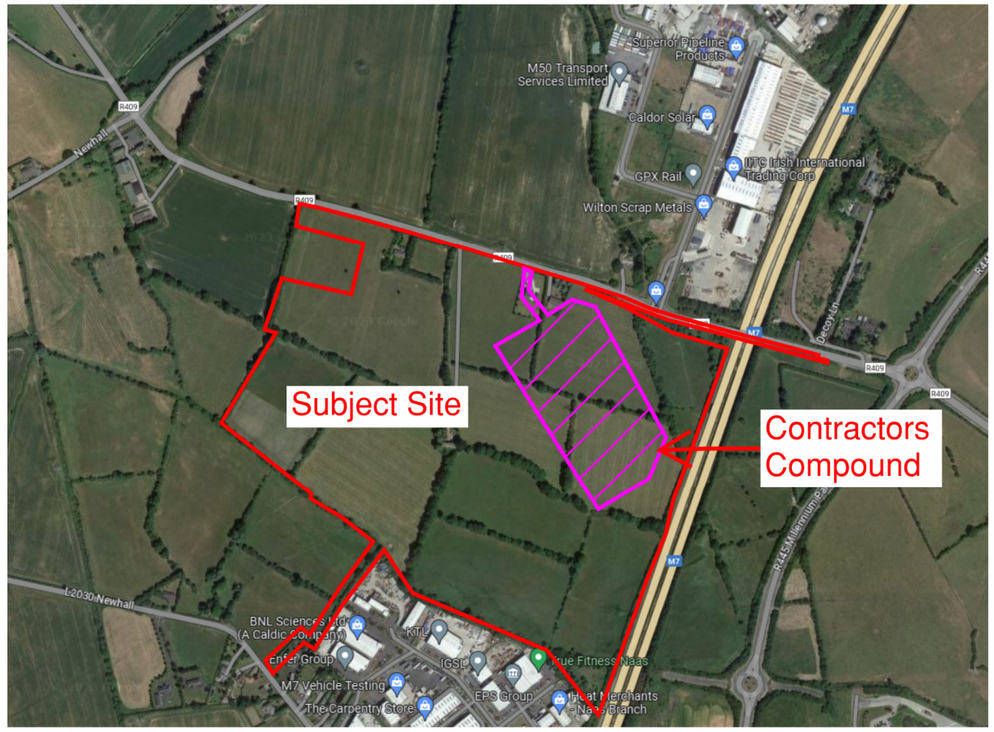
The following steps will be completed.

- Site enabling works (incl. pond construction)
- Foundation
- Substructure
- Main structure
- Site out
- Final Site Development, landscaping
- Handover

It is proposed to locate the Contractors compound for Phases 1 and 2 along the Southern edge of the R409 to the west of the M7 motorway as seen in Figure 4-3 below. Construction traffic will access and exit the site via the R409 from the east.

Phase 3 shall comprise of the construction of DC4 and DC 6, The final site development works and final landscaping. Construction traffic will continue to access and exit the site via the R409.

Figure 4-3. Contractor's compound location.



HGV - During the peak months 7 and 30 of construction, approximately 1221 construction vehicles (not staff) will access the site. This equates to 47 vehicles per day and 7 in the peak hour assuming 15% of vehicles arrive during the peak.

Estimates of construction material imports to the site will be fully estimated as part of the updated versions of this RWMP.

4.5 Proposed Site Clearance and/ or Demolition.

There will be demolition works required for the 3 no. existing dwellings that are located on the site, along the R409. In addition, there are a small number of existing agricultural/farming related buildings that will also require demolition as part of the proposed works.

Figure 4-4- Existing buildings on site.

There are no known hazardous materials on the site.

There are no known asbestos containing material (ACM) on site. A full demolition asbestos survey will be completed for the relevant existing buildings prior to demolition works commencing on the site.

There will be no disturbance or removal of bedrock.

There is a significant amount of existing vegetation to be removed (approximately 2900m of hedgerow planting and trees). Refer to BSM drawings BAM-ZZ-ZZ-DR-L-0211 to BAM-ZZ-ZZ-DR-L-0214 for the full extent of the planting and vegetation removals.

Based on the current cat and fill analysis, approximately 8,300m^3 of net fill would be required for the project development. The basis of the cut and fill strategy would be to have no material exported or imported for the bulk earthworks.

