

Limerick City & County Council in partnership with Limerick Twenty Thirty DAC

Cleeves Riverside Quarter

Circular Economy Statement

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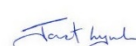
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1. Introduction

This Circular Economy Statement (CES) has been prepared by Arup on behalf of Limerick City & County Council in partnership with Limerick Twenty Thirty DAC (LTT) as part of a planning application for the proposed Cleeves Riverside Quarter Development.

Limerick City and County Council, in partnership with Limerick Twenty Thirty DAC, intends to seek the approval of An Coimisiún Pleanála in accordance with Section 175 and 177AE of the Planning and Development Act 2000, as amended, for a mixed-use development that seeks the regeneration and adaptive reuse of a strategic brownfield site, as part of the Limerick City and County Council ‘World Class Waterfront revitalisation and transformation project’.

The requirement for a CES in respect of the proposed development comes from the *Limerick Development Plan 2022 – 2028*, which states that “*To adopt the principle of the circular economy more fundamentally, applicants shall be required to submit a Resource Management Plan, including a Circular Economy Statement, covering different phases of the project from initial design through to construction and end-use functioning*”. The CES is a novel document in the context of planning applications in Ireland.

1.1 Objectives

The objectives of this CES are to:

- Reduce resource use and waste generation associated with the construction and operation of the proposed development;
- Keep products, materials and components used in the proposed development in use for as long as possible during their lifecycle; and
- Promote regenerative design in the proposed development.

1.2 Contents

The contents of this CES are set out as follows:

- **Section 2** provides an overview of the relevant policies and legislation – a detailed review of these is provided in **Appendix A**.
- **Section 3** provides an overview of best practice guidelines and other key publications of relevance to the report – a detailed review of these are provided in **Appendix B** and **Appendix C**, respectively.
- **Section 4** provides a summary of the proposed development.
- **Section 5** provides details of the circular design workshop held with representatives of the project design team to promote circular design and inform the CES.
- **Section 6** identifies the project-specific circular economy targets.
- **Section 7** provides an overview of circular design approaches of relevance to the proposed development.
- **Section 8** identifies the potential and proposed circular measures identified for the proposed development.

1.3 Related Reports

A number of standalone reports of relevance to the CES have been prepared and submitted alongside this document as part of the planning application for the proposed development, including the following:

- Pre-demolition Audit Report;
- Construction and Demolition Resource and Waste Management Plan (CDRWMP);

- Operational Waste Management Plan (OWMP);
- Structural Report;
- Construction Environmental Management Plan (CEMP);
- Environmental Impact Assessment Report;
- Architectural Design Report; and
- Illustrative Masterplan Vision Document.

In reading this CES, regard should be had to the contents of the above-listed related reports.

2. Relevant Policies and Legislation

In the preparation of this CES, regard has been had to the relevant policy documents and legislation, as listed in Table 1. The proposed development adheres to the relevant policy documents and legislation related to resource and waste management. A detailed review of each of these is provided in **Appendix A**.

As noted in Section 1, the requirement for a CES for of the proposed development comes from the *Limerick Development Plan 2022 – 2028*, which states the following:

*“The concept of the circular economy can be applied to the whole lifecycle of new developments, from planning and design right through demolition, construction, end-use and repurposing or end of life of a development. **To adopt the principle of the circular economy more fundamentally, applicants shall be required to submit a Resource Management Plan, including a Circular Economy Statement, covering different phases of the project from initial design through to construction and end-use functioning.** This approach would help the application of modular construction and the facilitation for easy repair and replacement of components and repurposing for reuse. Avoidance of demolition should be promoted in order to promote circularity and/or design for disassembly to facilitate reuse and recycling of materials back into a circular economy loop. An important source of information is the Environment Protection Agency’s Draft Best Practice Guidelines for the preparation of Resource Management Plans for Construction and Demolition Waste Projects.” (emphasis added)*

Table 1: Relevant policies and legislation

Scope and source	Item	Year
Multilateral – United Nations	<i>United Nations 2030 Agenda and Sustainable Development Goals</i>	2015
European Union – European Commission	<i>Waste Framework Directive (Directive 2008/98/EC)</i>	2008
	<i>European Green Deal</i>	2019
	<i>Circular Economy Action Plan</i>	2020
	<i>8th Environment Action Programme</i>	2022
	<i>Ecodesign for Sustainable Products Regulation</i>	2024
	<i>Construction Products Regulation</i>	2024
	<i>Clean Industrial Deal</i>	2025
National – Government of Ireland	<i>Waste Management Act, 1996</i>	1996
	<i>European Union (Waste Directive) Regulations 2011-2020</i>	2011
	<i>Waste Action Plan for a Circular Economy 2020-2025</i>	2020
	<i>Circular Economy and Miscellaneous Provisions Act 2022</i>	2022
	<i>Whole of Government Circular Economy Strategy 2022-2023</i>	2022
	<i>National Waste Management Plan for a Circular Economy 2024-2030</i>	2024
	<i>Buying Greener: Green Public Procurement Strategy and Action Plan 2024-2027</i>	2024
	<i>Climate Action Plan 2025</i>	2025
Regional and Local – Limerick City & County Council	<i>Limerick Development Plan 2022-2028</i>	2022

3. Best Practice Guidelines

In the preparation of this Circular Economy Statement, regard has been had to the relevant best practice guidelines and other relevant publications, including those listed in Table 2. Detailed summaries of these publications are provided in Appendix B and Appendix C.

There are no national guidelines for the preparation of CES in Ireland. In the absence of national guidelines, the Greater London Authority's *London Plan Guidance: Circular Economy Statements* (the 'London Plan Guidance' hereafter) is referred to as the best practice guidance document to inform the preparation of CES.

Additionally, as highlighted in Section 2, the Limerick Development Plan 2022 – 2028 recommends that regard should be had to the EPA *Best Practice Guidelines for the preparation of resource & waste management plans for construction & demolition projects* (2021) (the 'EPA Guidelines' hereafter) in the preparation of the CES.

Table 2: Relevant best practice guidelines and other publications

Category	Item	Source	Year
Best practice guidelines	<i>Guidance on Soil and Stone By-products (Version 3)</i>	EPA	2019
	<i>By-product Guidance Note</i>	EPA	2020
	<i>Best Practice Guidelines for the preparation of resource & waste management plans for construction & demolition projects</i>	EPA	2021
	<i>London Plan Guidance: Circular Economy Statements</i>	Greater London Authority	2022
	<i>Construction & Demolition Waste Management Protocol including Guidelines for Pre-demolition and Pre-renovation Audits of Construction Works</i>	European Commission	2024
Other key publications	<i>Circularity Gap Report – Ireland</i>	Circle Economy	2024
	<i>Building a Circular Ireland Roadmap 2025-2040</i>	IGBC	2025

4. The Proposed Development

4.1 Development Description

The proposed development comprises Phase II, of an overall Masterplan with four phases of development proposed. Phase II is subsequent to ongoing stabilisation and repair of the Flaxmill protected structure (Phase I). Phase III is intended to comprise an educational campus, inclusive of the adaptive reuse of the Flaxmill Building as part of that development and will be subject to a future separate application. Phase IV comprising the Shipyard site will be the final phase of development.

The proposed development provides for the (A) Demolition of a number of structures to facilitate development and (B) Construction and phased delivery of (i) buildings within the site ranging in height from 3 – 7 stories (with screened plant at roof level) including (a) 234 no. residential units; (b) 270 no. student bedspaces (PBSA) with ancillary resident services at ground floor level; (c) 256sqm of commercial floorspace; and (d) a creche; (ii) extensive public realm works, (iii) riverside canopy and heritage interpretative panels, (iv) 3 no. dedicated bat houses; (v) Mobility Hub with canopy; and (vi) all ancillary site development works including (a) water services, foul and surface water drainage and associated connections across the site and serving each development zone; (b) attenuation measures; (c) raising the level of North Circular Road; (d) car and bicycle parking; (e) public lighting; (f) telecommunication antennae and (g) all landscaping works. Consent is also sought for use of the PBSA accommodation, outside of student term time, for short-term letting purposes.

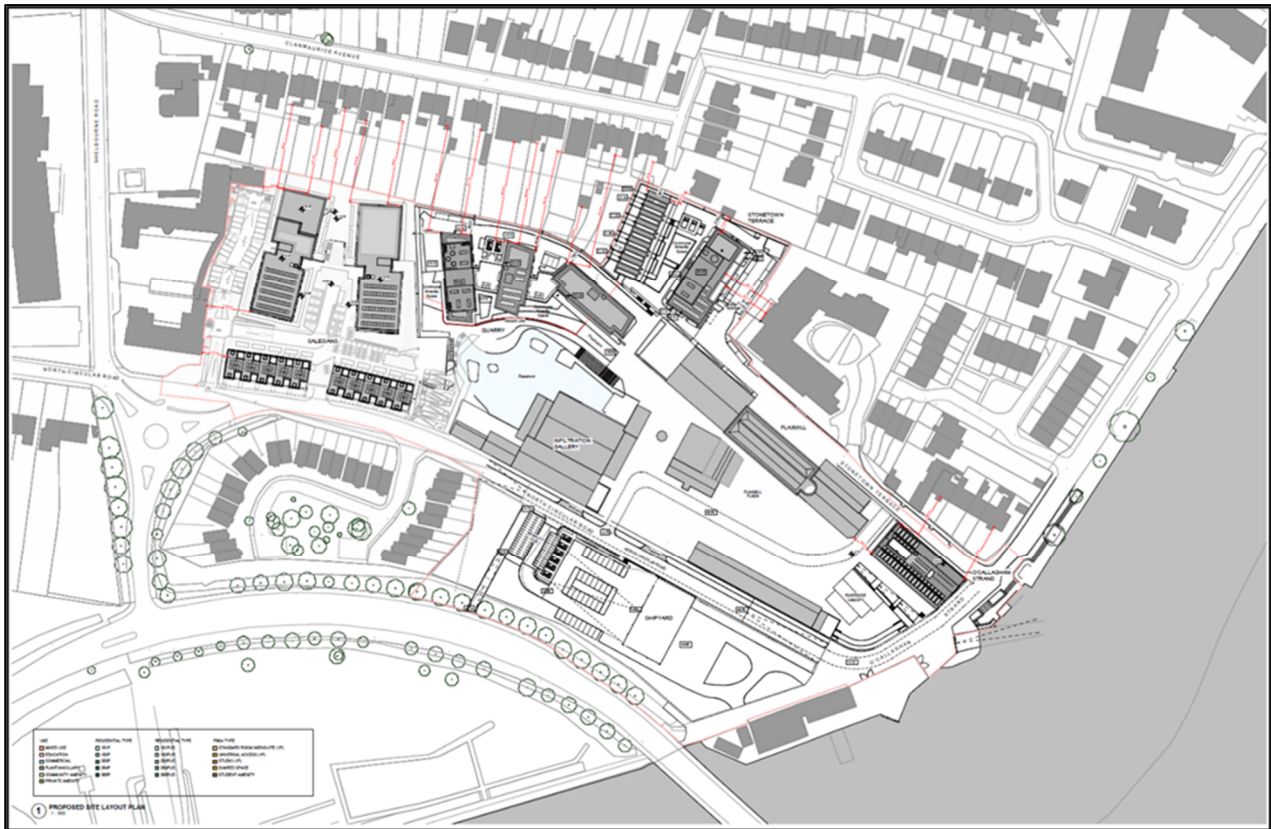


Figure 1: Site layout

4.2 Site Location

The site of the proposed development is located at North Circular Road and O'Callaghan Strand, immediately north-west of the River Shannon in Limerick City. It is situated in a built-up, urban area, with surrounding uses including educational, recreational/sports, commercial, industrial and residential.

The site of the proposed Cleeves Riverside Quarter development is currently occupied by numerous (approx. 18) disused industrial buildings, including Protected Structures; areas of hardstanding and revegetating bare ground. The site was used for quarrying and ship repairs c. 1830s, with numerous

developments in the intervening years, and has been disused/vacant since 2011. Historic uses have included quarrying of limestone, flax spinning and weaving, processing of flour, production of dairy products and sweets (including condensed milk, toffee), ship repairs, and production of metal cans and wooden crates.

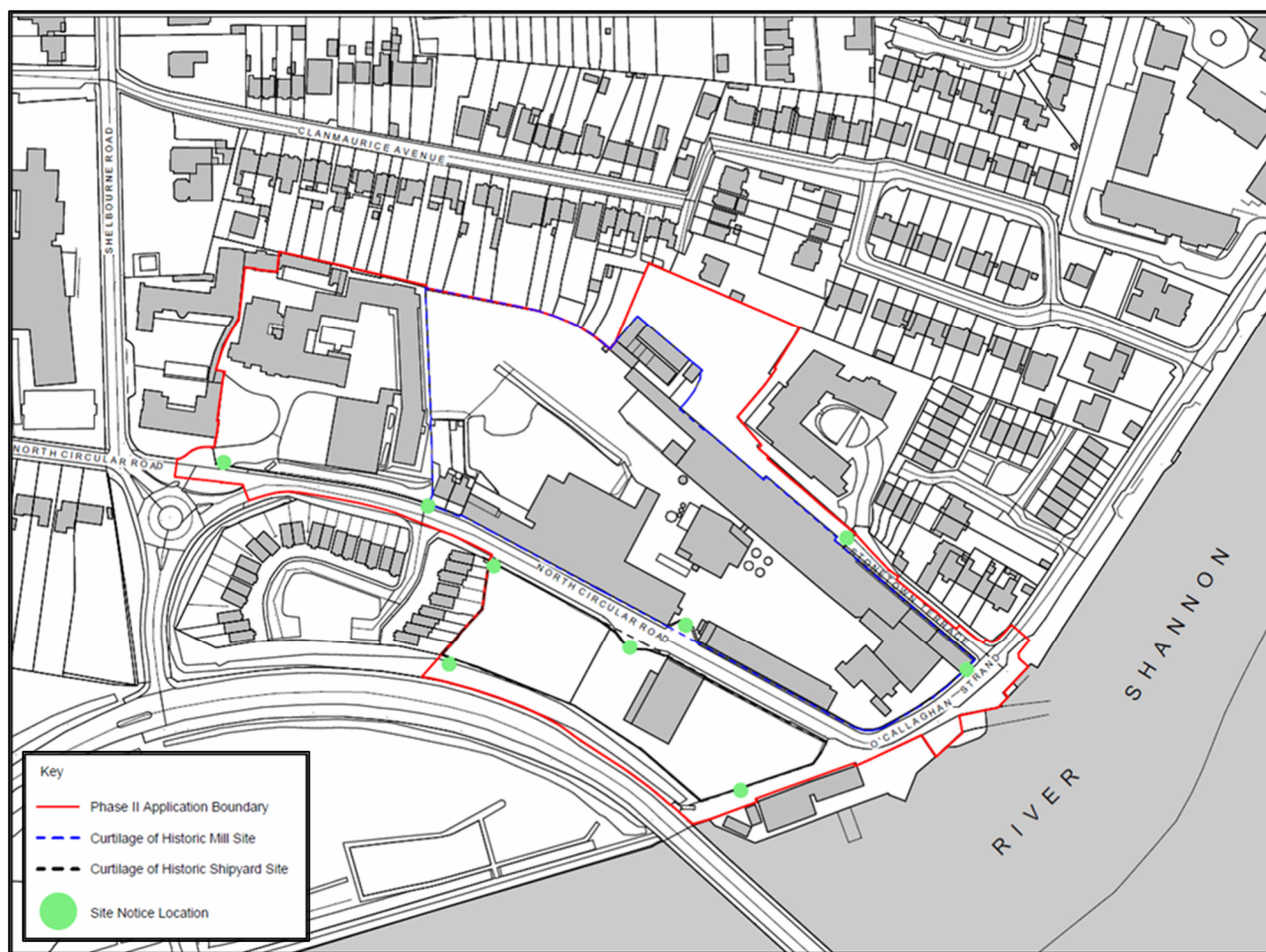


Figure 2: Existing site location plan

4.3 Proposed Construction and Demolition Works

As detailed in Chapter 2 of the EIAR (Project Description), it is envisaged that the project will be delivered in nine distinct but overlapping stages. Depending on market conditions and delivery mechanisms, some stages may progress more quickly or slightly ahead of others. The anticipated sequence of stages is outlined below and detailed further in Chapter 2 of the EIAR:

- **Stage 1: Construction of Bat Houses** - A 3-month period is allocated exclusively to this stage to allow bats on-site to adjust to their new accommodation. No other construction activity will overlap with this stage.
- **Stage 2: Site Demolition and Enabling Works** - This stage involves demolishing identified buildings and structures to facilitate development and installing enabling drainage infrastructure across the Flaxmill area. Temporary surface treatments will be applied to support access to the upper-level sites (Salesians and Stonetown). This stage is expected to take 12–15 months.
- **Stage 3: Flood Protection Works** - Raising the North Circular Road and implementing other flood protection measures will occur concurrently with Stage 2 and is expected to take 15 months.
- **Stage 4: Salesians Zone Development** - Construction of apartments and townhouses, along with local public realm and communal open spaces, will begin midway through Stage 2. This stage is expected to take 18–24 months.