5 Roles and Responsibilities

Herbata Ltd will act in the role of client and will also be a key member of the overall Design Team which will also comprise, at minimum, the Project Architect and Design Engineer. Other Team members will be appointed as the RWMP progresses to construction stage including the main contractor.

The main members of the Design Team are as follows:

- Client- Herbata Ltd
- Project Architect- RKD Architects
- Project Engineering- HDR inc.

The Guidelines require that a Resource Manager (RM) be appointed to the Design Team. The RM will be performed by number of different individuals over the life cycle of the construction phase of the Project, however it is intended to be a reliable person, with the requisite authority, chosen from within the Planning/Design/Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the Project RWMP are complied with. The role will include different activities at various stages of the project including conducting waste checks/audits, adopting construction methodology that is designed to facilitate maximum reuse and/or recycling of waste and conducting toolbox talks and awareness training. At pre-construction, the project architect is nominated to the role of RM to manage the RWMP through the design process. In later stages, the contractor appointed will nominate the RM.

5.1 Client Role

The Client is responsible for establishing the aims and the performance targets relating to resource and waste management.

- The Client has commissioned the preparation and submission of a preliminary RWMP as part of the design and planning submission.
- The Client is to commission the preparation and submission of an updated RWMP as part of the construction tendering process.
- The Client will ensure that the RWMP is agreed on and submitted to the local authority prior to commencement of works on site.
- The Client is to request the end-of-project RWMP from the Contractor.

5.2 Design Team Role

The Design Team is formed of architects, consultants, quantity surveyors and engineers and is responsible for:

- Drafting and maintaining the RWMP through the design, planning and procurement phases of the project.
- The Project Architect is the RM to track and document the design process, inform the Design Team, and update the RWMP.
- Ensuring that the design approach follows the principles of the Circular Economy.
- Preparing estimated quantities of all projected waste streams with the support of environmental consultants/scientists. This should include data on waste types and prevention and re-use mechanisms to illustrate the positive circular economy principles applied by the Design Team.
- Before construction commences an inventory of the amounts of materials required will be planned and calculated to prevent waste arising from surplus material brought to site.
- Ensuring that Green Procurement requirements are included in tender documents.
- Handing over of the RWMP to the selected Contractor upon commencement of construction of the development,
- Working with the Contractor as required to meet the performance targets for green procurement, resource efficiency and waste as set out in the RWMP.

5.3 Future Contractor Role

The future construction Contractors, once selected, will be responsible for:

- Updating, implementing, and reviewing the RWMP throughout the site development and construction phases (including the management of all suppliers and sub- contractors) as per the requirements of the guidelines.
- Identifying a designated and suitably qualified RM who will be responsible for implementing the RWMP during construction phase.
- Supporting the RM to ensure they have the requisite authority to carry out the role successfully.
- Implementing the following typical measures on best practice:
    - A “just in time” delivery strategy will be implemented to prevent waste generation by improper storage or weather damage. Deliveries will be arranged to align with project construction stages.
    - Protective packaging on delivered materials will be maintained to prevent damage to materials stored on-site. Storage areas will be maintained as weather-proof.
    - Reject materials damaged during transit will be returned to the supplier.
    - Suppliers will be requested to minimise packaging on goods where it is not required e.g., bricks. Goods, not susceptible to water damage will be sent back to suppliers if excessively packaged. Suppliers will be used who accept returned packaging where possible.
    - Works will be carried out in the correct order to minimise the need for remedial actions which could generate waste.
    - Materials for reuse within the site will be kept clean and dry.
    - Induction training of staff will be completed to improve awareness of the need to prevent waste generation, good waste management practices and the specific measures to be implemented on site.

- Regular tool-box talks will be given to ensure everyone who comes to site knows how to reduce, reuse, and recycle. Site photos of correct and incorrect practices will be used to communicate to staff.
- Resource re-use and waste management will be prioritised and brought up at every progress, co-ordination, and safety meeting to remind construction workers and to provide feedback on how to improve facilities etc.
- Materials coming onto and off-site will be tracked to constantly review wastage rates. High wastage rates will be highlighted, and preventative action taken.
- Regular waste audits will be conducted to determine why waste has been generated and how it can be prevented for future stages.
- Take-back schemes e.g., provided by material producers such as Saint Gobain / Gyproc for gypsum will be used to prevent waste.
- A dry mortar silo will be used to prevent concrete waste arising as quality is more assured on site with this method.
- Off-cuts will be re-used where possible.
- Hoarding etc. that can be dismantled will be fixed so that they can be re-used on other sites.
- Local registered charities such as Men's Shed will be engaged with to determine if off-cuts can be used.

In addition, as part of standard procedures the contractor will be required to:

- Identify all waste collectors to be engaged to transport each of the resources / wastes off-site.
- Identify all destinations for resources taken off-site. As above, any resource that is legally classified as a 'waste' must only be transported to an authorised waste facility by permitted waste collectors.
- Address end-of-waste and by-product notifications with the EPA where required.
- Clarify any other statutory waste management obligations, which could include on-site processing.
- Maintain full records of all resources (both wastes and other resources) for the duration of the project, and
- Prepare a RWMP Implementation Review Report at project handover.

6 Design Approach

The design team and the client have integrated best practice principles within the design process to optimise resource usage to prevent waste generation, ensure sustainable resources are used where possible including recycled material in building materials, prevent or reduce construction waste generation on site through re-use and finally responsible recycling and recovery of waste if it occurs.

“Waste out” and waste prevention design initiatives have been integrated into the overall project design through workshops and continuous feedback within the team.

Workshops will be held at key times as the project progresses; - initially with the client and design team and thereafter to include relevant key personnel as the project progresses.

The workshops/meetings will be documented and will cover designing out waste through:

- Primarily Prevention, Reuse and Recycling.
- Green Procurement Principles.
- Off-Site Construction.
- Materials Optimisation; and
- Flexibility and Deconstruction.

6.1 Design for Prevention, Reuse and Recycling

The site contains 3 no. existing dwellings and agricultural buildings. The existing dwellings and agricultural buildings are not suitable for re-use of materials for the main build but could be used for crusher material for the piling mat.

Existing natural materials such as soils and subsoils will be re-located within the site and therefore do not constitute “waste.” The landscaping proposals for the Project seek to re-use existing natural resources on site where possible.

Later in the process, the construction phase will include for waste prevention, re-use and recycling measures as preliminarily detailed earlier under the role of the contractor.

6.2 Design for Green Procurement

The Design Team will seek to source goods, services, or works with a reduced environmental impact throughout their lifecycle.

In this regard, tender requests will set out the policies and targets set in the RWMP which must be achieved. It will be imperative that the appointed Contractor has a comprehensive understanding of the requirements of the RWMP.

Tenders will be assessed and include scoring for proposals demonstrating how compliance will be achieved with the policies and targets of the RWMP e.g., proposals for use of recycled materials rather than virgin materials, identification of resource efficient and less polluting options as well as developing innovative measures to waste prevention and re-use while on site such as collaboration with supply chains to reduce packaging on incoming goods. For example, tenders where materials certified to BES 6001 Responsible Sourcing of Construction Products are proposed will be favorably considered. Low-carbon products will be preferred.

Typical materials include:

- Irish Cement CEM 2 Eco-Efficient Cement.
- ECOCEM Next Generation Cement.
- Plasterboard made with % recycled gypsum.
- Responsibly sourced Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification (PEFC) timber.

Tenderers will be requested to provide details on measures for waste prevention on site including:

- The implementation of “Just in time” deliveries.
- Proposing resources with reduced packaging.
- Correct management of resources on-site to prevent damage etc.
- Green procurement will be reiterated throughout each stage of development including with sub-contractors etc.

6.3 Design for Off-Site Construction

Off-site construction of building components reduces trades on site and in turn reduces the potential for waste generation. Resource usage is more efficient with less waste on-site.

The design team members have and will ensure that that all components of the structures/infrastructures are standardised and constructed off-site as much as possible within the design phase to prevent the generation of waste.

For example:

- Use of pre-cast concrete slabs or panels etc. will reduce the generation of waste bricks and mortar.
- The use of prefabricated composite panels for walls and roofing reduces residual volumes of insulation and plasterboards.
- Use of pre-cast hollow-core flooring instead of in-situ ready mix flooring or timber flooring reduce the residual volumes of concrete/formwork and wood/packaging, respectively.
- Use of prefabricated pods e.g., bathrooms.