- Stage 5: Stonetown Terrace Zone Development - This stage will likely begin alongside Stage 4 and take 15–18 months. Given its timeline, Stonetown Terrace is expected to be the first zone ready for occupation.
- Stage 6: O’Callaghan Strand Zone Development - Construction of apartments in this zone will begin midway through the Stonetown Terrace works and is expected to take 15 months, likely completing before the Salesians Zone.
- Stage 7: Quarry Zone PBSA and Public Realm - This stage includes the construction of Purpose-Built Student Accommodation (PBSA) and associated amenities, as well as public realm improvements around the reservoir. It is expected to take 24 months.
- Stage 8: Flaxmill Plaza and Riverside Public Realm - Delivery of Flaxmill Plaza and riverside canopy works is anticipated to take 15 months. This stage will begin after the completion of Stonetown Terrace but before the Salesians Zone is finished. Completion is expected to align with the PBSA.
- Stage 9: Shipyard Mobility Hub - The final stage involves constructing the Mobility Hub on the Shipyard site, along with associated site works. This will commence once all other stages are complete and is expected to take 6 months

It is envisaged that the Shipyard site will be utilised as a construction compound with access via the existing access arrangement on North Circular Road. There is the potential for a secondary compound/storage area to facilitate construction of O’Callaghan Strand on part of the Flaxmill site, while construction of the PBSA in the quarry can be facilitated with a compound in the area of vehicular access and partial open spaces between the wings. Stockpiles of C&D resources and waste materials (including excavated materials) will primarily be stored at the Shipyard site.

The CDRWMP provides a detailed breakdown of estimated waste arisings from the proposed deconstruction/demolition, earthworks and construction works for the proposed development.

For further details of the proposed construction methodology and phasing, refer to Chapter 2 of the EIAR (Project Description) and the CEMP for the proposed development.

4.3.1 Proposed Deconstruction & Demolition Works

As described in the Masterplan Vision Document, it is an objective of the overall vision for the Cleaves Riverside Quarter to retain and reuse existing built heritage on site, where appropriate. As stated in the Architectural Design Statement, the proposed development takes a conservation-led approach. Existing structures for retention, redevelopment or removal have been carefully identified with consideration of architectural heritage and historic significance and viability of reuse. The proposal aims to achieve maximum retention of historic fabric of the site. Particular structures have been identified for redevelopment or removal (e.g., where substantial change has eroded heritage value, or where retention would likely compromise the future viability of the development). Where structures are noted for demolition, the intention is to reuse materials in the consolidation and repair of the historic structures in the complex, where possible.

As described in the project description in Section 4.1, it is proposed to retain *in situ* several existing structures on the site, two of which are designated Protected Structures; the Flaxmill Building (LCCC RPS reg. no. 3265; NIAH reg. no. 21512053) and the Chimney Stack (RPS reg. no. 3264; NIAH reg. no. 21512059).

For other structures on the site, it is proposed to deconstruct/demolish to facilitate the proposed development (refer to Figure 3, below). As described in Section 4.1, structures identified for whole or partial demolition include the following:

- Salesians Secondary School and Fernbank House;
- Mid and late 20th Century building structure adjoining Cold Store (former Weaving Mill);

- Upper Reservoir on Stonetown Terrace comprising 2 no. structures;
- Linen Store and later 20th Century store next to Linen Store on Stonetown Terrace/O'Callaghan Strand;
- Office and Laboratory Building on O'Callaghan Strand;
- Packaging Offices on North Circular Road;
- 2 no. Houses on North Circular Road;
- Warehouse on the Shipyard site;
- Stone boundary wall adjoining O'Callaghan Strand (partial removal); and
- 20th Century extension at rear of Main Mill.

Various types of construction materials and waste will be generated as a result of these works, including concrete, brickwork, steel and other metals, timber, natural stone, gypsum-based materials, and asphalt. The nature and quantities of these materials are further detailed in the Pre-demolition Audit Report, submitted under separate cover. The CDRWMP provides a detailed breakdown of the estimated resource and waste arisings from the proposed deconstruction and demolition works, and a strategy for the management of these streams. Details of the proposed demolition works are provided in the CEMP for the proposed development.

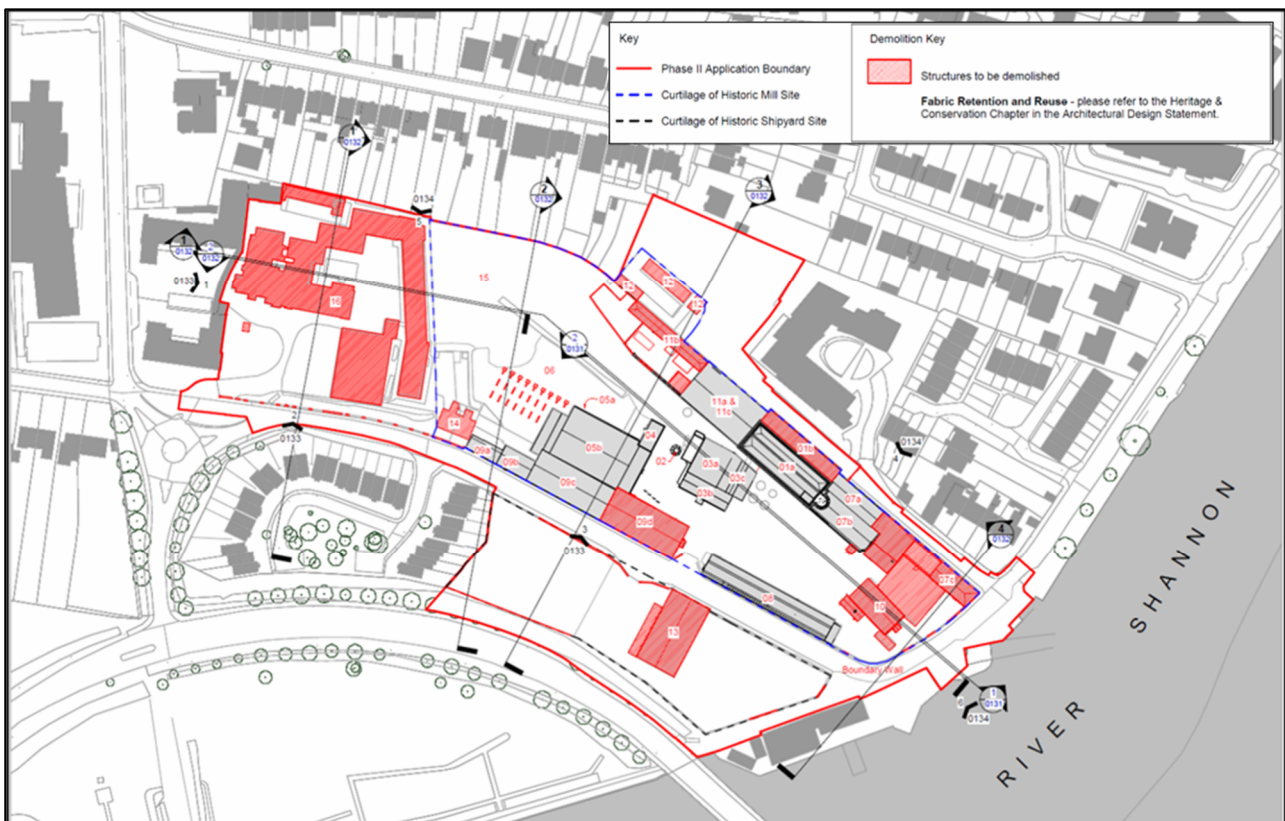


Figure 3: Demolition site plan

4.3.2 Proposed Earthworks

During the construction phase, earthworks (excavations) will be required to achieve the required formation levels, for building foundations and substructures, internal road network and parking areas, and installation/diversion of site services and utilities. Section 8.4 provides a breakdown of envisaged excavation material volumes and a strategy for the reuse and/or recovery of same.

5. Circular Design Workshop

A Circular Design Workshop was held with key members of the design team on Tuesday, 6 May 2025. Existing circular design approaches integrated into the design were identified, and the potential for further integration of circular design approaches was explored. Attendees of the workshop included representatives from Arup, LTT, FCBS, BMA and AtkinsRéalis.

The workshop used Arup's Circular Buildings Toolkit, co-developed with the Ellen MacArthur Foundation, as a framework for the workshop. The Toolkit is structured around four principles for circular buildings – build nothing, build for long-term value, build efficiently, and build with the right materials – with a series of corresponding circular design approaches, as illustrated in Figure 4.

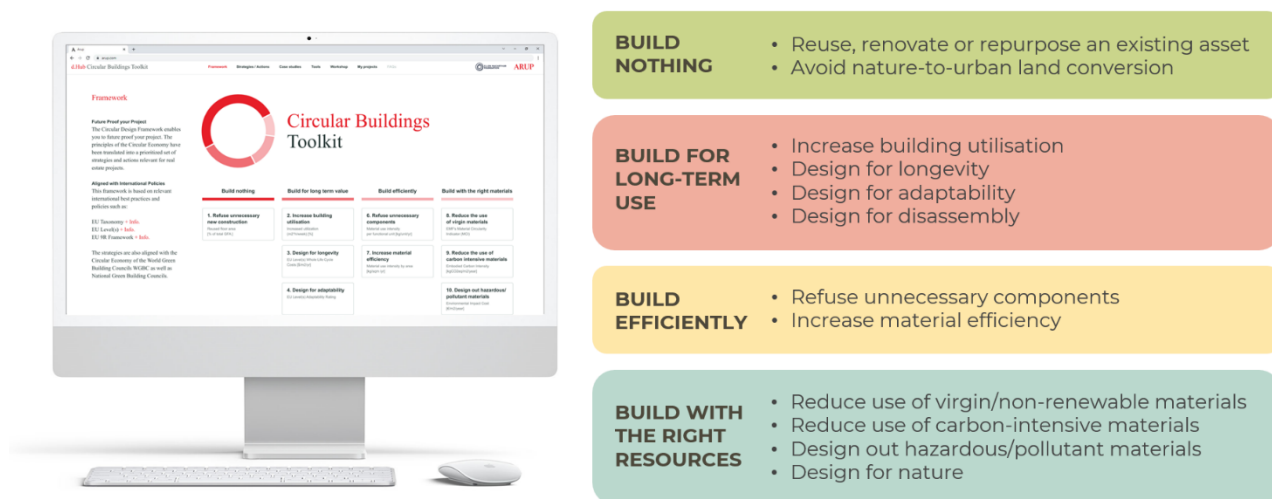


Figure 4: Arup Circular Buildings Toolkit: circular design approaches

6. Circular Economy Project Targets

As required in the London Plan Guidance, circular economy targets for the construction and demolition phase of the proposed development are set out in Table 3, below. These have also been informed by the recommendations in the EPA Guidelines regarding KPIs and target setting. These may be revised, as appropriate, during the detailed design stage (e.g., on the basis of new information and/or new targets set out in national or regional policies).

Table 3: Construction stage circular economy KPIs and proposed targets

KPI	Proposed target
Fraction of waste to landfill	0%
Percentage (%) recovery of total volume C&D non-hazardous waste, excluding soil and stone	95%
Percentage (%) reuse of total volume uncontaminated soil and stone – both on-site (preferred) and off-site as by-product	95%
Volume of waste generated per 100 m ² gross internal area (GIA)	≤ 3.2 tonnes

7. Circular Design Approaches

As required in the London Plan Guidance, the CES should document the circular economy design approaches adopted in the proposed development.

The key circular design approaches, following on from the Circular Design Workshops and as per the Arup Circular Building Toolkit, adopted for the proposed development are as follows:

Build nothing

- Refuse unnecessary new construction
 - Reuse, renovate or repurpose an existing asset

Build efficiently

- Increase material efficiency
 - Reduce material waste at production and construction through off-site prefabrication of building structure and envelope components

Build with the right resources

- Reduce the use of virgin and non-renewable materials
 - Use engineered timber (or other biobased materials) in building structures

Specific circular approaches considered and adopted are described in further detail in Section 8, below.

8. Potential and Proposed Circular Measures

This section identifies potential and proposed circular design measures for the proposed development based on a review of the project plans and particulars and input received during the Circular Design Workshop with the design team. These measures are subject to further consideration and feasibility assessment at detailed design stage. Appendix D provides a number of case studies demonstrating how similar circular economy initiatives have been successfully implemented

8.1 General

The on-site reuse of site-won materials will be prioritised over off-site reuse or recovery under the Regulation 27 and 28 regimes, respectively.

Where there is surplus of site-won material that cannot be reused on-site, opportunities will be identified to reuse or recover this material in accordance with the European Union (Waste Directive) Regulations 2011-2020, in collaboration with other projects, sites and initiatives, prioritising those in closest proximity to the proposed development.

The Contractor shall ensure that all materials for on-site reuse and by-products will be tested, as appropriate, to ensure suitability for the intended use, in accordance with the relevant standards/regulations.

8.2 Reuse of Existing Sites and Structures

The proposed development is situated on a brownfield site that has been used for various industrial activities and enterprises since c. the 1830s, as highlighted in Section 4, above. The redevelopment of the site, which has been vacant since 2011, constitutes a sustainable infill development within the existing built-up footprint of Limerick City Centre, in an area already well served by existing infrastructure and amenities to meet the needs of the future inhabitants and users. This represents a circular alternative to greenfield residential development, which results in approximately 30% more embodied carbon per dwelling.¹

As detailed in Section 4 **Error! Reference source not found.**, the proposed development represents one phase of the wider Masterplan for the Cleaves Riverside Quarter (CRQ). The present proposal is comprised of the new build elements. As part of the wider Masterplan, there are a number of existing heritage structures that will be retained and redeveloped, including the Flax Mill, Chimney Stack, Engine House and the Dairy Buildings. While the present proposal does not include the redevelopment of these structures, it has been designed in a manner that is cognisant of and will enable the future adaptive reuse of these structures.

8.3 Material Reuse in the Public Realm

The circular design principles of retention and reuse have been integrated into the design of the proposed development. Some examples of material reuse proposals and opportunities in the public realm are highlighted in this section.

The proposed development includes the public realm redevelopment for the majority of the CRQ Masterplan area. There is a significant opportunity for material reuse in the public realm as part of this proposal. It is proposed to retain and reuse existing materials on the site within the public realm, to the extent practicable.

It is proposed to retain existing architectural heritage elements, including stone walls, *in situ* in the public realm, where appropriate. Figure 5, below, identifies existing walls proposed for retention. Where it is necessary to deconstruct existing walls, stone from these will be salvaged for reuse on-site, where feasible (e.g., in gabion baskets, landscaping).

The landscape design proposes the reuse of cobbles as paving inlays alongside concrete paving units. There are salvaged cobbles from a previous development stored on the site that will be integrated into the proposed

¹ Brady, G., Comerford, P., Reddy C., Crowe, P., Kinnane, O., Barry, P., Crowley, B. & Varghese, J. (2024) *Viable Homes: Guidelines for planners on the design and building of low carbon, low rise, medium density housing in Ireland*, Version 1.0. [Project funded by Construct Innovate]. Available at: https://www.igbc.ie/wp-content/uploads/2024/02/Viable-homes_guidance_v1.0_24-01-30.pdf. Accessed July 2025.

landscape design, where feasible. It may also be possible to expose and retain *in situ* existing cobbles on the site that have been paved over in the intervening years.

The landscape design proposes the retention of existing concrete hardstanding *in situ* in localised areas. It is proposed to create a paving pattern by cutting into, excavating and inlaying small pockets of the existing hardstanding. Where concrete hardstanding is not retained *in situ*, it is proposed to crush and reuse concrete on-site as fill material, where feasible.

There may also be opportunities to reuse reclaimed timber and steel from the site in the landscape design (e.g., as street furniture, in SuDS features). For example, it is proposed to reuse steel I-beams in the cascading SuDS feature at Stonetown Terrace.

Reuse of site-won materials requires early planning and consideration to ensure the necessary authorisations and enabling factors are in place in good time. Material types, quantities and proposed fates will be identified at the earliest possible opportunity in project development and planning, in order to promote optimal outcomes in this regard.