6.4 Design for Materials Optimisation During Construction

Manufacturers and construction companies will be required to adopt lean production models including maximising re-use of materials on site. This will in turn reduce environmental impacts associated with transportation to the site and waste generation. Like Item 6.3 above, this involves the use of standardised sizes for certain type of materials.

In addition, the design team has and will consider where possible:

- Careful cut and fill analysis to ensure that all natural materials are used within the site and that there is no requirement for fill.
- Design freezes are regularly implemented for review. Building Information Modelling (BIM) is used to carry out 3D design coordination analysis thus preventing dimensional conflicts.
- Reduced weight and lower loadings, allowing for thinner structural members and foundations which require less concrete and less reinforcement.
- Sequence construction phases to ensure smooth and efficient operations.
- Reduced materials specified to simplify construction and facilitate process repeatability, thereby reducing potential for waste generation.
- Where standardized construction components do not work then the design team will ensure that manufacturers are contacted to ensure components are pre-sized and cut to prevent waste.

6.5 Design for Flexibility and Deconstruction

The Design Team has and will consider the overall life cycle of the buildings. In this regard, the team has considered the use of materials and products that can be easily recycled and are designed to be easily disassembled to allow potential re-purposing of the buildings in the future. Adaptability is a key design feature as set out in the Design Statement prepared by the Project Architects. For example, partitions are demountable and can be re-configured or re-used.

7 Key Materials, Quantities and Costs

The project specific targets for efficient resource usage, waste prevention, reuse, recycling, and recovery are set out earlier in Section 3.4 of this document e.g., at a minimum 70% of waste materials will be diverted from landfill.

Taking account of these targets or KPIs, an estimated resource and waste inventory in line with the template provided in Appendix D of the 2021 Guidelines is provided. The following is included:

- 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, re-use of resources and recycling, energy recovery, backfilling or other recovery and disposal for each waste material.
- The estimated cost of resource management.

7.1 Predicted Waste Generation

The typical breakdown of construction waste collected from Irish sites, taken from the EPA website is based on 2021 (latest) figures as presented in the *Table 7-1* below:

Table 7-1. Breakdown of Construction and Demolition Waste on Irish Sites

Waste Types	%
Soil, Stones, and dredging spoil	85.10
Metals	2.80
Concrete, bricks, tiles, and gypsum	6.70
Segregated wood, glass, and plastic	0.40
Bituminous mixtures	1.00
Mixed C&D waste	4.00
Total	**100.0**

Excluding soils, stones and dredging spoil, the breakdown of the remaining waste is presented in the *Table 7-2*.

Table 7-2. Breakdown (Excluding Soils and Stones)

Waste Types	%
Mixed C&D	26.89
Bituminous mixtures	6.48
Segregated wood, glass, and plastic	2.37
Metals	19.11
Concrete	45.14
Total	**100.00**

The treatment of C&D waste (excluding soils, stones etc.) is set out in *Table 7-3* based on 2021 figures:

Table 7-3. Waste Treatment (Excluding Soils and Stones)

Method	%
Recycling	44.44
Energy Recovery	16.67
Disposal	38.89
Total	**100.00**

It is clear from the table above, that disposal e.g., to landfill or incineration without energy recovery is still the most prevalent method for waste treatment.

The final treatment of C&D waste streams in 2021 is presented in *Table 7-4* below.

Table 7-4. Final Treatment of Waste Reported in 2021

Category	Recycling (%)	Energy Recovery (%)	Back-filling (%)	Disposal (%)
Soil, Stones, and dredging spoil	0	0	94	6
Metals	100	0	0	0
Concrete, bricks, tiles, and gypsum	45	0	52	3
Segregated wood, glass, and plastic	77	21	1	1
Bituminous mixtures	49	2	40	10
Mixed C&D waste	0	0	72	28
Waste Treatment Residues	24	4	18	53

Waste arisings have been calculated based on waste benchmarks set out in BREEAM (Building Research Establishment Environmental Assessment Methodology) for the Project construction phase. A value of ≤13.3 m^3 or 11.1 tonnes/100m^2 (gross internal floor area) development was applied (excluding soils and stones) as a Key Performance Indicator (KPI) for the Project.