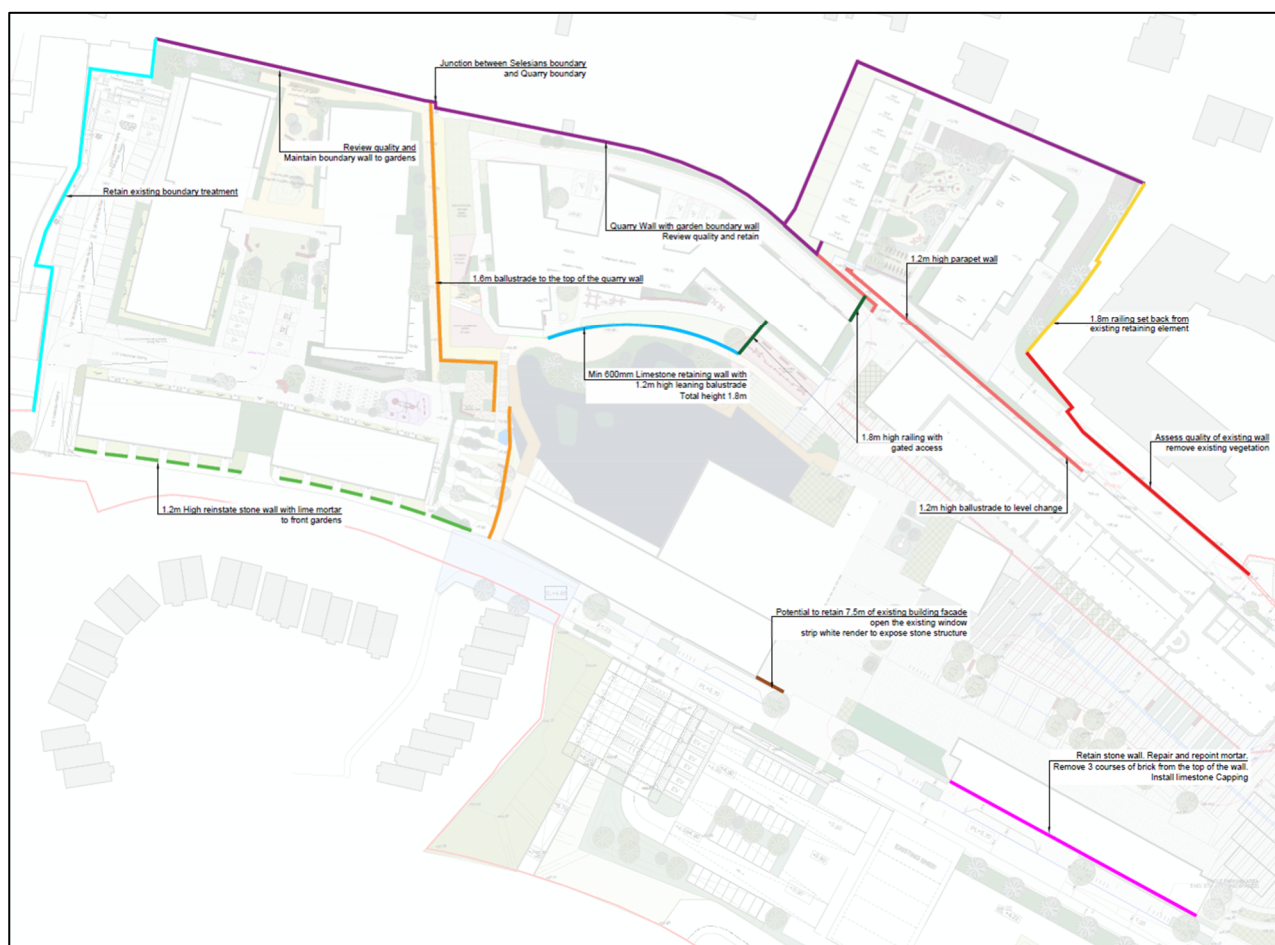


Figure 5: Boundary diagram showing proposed retention of existing walls

There are building materials, including timber and steel, present on the site that could potentially be reused as part of the proposed development, with the associated potential for reductions in embodied carbon. Such materials could be reused in proposed buildings or structures (e.g., the proposed canopies of the mobility hub(s)) and/or in temporary structures during the construction phase. It is noted that structural steel reuse needs to be considered and planned for from an early stage such that appropriate storage, re-certification and testing mechanisms are built into the project planning and delivery.

8.4 Reuse of Excavated Material

During the construction phase, excavated materials will arise from excavations to achieve the required formation levels, for building foundations and substructures, internal road network and parking areas, and installation/diversion of site services and utilities. It is estimated that approximately 46,100 m³ (98,120

tonnes) of excavated material will be generated, comprised of made ground (fill), glacio-fluvial subsoils and rock. A breakdown of the estimated quantities of the various excavated materials and indicative reuse and disposal quantities are provided in Table 4, overleaf.

Circular economy principles have been considered in planning the management of excavated materials on-site. It is proposed to reuse inert excavated material to the extent practicable within the proposed development site, in order to minimise the import and export volumes and associated impacts.

Opportunities for the on-site reuse of excavated material include use as fill material to achieve the required levels across the site, for the proposed raising of the North Circular Road and/or in earthworks (berms) for the proposed flood defence works. It has been estimated that 13,950 m³ of general fill and 16,800 m³ of engineered slab fill (combined total of 30,750 m³) will be needed to achieve the required levels for the proposed development.

There is made ground and contaminated land present on the site. As documented in Table 4, the made ground is considered unlikely to be suitable for reuse and all of this material is expected to require off-site disposal (approximately 26,800 m³ or 50,920 tonnes). In theory, the excavated subsoils and rock may be suitable for reuse on site (combined total of 19,300 m³ or 47,200 tonnes). In summary, it is envisaged that just under half of the excavated material by volume (19,300 m³ of rock and subsoils, ~42% of total volume) will be reused on site, with the remainder of the material requiring off-site disposal (26,800 m³ of made ground, ~58% of total volume).

Due to the cut/fill balance and the estimated deficit of fill material, no off-site reuse of excavated material is envisaged at this stage. However, in the event that there is a surplus of non-hazardous excavated material that cannot be reused on-site, opportunities will be considered for off-site reuse of this material as a by-product in accordance with Regulation 27 of the European Communities (Waste Directive) Regulations 2011-2020.

As documented in Table 4, assuming all the excavated subsoils and rock can be reused on-site, this indicates that approximately 11,450 m³ of fill material will need to be imported to meet the fill requirement for the proposed development.

These figures are estimates subject to the completion of an earthworks reusability assessment during the construction phase. This assessment will determine the suitability of site-won excavated materials for reuse as engineering and landscape fill material within the site, thereby minimising the need to import and export materials. Extensive testing and assessment will be required to demonstrate the suitability of the excavated materials for reuse. The suitability of excavated materials will be assessed in accordance with the requirements of the relevant specifications and standards (e.g., TII Specification for Road Works Series 600, NSAI).

It is proposed to use an on-site, mobile crusher to crush excavated stone for reuse on-site. For example, crushed stone could be used on-site as granular fill material, subject to the material fulfilling the requirements of the specification for Class 6F3 in the TII Earthworks Specification for National Roads (Series 600)² and any other relevant regulations or specifications that may apply to the proposed use.

² TII (2024) *Earthworks Specification for National Roads (CC-SPW-00600)*. Available at: <https://cdn.tii.ie/publications/CC-SPW-00600-04.pdf>. Accessed July 2025.

Table 4: Quantities of excavated materials, envisaged fate, and fill requirements – all figures estimates only

Material	Overall quantity*		On-site reuse		Off-site reuse		Off-site disposal		Fill requirement	
	m³	tonnes	m³	tonnes	m³	tonnes	m³	tonnes	m³	tonnes
Excavated material										
Made ground (fill)	26,800	50,920	-	-	-	-	26,800	50,920		
Glacio-fluvial subsoils	6,750	14,790	6,750	14,790	-	-	-	-		
Rock	12,550	32,410	12,550	32,410	-	-	-	-		
Total	46,100	98,120	19,300	47,200	-	-	26,800	50,920		
Fill material										
General fill									13,950	27,900
Engineered slab fill									16,800	32,800
Total									30,750	60,700
Cut/fill balance										
[Fill requirement] – [Excavated material to be reused on-site] = [Fill import requirement] [30,750 m³] – [19,300 m³] = [11,450 m³]										
*Limitations and assumptions of model										
- Bulk density testing was not carried out on the soils of bedrock. Values for conversion from m³ to tonnes were based on literature. - The majority of overburden material on-site contains anthropogenic materials, meaning the composition of the soils are expected to vary significantly in consistency across difference areas. It is assumed that most of the made ground consists of reworked boulder clay mixed with anthropogenic inclusions. - Bulking factors and post-excavation changes in moisture content were not considered, as this would introduce an additional level of uncertainty into the calculations. - All calculations have been carried out based on in situ conditions, including volume, mass, density and moisture content. - Volumes have assumed vertical sides to excavations and no over-dig for soft spots or other unwanted inclusions. - Excavations for utilities and services have not been included in the model. - All figures are estimates only.										

8.5 Off-site Material Reuse

As noted in Sections 8.3 and 8.4, above, reuse of site-won materials on-site will be prioritised over off-site reuse. However, where surplus site-won materials are generated, these will be reused off-site to the extent practicable to avoid waste generation. There may be opportunities, for example, to reuse salvaged stone and blockwork from deconstructed buildings or walls on other projects in the locality, for maintenance of stone walls and/or for use by stonemasons.

8.6 Materials Optimisation

Opportunities will be considered to employ precision design to avoid overspecification of materials in the proposed development. The use of shallow foundations may be possible in areas in which there is rock at or close to the surface. It is proposed to minimise the resource use needed for construction, where appropriate.

8.7 Prefabricated and Modular Elements

Opportunities will be considered by the Design Team to facilitate and incorporate the use of prefabricated and modular elements into the proposed development. The design seeks to facilitate the integration of prefabricated and modular elements (e.g., through standardisation and repetition of units) while allowing flexibility for the detailed design stage.

At detailed design stage, the Design Team will consider different options for the use of prefabricated elements in buildings (e.g., precast concrete, prefabricated timber frames, prefabricated 2D panels and 3D prefabricated units). The CES will be updated accordingly. For the proposed development, the use of 2D panelised elements is expected to have greater feasibility than the 3D volumetric approach, which necessitates early consideration in the design process. However, it may be feasible to incorporate 3D volumetric for discreet building elements (e.g., prefabricated bathroom pods and/or balconies).

Table 5: Categories of pre-manufactured building elements (adapted from Broderick & Hickey, 2024)³

Category	Description
3D volumetric (3D primary structural systems)	Three dimensional modules are pre-manufactured off-site before being transported to site where they are assembled to form a building. Modules may be fully or partially fitted out off-site. Some level of traditional construction is still required (e.g., foundations, core). Limited application in residential development in Ireland to date, although has been applied elsewhere. More common in industrial, education and healthcare sectors.
2D panelised (2D primary structural systems)	Two dimensional panels and/or framing systems are manufactured off-site before being transported to site where they are assembled to form a building. Examples include pre-manufactured roof trusses and fully enclosed and cladded 2D modular panels with windows and doors. This approach has been widely applied in residential development in Ireland. Some level of traditional construction is still required, which varies greatly depending on the type of 2D system used.
Pre-manufactured components (non-systemised primary structure)	Individual structural components are pre-manufactured off-site before being transported to site where they are combined with other elements to form the structure of a building. Examples include steel beams, columns and piles, precast floor slabs and walls, stairs and roofs, and engineered timber.
Non-structural pre-manufactured assemblies and sub-assemblies	Pre-manufactured non-structural components in which assembly work is carried out off-site prior to delivery. Examples include bathroom and kitchen pods.

It is noted that modular construction can be challenging in residential developments due to legislative requirements related to layouts. It is also important to consider whether the use of particular prefabricated

³ Broderick, B. & Hickey, J. (2014) *Design for Manufacture and Assembly with Design for Reuse*. Report No. CI-AHARDD01-TCD-R-01.01, Construct Innovate, Galway, Ireland, 4th February 2024. Available at: <https://constructinnovate.ie/wp-content/uploads/2024/08/2024-CI-Design-for-Manufacture-and-Assembly-with-Design-for-Reuse.pdf>. Accessed July 2025.

elements could undermine other circular design objectives (e.g., design for maintenance, repair or disassembly).

Opportunities for prefabricated and modular elements in the public realm will also be considered, e.g., the use of socketed/removable bollards and signage.

8.8 Mass Timber

The use of mass timber in the proposed development will be considered at detailed design stage. The design allows flexibility to facilitate timber use, should this be adopted. Mass timber could be used for structural spans, for example. Hybrid solutions are also possible, as highlighted by the HAUT case study (refer to Appendix D). From the perspective of embodied carbon, there are obvious benefits to using timber in the development. The use of mass timber as an alternative material would also make the structures in question lighter, enabling shallower foundations and specification of reduced material quantities.

Notwithstanding the carbon benefits, research has highlighted that a significant scaling up of timber construction of residential buildings in Europe could result in demand for engineered wood products exceeding the realistic growth potential of sustainable roundwood supply. However, it is also noted that the use of wood in construction should be prioritised as a high value, sustainable application that results in long-term storage of carbon, over lower value applications such as energy and pulp production.⁴

Considerations for Timber Construction in Ireland

Greater use of timber in construction represents a significant opportunity to improve circularity, reduce embodied carbon and reduce completion times. In 2023, the Joint Committee on Housing, Local Government and Heritage highlighted the need to increase the use of timber-frame construction in Ireland as a means of decarbonising the residential sector and speeding up delivery of housing.⁵ The Government's Forestry Strategy (2023 – 2030) also places a strong emphasis on the role of home-grown timber as a renewable alternative to carbon intensive construction materials such as concrete and steel.⁶

However, there are significant hurdles to greater adoption of timber in buildings in Ireland primarily related to fire safety guidelines and material strength performance.⁷

While the Building Regulations don't technically prohibit the use of timber at any building height, the current technical guidance document on fire safety prescribes the use of non-combustible material in buildings taller than 10 m. This effectively limits the use of mass timber in buildings to a max. height of three storeys in Ireland, while timber frame buildings are being constructed in other jurisdiction up to 100 storeys. Additionally, the fire certification process in Ireland varies between Local Authorities, which can result in uncertainty and possibility of delays in obtaining fire certificates for new timber-frame buildings.

Additionally, the strength class of Irish grown timber (C16) is less than that of imported timber (C24), which affects specification. Structural timber beams of Irish timber need to be bigger to provide equivalent strength performance of imported timber.

The Timber in Construction Steering Group was established by the Department of Agriculture, Food and the Marine (DAFM) in 2023 with the aim of increasing the use of timber in construction, while ensuring

⁴ Metabolic (2023) *Impact scan for timber construction in Europe*. Available at: <https://circulareconomy.europa.eu/platform/sites/default/files/2023-10/Impact%20scan%20for%20timber%20construction%20in%20Europe.pdf>. Accessed July 2025.

⁵ Joint Committee on Housing, Local Government and Heritage (2023) *Modern Methods of Construction*. Available at: https://data.oireachtas.ie/ie/oireachtas/committee/dail/33/joint_committee_on_housing_local_government_and_heritage/reports/2023/2023-10-05_report-on-modern-methods-of-construction_en.pdf. Accessed June 2025.

⁶ Government of Ireland (2023) *Ireland's Forest Strategy 2023 – 2030*. Available at: <https://assets.gov.ie/static/documents/irelands-forest-strategy-2023-2030.pdf>. Accessed June 2025.

⁷ National Economic and Social Council (2024). *Boosting Ireland's Housing Supply: Modern Methods of Construction*. Council Report No. 166. Available at: https://www.nesc.ie/app/uploads/2024/09/166_modern_methods_of_construction.pdf. Accessed June 2025.

the highest degree of building safety and property protection. The work of the Steering Group is ongoing. Two reports of findings have been published to date.^{8, 9}

8.9 Circular Water Infrastructure

Circular water infrastructure in the form of rainwater harvesting is proposed. This will be used to provide water for landscape planting, reducing demand for potable water supply.

8.10 Nature Regeneration

Nature regeneration is a key principle of the circular economy.¹⁰ As part of the development, it is proposed to retain and enhance the existing reservoir in the disused limestone quarry on-site (Figure 6) as a blue-green open space. This will include landscape planting and the addition of floating planted islands for water purification and biodiversity enhancement (Figure 7). The restored wetland habitat will serve as a SuDS feature and natural recreation area for residents and users of the site, with co-benefits for biodiversity.



Figure 6: Existing reservoir in disused quarry on-site (February 2021)

⁸ Timber in Construction Working Group & Forest Industries Ireland (2024) *Global Policies Influencing the Greater Adoption of Timber in Construction*. Available at: <https://assets.gov.ie/static/documents/global-policies-influencing-the-greater-adoption-of-timber-in-construction.pdf>. Accessed June 2025.

⁹ Timber in Construction Working Group (2024) *Timber in Construction Academic Survey – Core Research Final Report*. Available at: <https://assets.gov.ie/static/documents/timber-in-construction-academic-survey.pdf>. Accessed June 2025.

¹⁰ Ellen MacArthur Foundation (2022) *Regenerate nature*. Available at: <https://www.ellenmacarthurfoundation.org/regenerate-nature>. Accessed July 2025.

No. beds	No. persons	No. units	%
3-bed	5 persons	29	12.4%
Total		234	-

8.12 Product-as-a-service Models for Utilities

Consideration will be given to opportunities for circular approaches to procurement and maintenance of building plant, equipment and utilities, i.e., product-as-a-service (PaaS) models for provision of lighting, HVAC, elevators.

Lighting-as-service (LaaS)

Lighting-as-a-service (LaaS) is an example of a product-as-a-service (PaaS) or ‘servitisation’ business model whereby a service provider offers lighting solutions as a service rather than selling physical lighting products. The service provider retains ownership of the light fixtures and is responsible for providing a reliable lighting service to a customer (e.g., the owner or manager of a building, airport, college campus, etc.) and maintaining/replacing bulbs and light fixtures as needed. LaaS promotes circularity and an extended product lifecycle, as the service provider is incentivised to minimise costs – rather than maximising product sales. Companies offering LaaS include Philips, Eaton, UrbanVolt and Signify. Noteworthy examples include Schiphol Airport in Amsterdam, which uses LaaS provided by Philips.¹²

8.13 Sharing Economy and Product Leasing

The proposed development will facilitate sharing economy models during the operational phase, where appropriate. For example, the mobility hub will facilitate shared mobility (e.g., bicycle and/or car rental, carpooling). Other potential options for consideration include the provision of a ‘library of things’ (e.g., TULU¹³) or a reuse and repair hub or workshop for residents with shared facilities and tools (such as the Swedish ‘fixoteket’¹⁴), bearing in mind the need for sufficient demand/critical mass to make such models feasible.

8.14 Design for Adaptability and Disassembly

Options to design for adaptability (DfA) and disassembly or deconstruction (DfD) will be considered at detailed design stage to facilitate circular management of building materials and components throughout the building life cycle, including at end-of-life. Potential frameworks to facilitate this exercise include ISO 20887:2020 ‘Sustainability in buildings and civil engineering works – Design for disassembly and adaptability – Principles, requirements and guidance’ and Level(s) indicator 2.4, ‘Design for deconstruction’.¹⁵ Design considerations identified in the Level(s) framework are listed in Table 7.

Table 7: Level(s) framework indicator 2.4: aspects of design contributing to design for deconstruction

Category	Specific design aspect to address	Description
Ease of recovery	Elements and their parts are independent and easily separable	The potential to separate elements that are connected to each other and to disassemble elements into their constituent components and parts.

¹² Signify (2015) *Philips provides Light as a Service to Schiphol Airport*. Available at: <https://www.signify.com/global/our-company/news/press-release-archive/2015/20150416-philips-provides-light-as-a-service-to-schiphol-airport>. Accessed June 2025.

¹³ TULU (2025) *TULU – Transform Your Building with On-demand Living Essentials*. Available at: <https://www.tulu.io/>. Accessed August 2025.

¹⁴ Bradley, K. & Persson, O. (2022) Community repair in the circular economy – fixing more than stuff, *Local Environment*, 27, 10-11, 1321-1337. Available at: <https://doi.org/10.1080/13549839.2022.2041580>. Accessed August 2025.

¹⁵ Dodd, N., Donatello, S. & Cordella, M. (2021) *Level(s) indicator 2.4: Design for deconstruction – User manual: introductory briefing, instructions and guidance*, Version 1.1. [EC JRC Technical Report]. Available at: https://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/2021-01/UM3_Indicator_2.4_v1.1_18pp.pdf. Accessed June 2025.

Category	Specific design aspect to address	Description
	Connections are mechanical and reversible	The use of mechanical, non-destructive connections as opposed to chemical bonding.
	Connections are easily accessible and sequentially reversible	Easy and sequential access in order to reverse mechanical connections and remove elements.
	The number and complexity of the disassembly steps are low	The disassembly should not suppose the need for complex preparatory steps, the intensive use of manpower and machinery and/or off-site processes.
Ease of reuse	Specification of elements and parts using standardised dimensions	Specification of elements and parts that are of a standardised specification in order to provide consistent future stock.
	Specification of modular building services	Specification of modular systems that may retain value upon de-installation or which may be more easily swapped out and upgraded.
	Design supports future adaptation to changes in functional needs	Design of the building parts to support ongoing use in the same or a different design configuration in the same building.
Ease of recycling	Parts made of compatible or homogenous materials	Specification of components and constituent parts made of homogenous materials, the same materials or materials mutually compatible with recycling processes. Finishes, coatings, adhesives or additives should not inhibit recycling.
	Constituent materials can be easily separated	It should be possible to separate components and parts into their constituent materials.
	There are established recycling options for constituent parts or materials	The part or material is readily recyclable into products with a similar field of application and function, thereby maximising their circular value.

Appendix A

Relevant Policies and Legislation

A.1 Multilateral Policies

A.1.1 United Nations 2030 Agenda and Sustainable Development Goals

The United Nations (UN) 2030 Agenda for Sustainable Development was adopted by UN Member States at the UN Sustainable Development Summit in New York in September 2015. It provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. It set out 17 Sustainable Development Goals (SDGs) – shared goals for the UN to 2030.

Of the 17 SDGs, many if not all are related to resource use and the circular economy, even if indirectly. The most relevant is SDG 12, Responsible Consumption and Production. Targets for this goal include:

- Target 12.2, to achieve the sustainable management and efficient use of natural resources by 2030;
- Target 12.5, to substantially reduce waste generation through prevention, reduction, recycling and reuse, by 2030; and
- Target 12.7, to promote public procurement practices that are sustainable, in accordance with national policies and priorities.



Figure 8: UN Sustainable Development Goals (Source: UN)

A.2 European Union Policies and Legislation

A.2.1 Waste Framework Directive (Directive 2008/98/EC)

Directive 2008/98/EC, known as the ‘Waste Framework Directive’ came into force on 12 December 2008. It provides a general framework of waste management requirements and sets the basic waste management definitions for the European Union (EU).

The Directive enshrines the ‘waste hierarchy’ in EU policy, the five-step hierarchy of waste management options, with waste prevention as the preferred option, followed by re-use, recycling, recovery and safe disposal, in descending order. In addition, the Directive provides for ‘end of waste’ and clarifies the definitions of recovery, disposal and by-product. The Directive states that, *“The recovery of waste and the use of recovered material as raw materials should be encouraged in order to conserve natural resources”*.



Figure 9: Waste hierarchy (Source: EC)

Directive 2018/851/EC amends the Waste Framework Directive. It provides a number of updated waste management definitions. The Directive allows Member States to use economic instruments including taxes and levies as an incentive for the application of the waste hierarchy.

The Directive sets targets for municipal waste as follows:

- By 2025, at a minimum 55% (by weight) will be prepared for re-use or recycling;
- By 2030, at a minimum 60% (by weight) will be prepared for re-use or recycling; and
- By 2035, at a minimum 65% (by weight) will be prepared for re-use or recycling.

With regard to construction and demolition waste, Member States must take measures to promote selective demolition in order to enable removal and safe handling of hazardous substances, facilitate re-use and high-quality recycling. The Directive obliges Member States to take measures to prevent waste generation including reduction of waste generation in processes related to construction and demolition, taking into account best available techniques (BAT).

Article 5 of the Waste Framework Directive enshrines in EU law a regulatory regime for by-products, which is transposed into Irish legislation by Regulation 27 of the European Union (Waste Directive) Regulations 2011-2020 (see Sections A3.2 and A.3.3, below).

A.2.2 European Green Deal (2019)

The European Green Deal was launched by the European Commission in December 2019. It is a package of policy initiatives that aim to set the EU on the path to a green transition, with the ultimate goal of achieving climate neutrality by 2050. Initiatives under the Green Deal include the Circular Economy Action Plan, a key building block of Green Deal implementation.

A.2.3 Circular Economy Action Plan (2020)

The European Commission adopted a new Circular Economy Action Plan (CEAP) in March 2020. It announced initiatives along the entire life cycle of products, targeting for example their design, promoting circular economy processes, fostering sustainable consumption, and aiming to ensure that the resources used are kept in the EU economy for as long as possible. It introduced legislative and non-legislative measures targeting areas where action at the EU level brings real added value.

The CEAP sets out actions to:

- Make sustainable products the norm in the EU;
- Empower consumers and public buyers;

- Focus on the sectors that use most resources and where the potential for circularity is high such as: electronics and ICT; batteries and vehicles; packaging; plastics; textiles; construction and buildings; food; water and nutrients;
- Ensure less waste;
- Make circularity work for people, regions and cities; and
- Lead global efforts on circular economy.

‘Construction and buildings’ is identified as a key product value chain in the CEAP. The significance of the construction sector in terms of global resource consumption and waste generation is highlighted in the CEAP as follows:

“The built environment has a significant impact on many sectors of the economy, on local jobs and quality of life. It requires vast amounts of resources and accounts for about 50% of all extracted material. The construction sector is responsible for over 35% of the EU’s total waste generation. 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. Greater material efficiency could save 80% of those emissions.”

To address these and other problems, in the CEAP, the Commission commits to launching a new Strategy for a Sustainable Built Environment, whose aim will be to increase material efficiency and reduce climate impacts of the built environment, particularly through promoting the adoption of circular economy principles throughout the lifecycle of buildings. The Commission has stated that this new strategy will:

- Revise the Construction Product Regulation, to improve the sustainability performance of construction products, potentially introducing recycled content requirements for certain products;
- Use Level(s) (see Table 8, below), the European framework for sustainable buildings, to integrate lifecycle assessment (LCA) in public procurement and the EU sustainable finance framework;
- Consider a revision of EU waste legislation in relation to material recovery targets for construction and demolition waste, and specific fractions thereof (to be defined); and
- Promote initiatives related to soil, to reduce soil sealing, rehabilitate brownfield sites, and increase the safe and circular reuse of excavated soils.

Table 8: Overview of Level(s) framework

Thematic areas	Macro-objectives	Indicators
Resource use and environmental performance	Greenhouse gas emissions along a building’s life cycle	Use stage energy performance (kWh/m ² /year)
		Life cycle global warming potential (CO ₂ eq/m ² /year)
	Resource efficient and circular material life cycles	Bill of quantities, materials and lifespans
		Construction and demolition waste
		Design for adaptability and renovation
		Design for deconstruction
	Efficient use of water resources	Use stage water consumption (m ³ /occupant/year)
Health and comfort	Healthy and comfortable spaces	Indoor air quality
		Time out of thermal comfort range
		Lighting
		Acoustics

Thematic areas	Macro-objectives	Indicators
Cost, value and risk	Adaptation and resilience to climate change	Life cycle tools: scenarios for projected future climatic conditions
		Increased risk of extreme weather
		Sustainable drainage
	Optimised lifecycle cost and value	Life cycle costs (€/m ² /year)
		Value creation and risk factors

A.2.4 8th Environment Action Programme (2022)

On 2 May 2022, the EU’s 8th Environment Action Programme (EAP) entered into force, as a common agenda for environmental policy to 2030, and the Union’s basis for achieving the United Nations 2030 Agenda and SDGs.

Building on the European Green Deal, the EAP aims to accelerate the transition to a climate-neutral, resource-efficient economy. It identifies priority objectives to 2030 and the conditions needed to achieve these. Its long-term priority objective is that, by 2050 at the latest, Europeans live well within planetary boundaries¹⁶, in a well-being economy where nothing is wasted. Growth will be regenerative, climate neutrality will be a reality, and inequalities will have been significantly reduced.

The EAP sets out six priority objectives to 2030, as follows:

- Achieving the 2030 greenhouse gas emissions reduction target and climate neutrality by 2050;
- Enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change;
- Advancing towards a regenerative growth model, decoupling economic growth from resource use and environmental degradation, and accelerating the transition to a circular economy;
- Pursuing a zero-pollution ambition, including for air, water and soil, and protecting the health and well-being of Europeans;
- Protecting, preserving and restoring biodiversity, and enhancing natural capital; and
- Reducing environmental and climate pressures related to production and consumption (particularly in the areas of energy, industry, buildings and infrastructure, mobility, tourism, international trade and the food system).

A range of enabling conditions required to realise these objectives are identified, including “*significantly decreasing the Union’s material and consumption footprints*”.

A.2.5 Ecodesign for Sustainable Products Regulation (2024)

In July 2024, Regulation (EU) 2024/1781 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC (the ‘Ecodesign for Sustainable Products Regulation’ or ESPR), entered into force. The ESPR is based on, and will ultimately replace in full, the previous Ecodesign Directive (Directive

¹⁶ The planetary boundaries concept was developed by the Stockholm Resilience Centre (SRC) in 2009 and presents a set of nine planetary boundaries that define the “safe operating space for humanity”. As of 2023, the SRC has found that six of the nine boundaries have already been transgressed – novel entities, climate change, biosphere integrity, land-system change, freshwater change and biogeochemical flows – with pressure increasing on all boundaries but one (ozone depletion).

2009/125/EC),¹⁷ providing a framework for the setting of ecodesign requirements for specific product groups, including those used in construction projects.

The ESPR aims to improve the circularity, energy performance and other environmental sustainability aspects of products placed on the single market, whether produced inside or outside the EU. It enables the setting of performance and information rules – known as ‘ecodesign requirements’ – for almost all categories of physical goods, including:

- Improving product durability, reusability, upgradability and reparability;
- Enhancing the possibility of product maintenance and refurbishment;
- Making products more energy and resource-efficient;
- Addressing the presence of substances that inhibit circularity;
- Increasing recycled content;
- Making products easier to remanufacture and recycle;
- Setting rules on carbon and environmental footprints;
- Limiting the generation of waste; and
- Improving the availability of information on product sustainability.

Specific ecodesign requirements will be established by delegated acts pursuant to Article 4 the ESPR.

On 16 April 2025, the EC adopted the ESPR and Energy Labelling Working Plan 2025-2030, identifying the priority product categories for which the first new ecodesign requirements will be adopted, which include iron and steel, and aluminium. The first delegated act setting ecodesign requirements may come into force as early as July 2025.¹⁸

A key pillar of the ESPR is the requirement for the Digital Product Passport (DPP), a digital identity card for products, components and materials, containing up-to-date product information, including regarding its circularity and end-of-life management. Every product for which ecodesign measures will be adopted will have a DPP, except where there is an alternative, equivalent system in place. Technical preparations for the roll-out of the DPP are underway, including the establishment of a DPP registry and web portal. Information to be made available in DPPs will be specified in the product-specific delegated acts under the ESPR.

The ESPR has entered into force and will come into effect gradually over the next five years. In the built environment, the ESPR will facilitate the uptake of more circular construction products. The availability of DPPs for construction products will provide valuable information to support circular design, procurement of more circular alternatives and more circular materials management throughout the building lifecycle.

A.2.6 Construction Products Regulation (2024)

In December 2024, the revised Construction Products Regulation (CPR) (Regulation (EU) 2024/3110) was published in the Official Journal of the EU. The revised CPR lays down harmonised rules for the placing and making available on the market of construction products by establishing:

- Harmonised rules on how to express the environmental and safety performance of construction products in relation to their essential characteristics, including on life cycle assessment; and

¹⁷ Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (recast) (2012), *Official Journal of the European Union*, L 315.

¹⁸ Medium (2024) *Ecodesign for Sustainable Products Regulation (ESPR) Timeline*. Available at: <https://medium.com/@piconext/ecodesign-for-sustainable-products-regulation-espr-timeline-f4e2e2ba9dbd#:~:text=December%2031%2C%202028%20%E2%80%94%20January%201,discarding%20of%20unsold%20consumer%20products> .. Accessed March 2025.

- Environmental, functional and safety product requirements for construction products.

The previous iteration of the CPR addressed the ‘essential characteristics’ of construction products (e.g., physical characteristics such as compressive strength and durability). The new CPR also addresses the sustainability performance of construction products.

Article 7 empowers the EC to adopt delegated acts establishing product requirements for a product family/category or parts thereof. Annex III identifies the categories of ‘product requirements’ that products may be required to have before being placed on the market, which include ‘product environmental requirements’ related to *“the extraction and manufacturing of the materials, the manufacturing of the product, the transport of materials and products, its maintenance, its potential to remain as long as possible within a circular economy and its end of life phase”*.