The total gross internal floor area is 12,803.45m^2. Therefore, the total construction waste expected to be generated (excluding soils and stones) based on 11.1 tonnes/100m^2 is 1,421.18 tonnes split out as follows:

Table 7-5. Predicted Site- Specific Waste Generated

Waste Types	%
Mixed C&D	26.89
Bituminous mixtures	6.48
Segregated wood, glass, and plastic	2.37
Metals	19.11
Concrete, brick, tiles, and gypsum	45.14
Total	**100.00**

Each waste stream indicated above in *Table 7-5* is then split out into predicted re-use/recycle/ backfill/disposal rates and quantities using the EPA 2021 % rates as presented in *Table 7-4*. The template provided in *Appendix D of the 2021 Guidelines* is to be completed by the Main Contractor as shown in *Table 7-6*. This will form the baseline from which improvements will be measured and recorded throughout the project. At a minimum, waste generation shall not exceed these figures.

For example, as shown in *Table 7-4*, the EPA data for 2021 indicates that 52% of concrete, bricks, tiles and gypsum, the largest waste sources excluding soils and stones, are recovered by backfilling. Similarly, 72% of mixed C&D waste is backfilled. Therefore, an objective for this project will be to minimise the volume of waste going off-site to backfilling using the waste prevention mechanisms listed earlier.

The template in *Table 7-6* below will be completed regularly and updated throughout the project by the Resource Manager to ensure target(s) are met and recorded. Where slippage occurs, measures will be implemented immediately. In addition, any other waste types arising throughout the project will be recorded on the template Table 7-6.

Where prevention or re-use of materials has occurred on site, then this will also be measured and recorded on *Table 7-6*. A final version of *Table 7-6* will be fully completed at the end of the project for all materials /wastes. This will serve as a learning tool to inform future practices on other sites.

Table 7-6. Proposed Overall Resource and Waste Inventory template to be populated throughout the project by the contractor.

LoW Code	Description	Vol Generated (t)	Prevention (t) non-waste	Reused (t)non-waste	Recycled (t)(waste)	Recovered **(t) (waste)	Disposed (t)(waste)	Unit cost rate (€/t)	Total cost (€)
17 01 01	Conc.								
17 01 02	Brick								
17 01 03	Tiles and Ceramics								
17 02 01	Wood								
17 02 02	Glass								
17 02 03	Plastic								
17 03 02	Bit. Mix								
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	Soils and Stone								
17 06 04	Insulation								
17 08 02	Gypsum								
17 09 04	Mixed C&D Waster								
17 01 06*	Mix. Conc. Blocks, tile, ceramics								

17 02 04*	Glass, Plastic, and wood								
17 03 01*	Bit Mixture								
17 04 09*	Metal Wastes								
17 05 03*	Soil and Stone								
17 06 05*	Const. Materials								

**Hazardous*

***Recovery means energy, recovery, backfilling, and other recovery*

8 Site Management and Infrastructure

The following are outline requirements that shall be adopted by the Contractor at construction phase:

- As noted under “Roles and Responsibilities” a specified the Project Architect is the RM during the construction stage.
- Resource efficient supply chains shall be implemented. Put simply, the involves “doing more, with less” and is a cost-effective measure that is implemented at all project stages from planning to construction. At construction stage, this can involve swapping out virgin materials for recycled materials, reduced packaging on incoming goods, and using waste segregation for high quality recovery rates.
- The RWMP shall be outlined at the induction training for all employees and sub-contractors.
- The induction training of staff will be completed to improve awareness of:
  - The need for efficient use of resources,
  - Prevention of waste generation,
  - Good waste management practices, and,
  - The specific measures to be implemented on site regarding reuse, segregation and maintaining the correct conditions to facilitate this.
- Regular tool-box talks will be given to ensure everyone who comes to site knows how to reduce, reuse, and recycle. Site photos of correct and incorrect practices will be used to communicate to staff.
- Resource re-use and waste management will be prioritised and brought up at every progress, co-ordination, and safety meeting to remind construction workers and to provide feedback on how to improve facilities etc.
- Adequate waste segregation bins will be installed to prevent mixing of wastes. C&D mixed waste will be avoided. These will be located close to working areas to ensure that workers have the infrastructure to achieve the objectives of reduce, re-use and recycle.
- The preference is to fully implement on-site waste segregation as disposal of mixed waste off-site is the most expensive option. However, Herbata Ltd. will appoint a waste contractor who can provide off-site segregation of mixed wastes for onward recycling/recovery should any inadvertent mixing occur.
- Materials for off-site recycling will be kept clean and dry.
- Regular monitoring of waste receptacles will be completed by ‘Recycling Champions’ and logged to ensure that the correct materials are going into them.
- Robust signage will be placed on all bins and skips clearly stating what materials can be placed in them. Closed bins will be provided for plasterboard recycling. Separate bins will be provided for all materials such as wood, metal, WEEE, plasterboard, concrete, bricks etc.
- Dedicated bunded receptacles will be provided in the construction compound for hazardous waste arisings such as lubricating oils, paints, and other chemicals.
- Awareness signage will also be placed around the site for maximising resource usage and waste prevention.