The revised CPR is aligned with the ESPR, including the requirement for DPPs, whereby construction product information will be provided in a digital format and may be stored in centralised digital information systems, such as building logbooks.

A.2.7 Clean Industrial Deal (2025)

On 26 February 2025, the EC published its new ‘Clean Industrial Deal’ (CID). The CID provides a growth strategy for EU industry that aims to align competitiveness and decarbonisation, supporting European industry in the face of high energy costs and fierce global competition. It focusses primarily on energy-intensive industries including steel, chemicals and minerals; and the clean-tech sector, necessary to support decarbonisation and circularity.

The CID makes circularity a priority for the future growth of the EU industrial sector. It is an explicit ambition of the CID to *“make the EU the world leader on circular economy by 2030”*. It states that *“Putting decarbonisation and circularity at the heart of our economic policy is the only way for the EU to keep up with resource rich competitors”*.

It is a target of the CID to increase the circular material user rate (CMUR) in the EU from 11.8% to 24% by 2030. The CID acknowledges that, while EU industry is a frontrunner in circular economy, the circular transition is hampered in Europe by insufficient demand for secondary and reusable materials, and a lack of circular design in key product groups, including those containing valuable and scarce materials.

The CID sets out a range of measures to support circularity in the EU industrial sector, including a proposed for a new EU Circular Economy Act to accelerate the circular transition, to be adopted in Q4 2026. A new Industrial Decarbonisation Accelerator Act, set to be adopted in Q4 2025, will introduce a voluntary label on the carbon intensity of industrial products, including steel, using data from the EU Emissions Trading Scheme (ETS). To tailor the aims of the CID to individual sectors, work is ongoing on sector-specific plans, including a new Bioeconomy Strategy to harness the potential of bio-based materials substituting fossil-based equivalents.

A.3 National Policies and Legislation

A.3.1 Waste Management Act, 1996

The Waste Management Act, 1996, sets out the responsibilities and functions of various persons in relation to waste. It has been amended by a number of subsequent acts including the Waste Management (Amendment) Act 2001 and the Protection of the Environment Act 2003. The Act includes the following provisions, among others:

- Prohibition of any person from holding, transporting, recovering or disposing of waste in a manner which causes or is likely to cause environmental pollution;
- Requirement that any person who carries on activities of an agricultural, commercial or industrial nature to take all such reasonable steps as are necessary to prevent or minimise the production of waste;

- Prohibition of the transfer of waste to any person other than an authorised person (i.e. a holder of a waste collection permit or a local authority);
- Requirement of local authorities to make waste management plans in relation to non-hazardous waste; and
- Substantial penalties for offences including fines, imprisonment and/or liability for clean-up measures.

A.3.2 European Communities (Waste Directive) Regulations 2011

The adoption of the European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) substantially amended the provisions of the Waste Management Acts, 1996. These Regulations provide for measures to prevent or reduce the adverse impacts of the generation and management of waste, seeking to reduce the overall impacts of waste recycling and re-use, and to improve the efficiency of the use of waste. They provide definitions for ‘waste disposal’ and ‘waste recovery’, as well as setting out tests that must be satisfied with in order for material to be classified as a ‘by-product’ or achieve ‘end of waste’ status.

The Regulations enshrine the waste hierarchy in national law. The hierarchy must be applied as a priority order in waste prevention and management legislation and policy (in decreasing order of preference):

- Prevention;
- Preparation for re-use;
- Recycling;
- Other recovery (including energy recovery); and
- Disposal.

Regulation 27 of the Regulations provides a national regulatory regime for by-products in accordance with Article 5 of the Waste Framework Directive. It distinguishes between ‘waste’ (as defined in Section 4 of the Waste Management Act 1996) and ‘by-products’, providing a mechanism by which a substance or object, which is a production residue, could be determined not to be a waste but a by-product instead. Thus Regulation 27 provides a mechanism by which economic operators can avoid unnecessary waste generation, facilitating further use of production residues in support of the circular economy.

Economic operators wishing to treat a substance or object as a by-product must make a by-product notification to the EPA. By-product determinations are made by the EPA on a case-by-case and precautionary basis, with regard to four criteria that must be met in order for a production residue to be considered a by-product:

1. The further use of the substance or objective is certain.
2. The substance or object can be used directly without any further processing other than normal industrial practice.
3. The substance or object is produced as an integral part of a production process.
4. The 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 and human health impacts.

The Regulation 27 regime is a key mechanism facilitating circular reuse of site-won materials in construction and demolition projects. Key substances determined to be by-products by the EPA include soil and stone, bituminous road plannings, concrete and other demolition materials.

The EPA is currently developing national by-product criteria for the following key site-won materials:

- Site-won asphalt (bituminous road plannings) for use as a raw material in manufacture of bituminous material with reclaimed asphalt pavement (RAP) content; and

- Greenfield soil and stone from development sites with planning permission or exemption from the need for planning permission, providing for use as a by-product.

Regulation 28 of the European Communities (Waste Directive) Regulations 2011, as amended, provides a regulatory regime for achieving ‘end-of-waste’ status for recovered materials, transposing Article 6 of the Waste Framework Directive. The end-of-waste process allows waste holders to demonstrate that a waste material can be fully recovered and no longer defined as waste, to be used as a valuable secondary resource in the place of virgin materials, without causing overall adverse impacts to the environment or human health. Similarly, to the Regulation 27 by-product process, Regulation 28 sets out criteria for and ‘end-of-waste test’ that must be met in order to achieve end-of-waste status:

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

A key requirement is that the material has undergone a recovery operation with a waste authorisation. End-of-waste criteria exist at three levels for economic operators in Ireland: European, national and single-case. The EPA is responsible for making end-of-waste decisions on a case-by-case basis in Ireland.

A.3.3 European Union (Waste Directive) Regulations 2020

The European Union (Waste Directive) Regulations 2020 (S.I. No. 323 of 2020) give effect to Directive 2018/851/EC amending Directive 2008/98/EC (the Waste Framework Directive). They also give partial effect to the following:

- Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators, as amended by Directive (EU) 2018/849;
- Directive 2000/53/EC on end-of-life vehicles, as amended by Directive (EU) 2018/849;
- Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), as amended by Directive (EU) 2018/849;
- Directive (EU) 2018/852 amending Directive 94/62/EC on packaging and packaging waste; and
- Directive (EU) 2018/850 amending Directive 1999/31/EC on the landfill of waste.

The Regulations set out additional measures to protect the environment and human health by preventing or reducing the generation of waste, the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use, which are crucial for the transition to a circular economy and long-term competitiveness.

A.3.4 Waste Action Plan for a Circular Economy (2020)

The Waste Action Plan for a Circular Economy (WAPCE) is Ireland’s national waste action plan, published in September 2020. It is an action focused plan that reflects the European Commission’s 2020 CEAP (see above).

The WAPCE shifts focus away from waste disposal and moves it back up the product lifecycle. The document contains over 200 measures across various waste areas including circular economy, municipal waste, food waste, plastic and packaging waste, single use plastic, construction and demolition waste and green public procurement.

The overarching objectives of the WAPCE are to:

- Shift the focus away from waste disposal and treatment to ensure that materials and products remain in productive use for longer thereby preventing waste and supporting reuse through a policy framework that discourages the wasting of resources and rewards circularity;
- Make producers who manufacture and sell disposable goods for profit environmentally accountable for the products they place on the market;
- Ensure that measures support sustainable economic models (for example by supporting the use of recycled over virgin materials);
- Harness the reach and influence of all sectors including the voluntary sector, R&D, producers / manufacturers, regulatory bodies, civic society; and
- Support clear and robust institutional arrangements for the waste sector, including through a strengthened role for Local Authorities (LAs).

The WAPCE sets out a range of Government commitments to achieve optimum results, including the development of a Food Waste Prevention Roadmap; examination of the licensing of large-scale events with a view to prohibiting single-use food containers; and extension of green public procurement (GPP) monitoring and reporting requirements to all public bodies.

The WAPCE contains a dedicated chapter on construction and demolition (C&D) waste, which emphasises the significance of the sector in terms of waste generation as follows:

“In 2017, almost 5 million tonnes of C&D waste were collected by authorised waste collectors. Excavated soil and stone is the largest element of construction and demolition waste at approximately 80%. The remainder includes concrete, brick, tiles, metal, glass, wood, plastic and metal. This represents a huge cost and loss of value to the construction sector as well as resulting in significant volumes of avoidable waste. C&D waste is the largest waste stream in the EU representing approximately one third of all waste produced.”

The WAPCE notes that both upstream waste prevention and downstream waste management measures are needed to mitigate the impacts of the sector in this regard:

“If the State is to meet the targets as set out in the National Development Plan 2018-2027, it is vital that there is sufficient capacity for the recovery and/or disposal of the envisaged increased construction and demolition waste. From a broader circular economy perspective however, it is even more important that prevention and reuse is hardwired into construction activity.”

Specific issues of importance identified in relation to C&D waste include Regulation 27 by-product determinations, Regulation 28 end-of-waste decisions, waste permit threshold limits, capacity for recovery and/or disposal of waste, waste enforcement, and the need for best practice waste prevention and circular economy interventions on-site.

The WAPCE states that, in the coming years, the construction sector needs to:

- Promote waste prevention in the first instance.
- Follow best available techniques (BAT). Under the WAPCE, the Government has committed to developing a BAT document for the sector.
- Expand the range and use of recycled products.
- Create a market demand for recycled products and segregating more material on-site to allow for recycling.
- Meet the target of preparing for reuse, recycling and other material recovery (including beneficial backfilling operations using waste as a substitute) of 70% by weight of C&D non-hazardous waste (excluding natural soils and stone).

Under the WAPCE, the Government has committed to a range of measures to achieve optimum results, including working with key stakeholders to seek national Regulation 28 end-of-waste decisions for specific

C&D waste streams, and developing detailed guidance on the Regulation 27 by-product regime for several specific C&D materials.

The WAPCE acknowledges that the current Regulation 27 by-product regime in Ireland could be improved to provide more clarity, certainty and timely decisions for economic operators: *“We must enhance the efficiency of the process if we are to fully realise the circularity potential of by-product status”*. The Government is committed to working with the public sector to ensure that the Regulation 27 regime is utilised, where appropriate, in all public sector contracts; and working with the EPA and Local Authorities to establish whether Regulation 27 notifications for certain materials, such as uncontaminated soil and stone, could be assessed by Local Authorities rather than the EPA, with a view to speeding up determinations.

A target is set in the WAPCE to *“obtain end-of-waste status for a number of priority waste streams, particularly in the C&D sector”*. This may include recycled aggregates, for which the EPA established national end-of-waste criteria in September 2023.

A.3.5 Circular Economy and Miscellaneous Provisions Act 2022

The Circular Economy and Miscellaneous Provisions Act 2022 constitutes a key step in the transition of Ireland’s economy to a circular economy and is evidence of Government’s commitment to the achievement of that goal. It provides for the following, among other initiatives:

- A definition of the circular economy for the first time in Irish domestic law;
- Incentivisation of reusable and recyclable alternatives to a range of wasteful single-use disposable packaging and other items;
- Mandatory segregation and an incentivised charging regime for commercial waste, similar to what exists for the household market, to increase waste separation and support increased re-cycling rates; and
- Placing the Whole of Government Circular Economy Strategy (see below) and National Food Loss Prevention Roadmap on a statutory footing, and establishing a legal requirement for governments to develop and periodically update these policies.

A.3.6 Whole of Government Circular Economy Strategy 2022-2023

The Whole of Government Circular Economy Strategy is Ireland’s first national circular economy strategy. Its preparation was a specific commitment under the WAPCE. It provides a high-level strategy for the transition of all sectors and levels of government towards circularity. The overarching objectives of the Strategy are to:

- Provide a national policy framework for Ireland’s transition to a circular economy and to promote public sector leadership in adopting circular policies and practices;
- Support and implement measures that significantly reduce Ireland’s circularity gap, in both absolute terms and in comparison, with other EU Member States, so that Ireland’s rate is above the EU average by 2030; such measures to address facets of sustainable production and consumption most impactful in an Irish context;
- Raise awareness amongst households, business and individuals about the circular economy and how it can improve their lives;
- Support and promote increased investment in the circular economy in Ireland, with a view to delivering sustainable, regionally balanced economic growth and employment; and
- Identify and address the economic, regulatory and social barriers to Ireland’s transition to a more circular economy.

In relation to the construction sector, the Strategy states the following:

“Within the Construction and Demolition sector, greater resource efficiency and resource re-use could avoid the need for millions of tonnes of virgin raw materials per annum, as well as reducing the carbon intensity of our built environment. [...] Reducing the volume, and associated costs, of

Construction and Demolition waste could also contribute to greater affordability, particularly in relation to the high-density residential sector.”

Annex 4 of the Strategy sets out a preliminary outline of actions for inclusion in sectoral circular economy roadmaps. For the construction sector, the following potential actions are identified:

- Increased use of offsite design and manufacture;
- Modular building design;
- Refurbishment and retrofitting of existing stock;
- Tackling dereliction and bringing stock back into occupancy; and
- Increased use of C&D waste as a secondary construction material.

A.3.7 National Waste Management Plan for a Circular Economy 2024-2030

In February 2024, the ‘National Waste Management Plan for a Circular Economy’ (NWMPCE) was published.¹⁹ The Plan aims to *“influence sustainable consumption and prevent the generation of waste, improve the capture of materials to optimise circularity and enable compliance with policy and legislation”*. The stated ambition of the Plan is for *“0% total waste growth per person over the life of the Plan with an emphasis on non-household wastes including waste from commercial activities and the construction and demolition sector”*.

The NWMPCE places a strong emphasis on construction and demolition (C&D), which is identified as one of six material focus areas of the Plan. It highlights that Ireland’s C&D waste accounts for c. 60% of total waste generated in the State, significantly exceeding the EU average of 35%. The Plan notes that the majority of C&D waste generated in Ireland is recovered by backfilling (c. 85%), with the remainder being recycled (c. 8%) or sent for disposal (c. 7%).

The NWMPCE sets out eight overarching national targets, including the following of particular relevance to C&D projects:

- **National Target 1B – Construction Materials:** A cumulative 12% reduction in C&D waste by 2030 relative to the 2021 baseline of nine million tonnes.
- **National Target 3A – Reuse:** Per capita reuse target of 20 kg per year relative to the 2021 baseline of 10.6 kg per person.

The Plan proposes to achieve these targets in respect of the C&D sector by promoting the use secondary materials through national decisions on Regulations 27 (by-products) and 28 (end-of-waste) of the European Union (Waste Directive) Regulations 2011-2020, and implementation and enforcement of best practice on construction sites. This ambition is reflected in Key Deliverables 7, 8 and 9 of the NWMPCE:

- **Key Deliverable 7 – National Decisions – Regulation 27:** The EPA have published national decisions on Regulation 27 which will unlock the potential for a reduction in significant amounts of waste and increase in circularity rates annually.
- **Key Deliverable 8 – National Decision – Regulation 28:** The EPA have published a national decision on Regulation 28 to unlock the potential for a reduction in significant amounts of crushed aggregate waste annually.
- **Key Deliverable 9 – C&D Best Practice Guidelines:** The local government sector (LGS) is committed to the roll out and promotion of the EPA best practice guidelines for C&D projects.

¹⁹ The Waste Management Act, 1996 requires Local Authorities to make a waste management plan either individually or collectively for their functional areas. This requirement was previously met under the scope of three *Regional Waste Management Plans*, published in 2015. In February 2024, the ‘National Waste Management Plan for a Circular Economy’ (NWMPCE) was published¹⁹ replacing the Regional Waste Management Plans.

The NWMPCCE explicitly states that the “greatest opportunity for reduced consumption in this Plan is the consumption of primary aggregates for construction, which may be substituted by secondary aggregates through the application of Regulation 27 and 28 decisions and through the implementation of best practice”. In summary of the challenge for the C&D sector, the Plan states the following:

“With strong projected growth in the construction sector in the short to medium term, the generation of construction wastes is predicted to continue to grow over the Plan period. The need for significant intervention in this sector with materials which have a high circular potential is well established. It is imperative that the planned interventions on by-products, end-of waste and best practice are implemented without delay. In particular, the by-product measure has the greatest potential to curb waste generation within the sector if suitably implemented and widely adopted by the sector.”

The Plan includes a range of targeted policies and priority actions of relevance to C&D projects, as summarised in Table 9.

Table 9: Relevant policies and actions of the NWMPCCE

Focus Area	Targeted Policies	Priority Actions
Focus Area 8: Construction and Demolition Waste	TP8.1: Prioritise waste prevention and circularity in the construction and demolition sector to reduce the resources that need to be captured as waste	PA8.1 (LGS): Implement Green Public Procurement criteria on all local authority construction and demolition projects and promote its wider use within the sector.
	TP8.2: Identify and promote the growth of secondary material markets, including the elimination of barriers to the development of these markets, within the construction and demolition sector.	PA8.2 (LGS): Pilot the preparation of Resource & Waste Management Plans for construction and demolition projects at selected local authority developments.
	TP8.3: Incorporation of the EPA Best Practice Guidelines for the preparation of Resource & Waste Management Plans for Construction & Demolition Projects and NPWS Soil & Spoil Action Plan, and monitoring by local authorities of the application of these requirements.	PA8.3 (EPA/LGS): Develop and deliver training, with the EPA, to support national decisions on Regulation 27 by-products for site won asphalt (road planings) and greenfield soil and stone; and support the implementation of a national decision on Regulation 28 end-of-waste for aggregates, which includes crushed concrete and prioritise the use of materials arising from national end-of-waste or by-product decisions.
	TP8.4: Identify and promote materials with a low embodied carbon and high circular potential to maximise use in the construction sector.	PA8.4 (LGS): Incorporate the requirement for Construction and Demolition Resource & Waste Management Plans in land use policy in County/City Development Plans.
	TP8.5: Pursue and support a targeted levy on virgin materials to encourage the use of secondary raw materials.	PA8.5 (LGS): Explore the potential to segregate waste streams in mixed waste skips to minimise contamination and maximise reuse, recycling and circularity on construction projects and provide guidance to the sector.
		PA8.6 (LGS): Allocate available resources, and identify any additional resources required, to consistently monitor construction and demolition projects to assess compliance with the project Resource & Waste Management Plan and apply appropriate enforcement measures to ensure compliance.
Focus Area 14: Recovery Infrastructure	TP14.2: Support the provision of 200,000 to 300,000 tonnes of additional dedicated thermal recovery capacity for the treatment of non-hazardous residual wastes nationally, to ensure there is adequate active thermal treatment capacity.	PA14.2 (EPA/LGS): Set circularity criteria for the output from biological treatment facilities and for soil and other construction and demolition waste streams.

The Plan also places an emphasis on the role of GPP on the part of Local Authorities in waste reduction. This is reflected in Core Policy 10, ‘Green Public Procurement’, to “Reinforce the consistent application of [GPP]

criteria in local authority contracts to ensure that public spending is aligned with the policies of this Plan and the [GPP] strategy and Action Plan”.

A.3.8 Buying Greener: Green Public Procurement Strategy and Action Plan 2024-2027

‘Buying Greener: Green Public Procurement Strategy and Action Plan 2024-2027’ (‘Buying Greener’) provides the strategy and action plan for green public procurement (GPP) in Ireland from 2024 to 2027, as required under the Government’s Climate Action Plan (CAP23 and CAP24). The document supersedes ‘Green Tenders – An Action Plan on Public Procurement’, the Government’s previous GPP document, published in 2012.

Buying Greener sets out key principles for GPP as follows, which summarise the GPP implementation mandate for the public sector in Ireland:

- Consider environmental sustainability when assessing need.
- Insert GPP criteria in published tender documentation:
 - When inserting GPP criteria, use national GPP criteria for goods, services or works, where available.
 - Use GPP criteria from other sources where no national GPP sectoral GPP criteria are available.
 - Use ‘Minimum Sustainability/Environmental Criteria’ where no national, EU GPP criteria or other guidance for the goods, services or works being procured are available.
 - Consideration should be given to using an innovative procurement procedure or the innovation partnership to find goods, services, or works to address a specific environmental need that cannot be otherwise met.
- Comply or explain.

The principle of ‘comply or explain’ underpins the strategy and action plan. It states that “Having regard to the actions set out in the GPP Strategy and Action Plan (to be communicated by a Circular that replaces DPER Circular 20/2019), public bodies that do not include GPP criteria in published tender documentation in accordance with Principle 2a, must provide justified reasons for not including such criteria in an annual report.”

The strategy includes a foreword from the former Minister of State with responsibility for Public Procurement, eGovernment and Circular Economy, Ossian Smyth T.D., which clearly sets out the envisaged role of public bodies, such as TII, in supporting the transition to a circular economy through the implementation of GPP:

“One of the important areas of the economy that can play a key role in helping Ireland to become a more resource efficient and circular economy is Green Public Procurement. [The Strategy] aims to drive the implementation of green and circular procurement practices across the public sector. [...] The implementation of this [GPP] Strategy and Action Plan will ensure that public bodies play a critical part in supporting the delivery of important commitments on climate action, and helping our transition to a circular economy”.

A.3.9 Climate Action Plan 2025

On 15 April 2025, the Government launched its Climate Action Plan 2025 (CAP25), its third annual update to Ireland’s Climate Action Plan 2019. The CAP establishes a roadmap to halve national greenhouse gas emissions by 2030 and achieve net zero no later than 2050.

Chapter 13 of the CAP specifically addresses the role of built environment in decarbonisation. The sectoral emissions have decreased by 21% since 2018, however, it notes that the sector accounted for 11.1% of Ireland’s greenhouse gas emissions in 2023. The residential sector is on track to meet its 2025 sectoral emissions ceiling. However, for commercial and public sector buildings the required emissions reduction is 2.9% per annum to stay within the 2025 sectoral emissions ceiling. Sectoral emissions ceilings for the built environment have been set at 28 MtCO₂eq for 2026–2030.

CAP25 sets out decarbonisation actions for the built environment sector, including Action BE/25/1, to develop an embodied carbon methodology and establish structures in line with the Energy Performance of Buildings Directive to reduce carbon in construction materials for all new buildings.

In relation to the industrial sector (Chapter 12), the CAP highlights the need to reduce the embodied carbon of construction materials. It sets targets for reducing the embodied carbon of materials produced and used in Ireland by 10% by 2025, and at least 30% by 2030.

A key aim for the industrial sector set out in the CAP is to reduce emissions associated with the use of concrete. CAP25 refers to the Department of Enterprise, Trade and Employment (DETE) 2024 report, ‘Reducing embodied carbon in cement and concrete through public procurement’. Based on this publication, a mandate has been issued to all Government Departments and Local Authorities to implement the decarbonisation measures set out in the report. Additionally, under the Public Sector Mandate as part of CAP, public bodies are required to use best practice approaches to reduce embodied carbon of construction projects, including by specifying concretes containing low-carbon cement.

CAP 25 also noted that there is an opportunity for decarbonisation of the construction industry through the use more timber as an alternative to more carbon intensive materials. The CAP highlights the importance of the ongoing work of the Timber in Construction Steering Group, as well as policies related to modern methods of construction (MMC) and circularity in construction (including reuse of cement and concrete) in driving down embodied carbon in the built environment.

A.4 Regional and Local Policies

A.4.1 Limerick Development Plan 2022-2028

The Limerick Development Plan 2022 – 2028 (‘the Development Plan’) was adopted by the Elected Members of Limerick City and County Council in June 2022 and came into effect in July 2022. A first Variation to the Development Plan was adopted in May 2023.

The Development Plan provides a strategy for proper planning and sustainable development in Limerick City and County to 2028. The strategic vision for Limerick as set out in the Development Plan is as follows:

“By 2030, Limerick will become a green City region on the Shannon Estuary connected through people and places. This will be achieved through engagement, innovation, resilient urban development and self-sustaining rural communities.”

This vision is underpinned by 10 interlinked strategic objectives, including the following:

- Transition to an environmentally sustainable carbon neutral economy; and
- Ensure new and existing residential development is of the highest quality, enabling life cycle choices and physical, community, recreation and amenity infrastructure are provided in tandem, to create sustainable, healthy, inclusive and resilient communities.

The Development Plan acknowledges the important role of the circular economy as follows:

“The transition to a more circular economy, where the generation of waste is minimised by the principles of designing out waste and pollution and keeping products and materials in use for as long as possible, is essential in developing a competitive, sustainable, low carbon, resource efficient economy.”

This is reflected in Objective ECON 044, which states that “It is an objective of the Council to support the economic benefits and opportunities that exist in the transition to a more circular economy”; and Objective CAF 016, which states that “It is an objective of the Council to encourage the adoption of the circular economy through promotion of the reuse, recycling and reduction of the use of raw materials and resources”.

The Development Plan notes that “*designing for waste prevention is the most desirable and effective option*” for promoting the transition to a circular economy, while “*waste that is generated can be accommodated in the circular economy reuse loop, through preparation for reuse, recycling and recovery*”.

Objective IN 017 sets out the Council’s objectives for the role of waste management in the circular economy, stating that “*It is an objective of the Council to...*

- (a) *Support innovative, smart solutions and processes, based on the principles of the circular economy to implement the Regional Waste Management Plan for the Southern Region 2015 – 2021 and any subsequent plan, including any targets contained therein.*
- (b) *Collaborate with the Regional Waste Management Office and other agencies to implement the EU Action Plan for the Circular Economy – Closing the Loop, 2015, its successor the Circular Economy Action Plan: A New Circular Economy Action Plan for a Cleaner More Competitive Europe, 2020 and the Resource Opportunity – Waste Management Policy, DECLG, 2012 and any subsequent plans.*
- (c) *Promote sustainable patterns of consumption and production in the areas of product design, production processes and waste management.*
- (d) *Implement the provisions of the Waste Action Plan for a Circular Economy – Ireland’s National Waste Policy 2020 - 2025, DECC, 2020 in the assessment of planning applications.*
- (e) *Protect existing civic amenity sites and bring sites throughout Limerick and support the development of additional sites in accordance with the Southern Regional Waste Management Plan 2015 – 2021 and any subsequent plans.”*

The Development Plan highlights the importance of development design and construction and demolition waste management in supporting the transition to a circular economy:

“Construction related waste accounts for a significant proportion of total landfill waste in Ireland. During construction, measures should be implemented to minimise soil removal (as part of the scheme design process), properly manage construction waste, design with and use smart materials on the principles of the circular economy and encourage off-site prefabrication where feasible. All future developments should seek to minimise waste through reduction, re-use and recycling. Waste management and disposal should be carefully considered as part of the construction process and in the operation of the development when completed.”

It is further stated that:

“Those responsible for carrying out a construction and/or demolition project must ensure that they have a Waste Management Plan for all waste generated and ensure the segregation of waste for re-use, recycling or disposal appropriately. Developers shall submit, as part of a planning application, a Waste Management Plan. Where construction or demolition waste cannot be reused or recycled, the waste must be transported to authorised waste facilities using the services of authorised waste collectors. In the case of demolition, the developers will be required to submit a Refurbishment/Demolition Asbestos Survey (RDAS) with full details of disposal of the asbestos. [...]

At the design stage, consideration should be given to the use of renewable building materials, such as wood, from sustainably managed forests and locally sourced building materials for development projects. Other aspects should be considered, including offsite construction and prefabrication to minimise the impact of building on the site, reductions in levels of onsite waste and also minimising the cost of waste disposal. The reuse of construction waste such as excavated material and topsoil onsite is welcomed, subject to the appropriate assessment of the presence of invasive species onsite. Any materials used in the construction of new buildings should comply with the minimum standards as set out in the Building Regulations (1997-2019).”

Objective IN 021 (Construction and Demolition) sets out requirements of developers in this regard:

“It is an objective of the Council to:

- (a) *Require construction Waste Management Plans to be submitted as part of planning applications, to address waste management on site during construction and mitigation measures to address waste generation, in accordance with the principles of the circular economy and the principles of prevention, renewal and recycle.*
- (b) *Require a Refurbishment/Demolition Asbestos Survey (RDAS) with full details of disposal of the asbestos to be submitted with any planning application. The RDAS should be carried out in accordance with Section 8 of the Health and Safety Authority, Asbestos Guidelines (Practical Guidelines on ACM Management and Abatement) by a suitable qualified professional with expertise in asbestos disposal.”*

The role of the circular economy in driving decarbonisation of the built environment is addressed in Section 11.7 (Climate Action), which notes that, in order to achieve a more sustainable built environment, the Council will encourage, among other measures, design statements addressing how the circular economy is addressed from design through to planned end-use.

The Development Plan further states that:

*“The concept of the circular economy can be applied to the whole lifecycle of new developments, from planning and design right through demolition, construction, end-use and repurposing or end of life of a development. To adopt the principle of the circular economy more fundamentally, applicants shall be required to submit a Resource Management Plan, including a **Circular Economy Statement**, covering different phases of the project from initial design through to construction and end-use functioning. This approach would help the application of modular construction and the facilitation for easy repair and replacement of components and repurposing for reuse. Avoidance of demolition should be promoted in order to promote circularity and/or design for disassembly to facilitate reuse and recycling of materials back into a circular economy loop. An important source of information is the Environment Protection Agency’s Draft Best Practice Guidelines for the preparation of Resource Management Plans for Construction and Demolition Waste Projects.”*
(emphasis added)

Thus, the Development Plan requires developers to submit a Circular Economy Statement as part of the documentation accompanying the planning application.

Appendix B

Relevant Guidelines

B.1 EPA Guidance on Soil and Stone By-products (2019)

In 2019, the EPA published specific *Guidance on Soil and Stone By-products* to encourage the prevention of waste, including the lawful and beneficial use of excess uncontaminated soil and stone; to set out the Agency’s regulatory approach to determining by-product notifications for soil and stone; and to provide guidance to interested parties. The guidance document unambiguously states that the EPA encourages the prevention of waste, including the lawful and beneficial use of excess uncontaminated soil and stone. It sets out the following objective – and mandate for producers:

“By making certain that excess uncontaminated soil and stone is beneficially used with no overall adverse impacts on the environment or human health, a material producer will ensure that the material is regarded as a by-product rather than a waste.”

It distinguishes between the circumstances in which excess uncontaminated soil and stone from construction projects are regulated as waste and not regulated as waste, as set out in Table 10. The document goes on to provide detailed guidance for interpreting the by-product criteria in respect of excavated soil and stone. It states that the management of excess uncontaminated soil and stone – either as by-product or as waste – should be pre-arranged by the producer at the earliest opportunity – at the planning stage or, at the latest, prior to commencement of the development. Where it is proposed to use the material as by-product, the corresponding Regulation 27 by-product notification should be made to the EPA prior to the commencement of development.

Table 10: Uncontaminated soil and stone – waste versus non-waste

Regulated as...	
Waste	Excess uncontaminated soil and stone produced during construction projects may be a waste if it is discarded, is intended to be discarded or is required to be discarded.
Not waste	Uncontaminated soil and stone that is certain to be used in construction at the same project site from where it was excavated is not regulated as waste. For example: • Soil that is excavated from one part of a road project and used as fill in another part of the same road project, all within the same site; or • Soil excavated to enable construction but stored for use later at the same site for landscaping works.

B.2 EPA By-product Guidance Note (2020)

The EPA’s 2020 *By-Product Guidance Note* provides detailed guidelines for economic operators intending to make by-product notifications to the Agency. It includes a simplified decision tree for determining whether a material is a by-product or waste (Figure 10, overleaf).

In making a Regulation 27 notification to the EPA, economic operators must demonstrate compliance with the by-product criteria. By-product notifications are reviewed by the EPA on a case-by-case basis. The EPA may consult with a notifier to clarify matters where there is doubt about the notification’s compliance with the four criteria. The EPA will either determine in agreement with the notifier (i.e., the substance or object is a by-product) or determine that the substance/object is a waste, in which case a waste enforcement regime may apply (e.g., if the waste has already been moved to the proposed end use location).

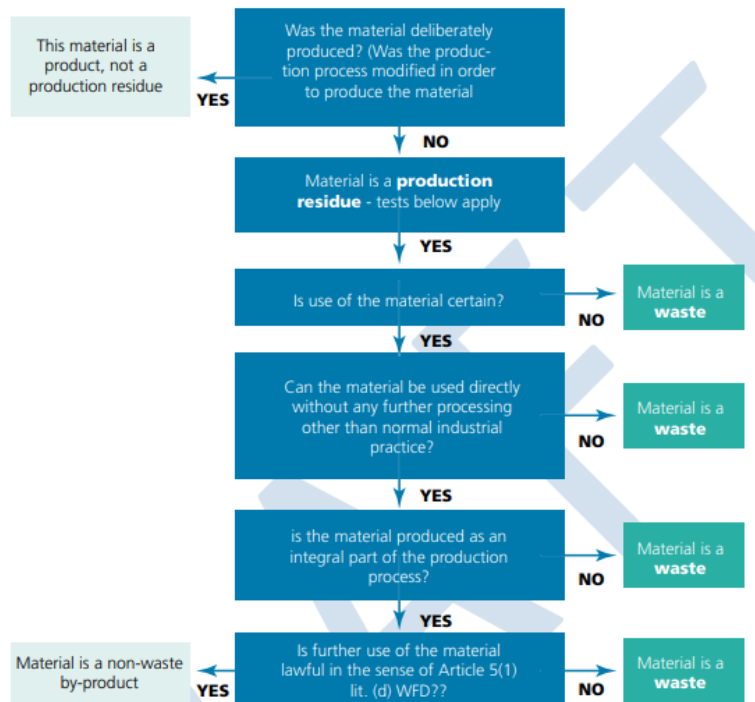


Figure 3: - Decision Tree for Determining Whether a Material is a by-product (EC, 2012).