Where material does leave the site as waste, the following will apply:

All movement of waste and the use of waste contractors will be undertaken in accordance with the Waste Management Acts 1996 - 2011, Waste Management (Collection Permit) Regulations 2007 as amended, and Waste Management (Facility Permit and Registration) Regulations 2007 as amended.

Waste will be transported by waste contractor(s) holding current waste collection permits as applicable, and,

Will be sent to facilities holding the appropriate registration, permit or license only.

All waste will be documented prior to leaving the site.

Waste will be weighed either by weighing mechanism on the truck or at the receiving facility. Smaller quantities may be estimated. A Waste Register will be used to track waste leaving the site and will contain the following information, as applicable:

- Date
- Time
- Waste Contractor
- Collection Permit
- Vehicle Reg
- Driver Name
- Docket No.
- Waste Type
- LoW
- Proposed destination and treatment (recycling, recovery, disposal)

A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licenses will be always maintained on site. Subcontractors who have engaged their own waste contractors, will provide the main contractor with a copy of the waste collection permits and COR/permit/license for the receiving waste facilities and maintain a copy on file available for inspection on site as required.

Waste transfer forms (WTF) will be used for the transfer of hazardous waste and kept on-site along with details of the destination (COR, permits, licenses etc.). A receipt from the destination of the material will be kept as part of the on-site waste management records.

Any waste transfer dockets, WTFs and the register will be collated and reviewed by the Resource Manager on a regular basis. *Table 7-6* will be updated accordingly. Documents will be maintained for at least 3 years.

At this juncture, it is not possible to list all waste facilities proposed as final destinations for each waste stream however locally based authorised operators/facilities will be used.

9 Audits and Inspections

The RW shall be responsible for carrying out waste audits and inspections.

At a minimum, daily housekeeping checks of waste infrastructure will be made and recorded. Unusual activities such as high levels of waste generation will be monitored. Where an incident occurs, corrective and preventative action will be taken immediately.

Regular audits will be conducted covering:

- Resource/waste re-use, recycling, and recovery records.
- Construction workers awareness and training.
- Review of waste contractors and hauliers permits and licenses etc.
- Initiatives for resource efficiency implemented.

A record of each audit shall be maintained with corresponding details of non-compliances and preventative and corrective actions assigned where necessary.

10 Communication with the Local Authority

This RWMP shall be updated regularly and submitted to KCC throughout the construction phase. A final report will be prepared at the end of the project detailing at a minimum, the rates of reuse, recycling, and recovery of material and associated costs.

Once construction contractors and waste contractors have been appointed, and prior to removal of any C&D waste materials offsite, details destination of each waste stream will be provided to the KCC Waste Regulation Unit.

KCC will also be consulted, as required, throughout the site development and construction phases to ensure that all available waste reduction, reuse, and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

11 References

- A Waste Action Plan for a Circular Economy, Ireland’s National Waste Policy 2020 - 2025, Department of Environment, Climate and Communications, Sept 2020.
- Best Practice Guidelines for the Preparation of Resource and Waste Management Plans, for Construction and Demolition Projects, EPA, November 2021.
- Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions A new Circular Economy Action Plan for a Cleaner and more Competitive Europe COM 2020/98 final.
- Decision (EU) 2022/591 of the European Parliament and of the Council of the 6 April 2022 on a General Union Environmental Action Programme to 2030.
- Design out Waste, A Design Team Guide to Waste Reduction in Construction and Demolition Projects, EPA Research.
- Eastern-Midlands Region Waste Management Plan 2015 - 2021, Dublin City Council.
- Kildare County Development Plan 2023 - 2029, Kildare County Council.
- Naas Local Area Plan (LAP) 2021 - 2027, Kildare County Council.
- National Waste Statistics, Summary Report for 2021, EPA, August 2023