Figure 10: Regulation 27 by-product decision tree (source: EPA, 2020)

B.3 EPA Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects (2021)

In 2021, the EPA published its *Best practice guidelines for the preparation of resource & waste management plans for construction & demolition projects*. The purpose of the guidelines is to provide a practical approach, informed by best practice, to the prevention and management of C&D waste from design through construction and demolition/deconstruction. They provide various stakeholder, including developers, designers and contractors with a common approach to preparing Construction & Demolition Resource and Waste Management Plans (CDRWMP).

The guidelines supersede the Government's 2006 *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Waste Projects*. The 2021 guidelines reflect developments in resource and waste management policy in the intervening years, including the increasing emphasis on waste hierarchy and circular economy and a paradigm shift away from purely 'waste-centric', end-of-pipe approaches. They place greater emphasis on waste prevention, material reuse, circular design and green procurement.

The guidelines set out seven key principles for optimising resources and reducing waste on construction and demolition projects in Ireland as follows:

- Prevention
- Reuse
- Recycling
- Green procurement
- Off-site construction

- Materials optimisation
- Flexibility and deconstruction

According to the guidelines, the level of detail presented in the CDRWMP should reflect the scale and complexity of the development. The guidelines set out thresholds distinguishing between smaller- and larger-scale developments. Projects below the following thresholds may be classed as Tier 1 developments:

- New residential developments 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 in total less than 100m³ in volume of C&D waste.

Developments above these thresholds are classed as Tier 2 developments under the EPA guidelines. For Tier 1 developments, the guidelines require a simplified C&DRWMP, while for Tier 2 developments, the guidelines require a bespoke C&DRWMP. In both cases, the guidelines provide minimum information requirements.

Section 4.3 of the guidelines provides a ‘guide to designing out waste’, the key points of which are summarised in Table 11.

Table 11: EPA Guidelines for CDRWMP: Key recommendations for designing out waste

Principle/stage	Considerations/options
Design for reuse and recycling	• Potential for reusable site assets (buildings, structures, equipment, materials, soils, etc.). • Potential for refurbishment and/or refit of existing structures or buildings rather than demolition and new build. • Enabling optimum recovery of assets on site.
Reuse the site	• Completion of appropriate site investigations to determine site conditions and identify any potential contamination and related issues. • Possibility for reuse of the existing brownfield site in its current form. • Potential for adapting a 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 need for the import/export of materials. • Potential remediation strategies and ground improvement techniques (of contaminated sites) to assess site reuse options (e.g., stabilisation, hydraulically bound materials, geosystems, etc.). • Agree remediation plans with the relevant regulatory bodies.
Excavation works	• 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. • Revise site layout and levels to minimise excavation work (i.e., use the existing topography where possible to minimise the need for excavation). • Utilise split level design on sloping sites. • 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). • Set aside good quality and high value materials from existing hard and soft landscaping for reuse on site, where appropriate (e.g., use of concrete paving, flagstones for new landscape areas, produce compost from soft vegetation). • Site-won tarmac and asphalt should be sent off-site for appropriate management. • Use excavated materials off-site (i.e., on other projects but only if this complies with the relevant legislation). • 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).

Principle/stage	Considerations/options
Demolition works	• Prepare a pre-demolition audit detailing resource recovery best practice (i.e., deconstruction and disassembly where feasible and practicable). • Reuse and recycle deconstructed components, elements and materials within the new build if in compliance with functionality, regulatory and performance requirements. The reuse and recycling of deconstructed components, elements and materials must be carried out in compliance with relevant requirements relating to by-product, end-of-waste and waste data reporting. • Reuse and recycle deconstructed components, elements and materials from other projects off-site if in compliance with functionality, regulatory and performance requirements. The reuse and recycling of deconstructed components, elements and materials must be carried out in compliance with relevant requirements relating to by-product, end-of-waste and waste data reporting. • Undertake a specific audit for potentially hazardous material (e.g., asbestos, polychlorinated biphenyls (PCBs), persistent organic pollutants (POPs), etc.) and document procedures for removal of same prior to main demolition works.
Site preparation	• Avoid designing for excessive temporary works (e.g., site roads, site offices/foundations). • Reuse existing buildings for site accommodation, welfare facilities and materials storage. • Protection of the local natural environment and biodiversity from any adverse impacts associated with the sorting, segregation, storage and transport of waste.
Reuse existing assets: buildings, elements and materials	• 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. • Adapt and reuse existing buildings where feasible, considering the existing building(s) in terms of structure, services, equipment, external façade, durability, performance, quality and regulations. • Consider potential to reuse materials and/or components on other projects (e.g., steel portal frames used for warehousing and distribution centres with short lifespans (<20 years) to be reused for other building designs). • Consider potential to reuse materials and/or components from other projects; this especially applies to heritage and refurbishment works. • 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). • 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).
Recycling	• 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). • 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). • Review availability of recycled aggregates and other materials in the local area and decide on the most sustainable options; for example, the use of an on-site crusher for recycling of residual concrete to generate aggregates for use on site (subject to the appropriate waste consent, such as a Regulation 28 end-of-waste decision and once processing is industry standard practice, such as ensuring the aggregate outputs comply with the specifications of IS EN 12620). • Consider design approaches that will facilitate material reuse and recycling at the end of the building's life. • 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. • Specify materials with lower environmental impact, including reduced content of hazardous substances. • Assess existing materials that will be recycled for use off-site, tracking to their final end-use.
Design for green procurement	• State the Client corporate policy and targets in relation to waste prevention and reduction in all design-phase documentation and tender documentation. • Include resource prevention and reduction capability and competence questions in the contract pre-qualification questionnaires. • Secure contractual agreement to implement the initiatives outlined in the commitments, policies and any RWMP as part of the contract. • Include gateway reviews during the design process to monitor compliance with designing out waste principles.

Principle/stage	Considerations/options
	- 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. - Employ a waste specialist consultant/contractor with expert knowledge in waste prevention and minimisation. - Discuss methods of waste prevention and minimisation with potential contractors, sub-contractors and suppliers at an early stage (pre-procurement). Discuss proposed design solutions, encourage innovation in tenders and incentivise competitions to recognise sustainable approaches. - Select procurement route that minimises unnecessary packaging. Discuss options for packaging reduction with subcontractors and suppliers using measures such as 'Just-in-Time' delivery. - Use ordering procedures that avoid waste (i.e., no over-ordering, take-back schemes for both material surplus and offcuts). - Include within the tender documents, the requirement to sign off 'the waste per work package', where waste must not exceed a contractually agreed limit.
Design for off-site construction	- Modular buildings can displace the use of concrete and the resource losses associated with concrete blocks such as broken blocks, mortars, etc. - Modular buildings are typically pre-fitted with fixed plasterboard and installed insulation, eliminating these residual streams from site. - Use of pre-cast structural concrete panels can reduce the residual volumes of concrete blocks, mortars, plasters, etc. - The use of prefabricated composite panels for walls and roofing can also reduce residual volumes of insulation and plasterboards. - 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. - In general, designing for the preferential use of off-site modular units eliminates offcuts and if handled correctly, on-site breakages are reduced as modular units are often more resistant to damage. - Manufacturers can also produce modular construction sets that are made to measure with components numbered for assembly, eliminating over-ordering and wasting of materials.
Design for materials optimisation	- 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. - Simplify the design, layout, building form, structural system, building services and construction sequencing, where appropriate and feasible. - Standardise design details and 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. - 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. - Coordinate the design (i.e., structural and service zones, to prevent cutting and jointing of materials, which create offcuts). - Use Building Information Modelling (BIM) to carry out 3D design coordination analysis to prevent dimensional conflicts through clash detection. - 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). - 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.
Design for flexibility and deconstruction	- Consider 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 allows spaces to be reconfigured following the end of the building's original purpose.

B.4 Greater London Authority London Plan Guidance: Circular Economy Statements (2022)

Under the London Plan, development applications that are referred to the Mayor are required to submit a Circular Economy Statement (CES). To provide guidance on the contents of this document, in 2022, the Greater London Authority published its *London Plan Guidance for Circular Economy Statements* ('London Plan Guidance' hereafter). In the absence of Irish guidelines, this document constitutes best practice guidance on the preparation of CES.

The London Plan Guidance sets out six circular economy principles for buildings as follows:

- Building in layers – ensuring that different parts of the building are accessible and can be maintained and replaced where necessary;
- Designing out waste – ensuring that waste reduction is planned in from project inception to completion, including consideration of standardised components, modular build, and reuse of secondary products and materials;
- Design for longevity;
- Design for adaptability or flexibility;
- Designing for disassembly; and
- Using systems, elements or materials that can be reused and recycled.

It uses the 'building in layers' or 'six S' framework to promote circular design based on the concept that buildings are comprised of layers with different lifecycles and lifespans. To support adaptation, maintenance and repair, disassembly, reuse and recycling, these layers should be independent, accessible and removable. This is particularly relevant to layers that need more frequent repair or replacement, such as services and internal fit-out.

It also sets out a circular economy hierarchy for buildings, as illustrated in Figure 12. Diminishing returns, in terms of circularity, are achieved by moving outwards towards the edge.

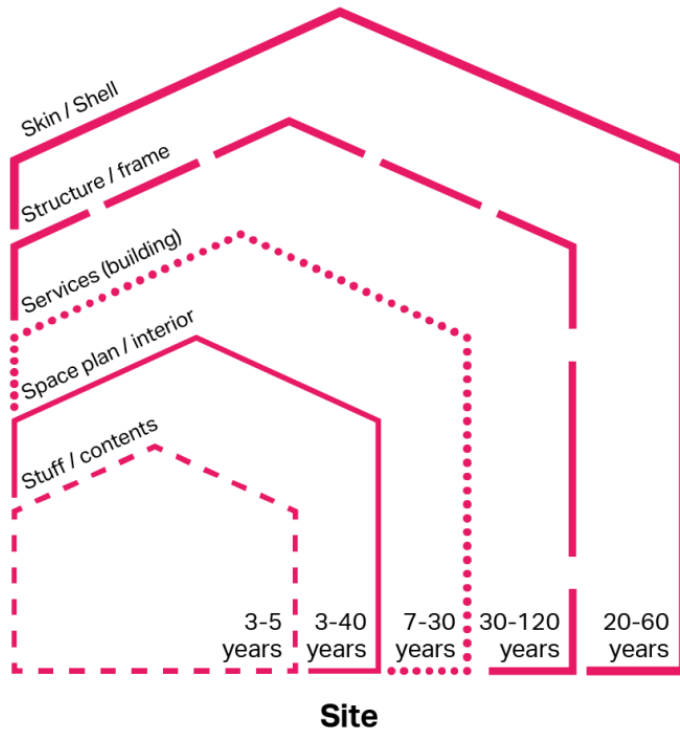


Figure 11: Building in layers and 'six S' framework for circular design (source: Greater London Authority, 2022)

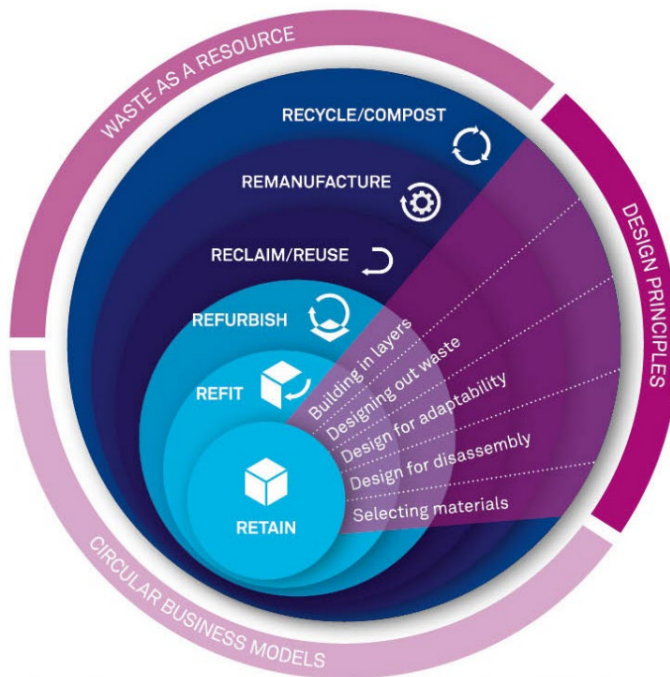


Figure 12: Circular economy hierarchy for buildings (source: Chesire, 2016)

The London Plan Guidance distinguishes between sites that have existing buildings on-site and those that do not, identifying slightly different circular design approaches for each case. It notes that circular design approaches should be applied to the whole development, including external areas and structures. Circular design approaches for new developments are set out as summarised in Table 12.

Table 12: London Plan Guidance for Circular Economy Statements: Circular design approaches for new buildings

Approach	Definition
Building relocation	Designing to allow the whole building to be used on a different site, either by moving as a whole or disassembling into large modules.
Component or material reuse	The use of a product in its original form with minimal reprocessing. Preparation for reuse involves checking, cleaning or repairing materials so that they can be used again for their original purpose. Materials can be reused as a whole; redeployed as modules; or reused as a kit of parts on one or more different sites.
Adaptability	A building that has been designed with thought of how it might be easily altered to prolong its life, for instance by alteration, addition, or contraction, to suit new uses or patterns of use. Often used interchangeably with flexibility; however, it relates more to building structural changes.
Flexibility	A building that has been designed to allow easy rearrangement of its internal fit-out and arrangement to suit the changing needs of occupants. Often relates to floorplates rather than structural changes (see Adaptability).
Replaceability	Designing to facilitate easy removal and upgrade, and ideally to be reused, remanufactured or recycled on a part-by-part basis.
Disassembly	Designed to allow the building and its components to be taken apart with minimal damage to facilitate reuse or recycling. If designed well, it should be possible to replace any component.
Longevity	Designing to avoid a premature end of life for all components through considering maintenance and durability.

B.5 EU Construction & Demolition Waste Management Protocol Including Guidelines for Pre-demolition and Pre-renovation Audits of Construction Works (2024)

In September 2016, the European Commission (EC) published its ‘EU Construction & Demolition Waste Management Protocol’, the first protocol of its kind.²⁰ Subsequently, in May 2018, the EC published ‘Guidelines for the waste audits before demolition and renovation works of buildings’.²¹ These documents were not legally binding and were introduced as a proposal to the C&D industry, with the overarching aims of increasing confidence in the C&D waste management process and the quality of secondary materials from C&D works, in line with EU policy at the time on the construction sector and circular economy.²²

In August 2024, the EC published an updated ‘EU Construction & Demolition Waste Management Protocol including guidelines for pre-demolition and pre-renovation audits of construction works’²³ as a single document (as opposed to the previous Protocol and audit guidelines, which were published separately). The

²⁰ EC (2016) *EU Construction & Demolition Waste Management Protocol*. Available at: https://single-market-economy.ec.europa.eu/news/eu-construction-and-demolition-waste-protocol-2018-09-18_en. Accessed September 2024.

²¹ EC (2018) *Guidelines for the waste audits before demolition and renovation works of buildings*. Available at: https://single-market-economy.ec.europa.eu/news/eu-construction-and-demolition-waste-protocol-2018-09-18_en. Accessed September 2024.

²² EC (2018) *EU Construction and Demolition Waste Protocol and Guidelines*. Available at: https://single-market-economy.ec.europa.eu/news/eu-construction-and-demolition-waste-protocol-2018-09-18_en. Accessed September 2024.

²³ EC (2024) *EU Construction & Demolition Waste Management Protocol including guidelines for pre-demolition and pre-renovation audits of construction works*. Available at: <https://op.europa.eu/en/publication-detail/-/publication/d63d5a8f-64e8-11ef-a8ba-01aa75ed71a1>. Accessed September 2024.

aim of this was to update the Protocol and guidelines *“in light of the evolution of technologies, practices and legislation, supporting industry in a shift to a circular economy by considering stakeholders’ needs and the diversity of CDW management practices across the EU27 Member States”*.

The updated Protocol and guidelines place a greater emphasis on the question of whether demolition is warranted (as opposed to renovation), and the use of measures, including the pre-demolition/pre-renovation audit, to support selective demolition and dismantling and to enhance C&D material recovery with a view to reuse, preparation for reuse and recycling (i.e., waste prevention).

The updated document reflects a shifting policy focus from a linear to a more circular model of resource use, and from direct and/or operational carbon emissions to whole lifecycle carbon – including the embodied carbon of new construction materials and C&D waste generation. This is reflected, for example, in a terminological shift in the updated Protocol and guidelines away from ‘waste’ in favour of ‘resources’, ‘components’, ‘products’ and ‘materials’.

Appendix C

Other Relevant Publications

C.1 Circularity Gap Report – Ireland (2024)

In September 2024, the *Circularity Gap Report* (CGR) for Ireland was published, providing an evidence-based baseline of the circularity of the Irish economy.²⁴ The analysis undertaken to inform the CGR found that Ireland's rate of technical cycling is 2.7%, meaning that over 97% of materials flowing through the Irish economy are from virgin sources. This rate is low relative to the global economy (7.2%) and other EU Member States, including Austria (9.7%),²⁵ Denmark (4%)²⁶ and the Netherlands (24.5%).²⁷ This low rate can be attributed, in part, to Ireland's very high material footprint per capita (22 tonnes), substantially higher than the EU average of 17 tonnes per capita.²⁴

The CGR identifies the built environment as a priority sector for interventions to support Ireland's circular transition. According to the CGR, of all sectors, the built environment contributes the largest share of Ireland's material footprint, at 35%, and a significant proportion of its carbon footprint, at 11%.

The CGR highlights a number of issues for the C&D sector that negatively affect the circularity of the built environment. According to the CGR, the sector's impact is largely attributable to the significant proportion of construction materials that are imported from overseas, including India, China and the United Kingdom. The C&D sector generates very large volumes of waste. While the rate of recovery of C&D waste exceeds the EU target of 70%, this is largely used for low value applications, such as backfilling²⁸. The use of renewable and bio-based materials (such as timber) and secondary materials is low.

The CGR acknowledges the significant challenge for the built environment sector of meeting the existing and future housing needs of the population while reducing its material and carbon footprints. A number of potential interventions are highlighted to increase the circularity of the sector, including:

- **Optimising the use of existing buildings:**
 - Prioritising the adaptive reuse of buildings and intensifying the use of existing spaces to reduce the need for new buildings; and
 - Increasing the reuse of building materials and components and reducing the consumption of virgin materials for new builds, e.g. through:
 - Use of deconstruction and pre-demolition audits to optimise reclamation of construction products and materials;
 - Reuse of materials through the Regulation 27 regime and national by-product criteria (e.g., for site-won asphalt and greenfield soil and stone); and
 - Recycling of materials through the Regulation 28 regime and national end-of-waste criteria (e.g., for recycled aggregates).
- **Creating a low-carbon, energy-efficient building stock:**
 - Scaling up deep retrofitting of existing buildings; and

²⁴ Circle Economy (2024) *The Circularity Gap Report – Ireland*. [Report commissioned by DECC]. Available at: <https://www.circularity-gap.world/ireland>. Accessed February 2025.

²⁵ Circle Economy (2019) *The Circularity Gap Report – Austria*. Available at: <https://www.circularity-gap.world/cgr-austria>. Accessed February 2025

²⁶ Circle Economy (2023) *The Circularity Gap Report – Denmark*. Available at: <https://www.circularity-gap.world/denmark>. Accessed February 2025

²⁷ Circle Economy (2020) *The Circularity Gap Report – The Netherlands*. Available at: <https://www.circularity-gap.world/netherlands>. Accessed February 2025

²⁸ A recovery operation carried out at authorised facilities, where suitable waste is used for land improvement, for reclamation purposes in excavated areas, or for engineering purposes in landscaping. Soil recovery facilities are typically worked out quarries in the process of being restored or sites where soil and stone are imported to raise natural ground levels.

- Employing low-carbon energy-efficient retrofitting.
- **Shifting to resource efficient building practices:**
 - Employing lightweight and circular design practices;
 - Reducing construction losses; and
 - Supporting local procurement and low-carbon material and biobased alternatives.

C.2 Building a Circular Ireland Roadmap 2025-2040

On 15 May 2025 the Irish Green Building Council (IGBC) launched its ‘Building a Circular Ireland’, a roadmap for circularity in the construction sector and built environment in Ireland, developed as the output of a research project funded by the EPA, prepared by IGBC in conjunction with the University of Galway, Technological University of Dublin and Atlantic Technological University.

The roadmap is structured around six themes:

- Value our existing building stock;
- Plan for resource efficiency;
- Design for circularity;
- Close the materials loop;
- Change the business model; and
- Enable the circular transition.

The roadmap sets out objectives and targets in relation to each theme. Key objectives and targets are highlighted in Table 13, overleaf.

Table 13: Building a Circular Ireland Roadmap: Key objectives and targets

Theme	Key objectives	2030 interim targets	2040 targets
Value our existing buildings stock	• Prioritise reducing vacancy and dereliction, while increasing the vibrancy of our villages, towns, and cities. • Retain and enhance the (economic, social and cultural) value of existing buildings and infrastructure. • Intensify the use of existing homes, buildings and infrastructure.	• Policies are implemented to tackle vacancy resulting in initial reduction of 10%. • The underuse of buildings identified, and strategies put in place to tackle vacancy.	• 50% - 75% reduction in underuse/vacancy in the building stock achieved.
Plan for resource efficiency	• Strengthen guidance within the planning system to enable resource-efficient and circular built environment neighbourhoods. • Create a built environment that accommodates evolving needs (e.g. affordable life stage housing) optimising the occupancy of housing. • Embrace a more efficient approach to design, delivery and operation practices through interconnected strategies, including compact growth, spatial efficiency, sufficiency, and sharing economy.	• Resource efficient planning embedded in policy & development plans. • Increased availability of affordable, alternative housing/tenure life stage appropriate options.	• Optimised infrastructure to development ratios achieved through good planning. • All communities have access to a full range of affordable life stage appropriate housing ensuring better use of the housing stock.
Design for circularity	• Embed circular design into all stages of building design. • Establish core principles to balance and reconcile trade-offs within project circularity strategies. • Develop benchmarks and targets to measure and improve lean resource efficiency, waste reduction, and designing for adaptability, disassembly, and deconstruction.	• Resource efficiency baselines established with target of 10-25% reduction below baseline for 2030. • All larger projects > 5000sqm designed with Design for Adaptability / Deconstruction approaches.	• 100% buildings adopted Design for Adaptability / Deconstruction approaches. • Improved resource efficiency by 40-50% over baseline. • Optimised use of regenerative & biobased materials within viable capacity.
Close the materials loop	• Develop a bioeconomy strategy for construction, taking a holistic approach to developing timber and agri-crop supply chains and industries. • Design, deliver and operate products and buildings adopting 'Waste Hierarchy' principles • Prioritising Prevention and Preparing for Reuse • Adopting innovative Recycling and Recovery approaches • Disposal - only when absolutely necessary • Support and co-develop both demand and robust supply chains to transition to more efficient use, reuse and repurposing of materials (regenerative/low-carbon).	• Minimum targets in place for bio-based materials. • Supply chains established for a variety of agri-based materials. • GPP targets set for 15% recycled material use within buildings.	• 100% materials from deconstruction reused/recycled. • 100% of materials from / or can enter non-toxic closed loop supply chains. • Optimised use of regenerative & biobased materials within viable capacity.
Change the business model	• Establish Extended Producer Responsibility (EPR) schemes for construction materials, to reduce levels of construction and demolition waste, and capture materials for reuse.	• Extended Producer Responsibility schemes in place for a variety of construction materials.	• All materials within Extended Producer Responsibility (EPR) schemes. • Product as a Service widely used.

Theme	Key objectives	2030 interim targets	2040 targets
	• Incentivise producers to switch to Product as a Service (PaaS) where appropriate to retain ownership and control of products. • Sharing measurable indicators, providing a common language between the procurer and supply chain, enabling the setting and achievement of ambitious targets.	• PaaS models becoming available and supported by government and industry.	
Enable the circular transition	• Ensure agile planning, regulatory and certification systems that facilitates innovation whilst ensuring safety and compliance. • Facilitate procurement practices to act as a driver and enabler of a circular innovation ecosystem supporting contracting authorities, suppliers and contractors. • Support all in the value chain, including procurers, design professionals, contractors, and building operatives, to upskill and share learnings regarding circularity solutions. • Invest in activating private sector investment within the circular economy transition for the construction industry. • Support digital solutions which enable value traceability of components and materials, facilitating adaptation, repair, deconstruction, and reuse.	• Changes in the planning, regulatory and certification system start to facilitate greater integration of circularity. • Procurement processes starting to be a driver of circular innovation systems. • All in the construction industry have already started upskilling in circular solutions. • Government and industry have started to invest in the transition to circularity. • Digital solutions starting to enable traceability of components and materials, facilitating adaptation, repair, deconstruction and reuse.	• All 2030 targets achieved.

Appendix D

Case Studies

D.1 Opera Square

Opera Square is a landmark €290 million commercial property development of 3.7 acres in Limerick City, being developed by Treaty Stone Partnership DAC, a joint venture between Limerick Twenty Thirty and the Ireland Strategic Investment Fund (ISIF). The development is setting a precedent in the Irish construction industry with its innovative approach to circular resource management and waste prevention. Once completed, the development will create a new business and employment hub in Limerick City centre, including a six-storey office building ('One Opera Square'); a 14-storey landmark office building that will accommodate the Revenue Commissioners; a restored 1800s granary building, incorporating office space for the Council, hotel and bar; a new city library and café in a restored Georgian town hall and houses; and a revitalised public realm. The development was designed to LEED Platinum, WELL Platinum and nZEB standards.

The development is situated on what was a previously developed site with 18 existing structures, including Georgian buildings of architectural heritage significance. The majority (16 no.) of the existing historic buildings have been retained *in situ* for redevelopment, where appropriate. However, the development still necessitated large-scale demolition works – the largest undertaken in Limerick to date.

Facilitated through a partnership between the Southern Region Waste Management Office, developer Limerick Twenty Thirty, and contractor John Sisk & Son, over 1,000 tonnes of existing components and materials were salvaged during demolition and enabling works and reused on-site and elsewhere in the City and County. Salvaged materials were diverse and included stone, glass, timber, bricks, ceiling and floor tiles, fencing panels and door frames. Significant volumes of stone and brick were reused in other developments including the Foynes Flying Boat Museum, the Canal Harbour Building; in old stone wall repairs; and as materials for trainee stone masons.



Figure 13: Operate Square project, Limerick: artist's rendering (source: Limerick Twenty Thirty)

D.2 Zolhallen Plaza

Zolhallen Plaza is a 5,600 m² urban public plaza completed in 2011 at the historic customs hall in Freiburg, Germany.²⁹ It involved the redevelopment and revitalisation of a disused railyard. Where possible, existing materials on the site were reused and integrated into the design. The hardscape was fully constructed of site-won demolition materials, and old rail tracks were retained as paving inlays. The plaza was also designed to be multifunctional, providing a flexible public space that can accommodate pop-up events and markets. Bespoke benches designed to resemble railway buffer stops provide flexible use and can be used for sitting, lying down or as tables. The plaza was also designed with sustainable drainage in mind – the site drains directly to ground rather than the local sewer system, alleviating pressure on the municipal drainage network.³⁰



Figure 14: Zolhallen Plaza, Freiburg, Germany © B Doherty

²⁹ Landezine (2015). *Zolhallen Plaza*. Available at: <https://landezine.com/flood-zone-on-public-plaza-design-by-henning-larsen/>. Accessed June 2025.

³⁰ Land 8 (2015). *How Zollhallen Plaza is Ready for a 100-Year Flood*. Available at: <https://land8.com/how-zollhallen-plaza-is-ready-for-a-100-year-flood/>. Accessed June 2025.

D.3 Brent Cross Town Substation

A colourful ‘wrap’ around the sustainable energy substation at Brent Cross Town has created the largest permanent public artwork in the UK, with approximately 99.2 tonnes of embodied carbon of the structural steel frame avoided through reuse.

The substation is wrapped in a 52-metre-long and 21-metre-high artwork, created by London-based artist Lakwena and architects IF_DO. Taller than the Angel of the North, it sits in a prominent location, next to the busy junction between London’s North Circular Road and the M1 motorway and adjacent to Thameslink railway lines and the new Brent Cross West station. As many as six million people will see the work every year from road and rail alone. Titled ‘Here we come, Here we rise and shine’, the artwork reflects the ambition to inspire and bring people together in the local community.

The sustainable energy substation is critical to Brent Cross Town achieving net zero carbon by 2030. It will supply electricity to the whole town, including 6,700 new homes, 3 million sq ft of offices and new retail and leisure spaces. It will also power the town’s district heating and cooling centre.



Figure 15: Brent Cross Town Substation © Arup

D.4 Pim Street Apartments

This project is a six-storey, 30-apartment development on an infill site on Pim Street in Dublin 8. It provides a recent example of the application of modern methods of construction (MMC) to residential development in Ireland. The apartment block was constructed in 2022 using prefabricated 2D panels with an enclosed light gauge steel structure, manufactured off-site in Co. Longford.³¹ Assembly of the panels and building fit-out was completed on-site. This approach can be considered to be more flexible than the 3D volumetric approach to building prefabrication, as it can be adopted at a later stage in the design process.³² Compared with traditional construction, use of prefabricated elements can result in reduced waste, fewer traffic movements and construction workers on-site, and shorter completion times.³³ It also aligns with the use of digital tools such as Building Information Modelling (BIM) and Digital Product Passports (DPP), as prefabricated elements can have integrated QR codes or RFID tags providing relevant information and traceability throughout the supply chain and building lifecycle.



Figure 16: Pim Street Apartments: on-site assembly of 2D panels © Framespace

³¹ Framespace (2025). *Construct Innovate IndEx: Framespace Solutions in Collaboration with Construct Innovate*. Available at: <https://constructinnovate.ie/wp-content/uploads/2025/04/Framespace-construct-Innovate-IndEx-2025.pdf>. Accessed June 2025.

³² National Economic and Social Council (NESC) (2024). *Boosting Ireland's Housing Supply: Modern Methods of Construction*. Council Report No. 166. Available at: https://www.nesc.ie/app/uploads/2024/09/166_modern_methods_of_construction.pdf. Accessed June 2025.

³³ Framespace (n.d.) *Pim St. Apartments, Dublin 8*. Available at: <https://www.framespace.ie/projects/pim-st-apartments/>. Accessed June 2025.

D.5 HAUT

HAUT is a 21-storey, 55-unit apartment development located in Amstelkwartier, Amsterdam.³⁴ It provides a leading-edge example of the application of mass timber as a bio-based construction material for residential buildings. HAUT is the tallest timber-hybrid residential building in the Netherlands and one of the tallest timber-hybrid buildings in the world. A design principle for the project was ‘timber, where possible; concrete and steel, where necessary’. The building contains 2,000 m³ of timber, sequestering some 3 million kg of carbon. While the basement and core of the building are concrete, providing the necessary stability and fire safety for the structure, the rest of the structure is predominantly mass timber. In order to use timber as much as possible, the building features precast timber-concrete composite floor plates. It also features flexible floor plans, allowing residents the freedom to adapt their living spaces to their changing needs over time in a resource efficient manner.

Other circular design features include solar PV panels meeting the full electricity demands of the building, and wastewater purification through an integrated constructed wetland on the rooftop. In 2018, HAUT was awarded the International BREEAM Award before it was built. In 2023, it was certified BREEAM Outstanding – the first residential development in the Netherlands to achieve this rating.



Figure 17: HAUT, Amsterdam © Arup

³⁴ Arup (n.d.) *Designing and engineering the Netherlands' tallest timber-hybrid residential building*. Available at: <https://www.arup.com/projects/haut/>. Accessed June 2025.

D.6 TFI Bikes

Transport Infrastructure Ireland (TFI) offers a self-service bike rental in the cities of Limerick, Cork, Galway and Waterford.³⁵ Individuals over the age of 14 can obtain an annual subscription for €10 or a three-day pass for €3 to access the service in these cities – a €150 security deposit applies in both cases. The first 30-minutes of each rental is free; for longer rentals, a time-based charge is applied. Bikes are repaired by TFI, as needed. The dedicated TFI Bikes App provides users with information on bike station locations, availability of bicycles and route planning. In Limerick, TFI has 23 stations and 215 bikes available. The nearest station to the proposed development site is on O’Callaghan Strand, where there are up to eight bikes available for rental.

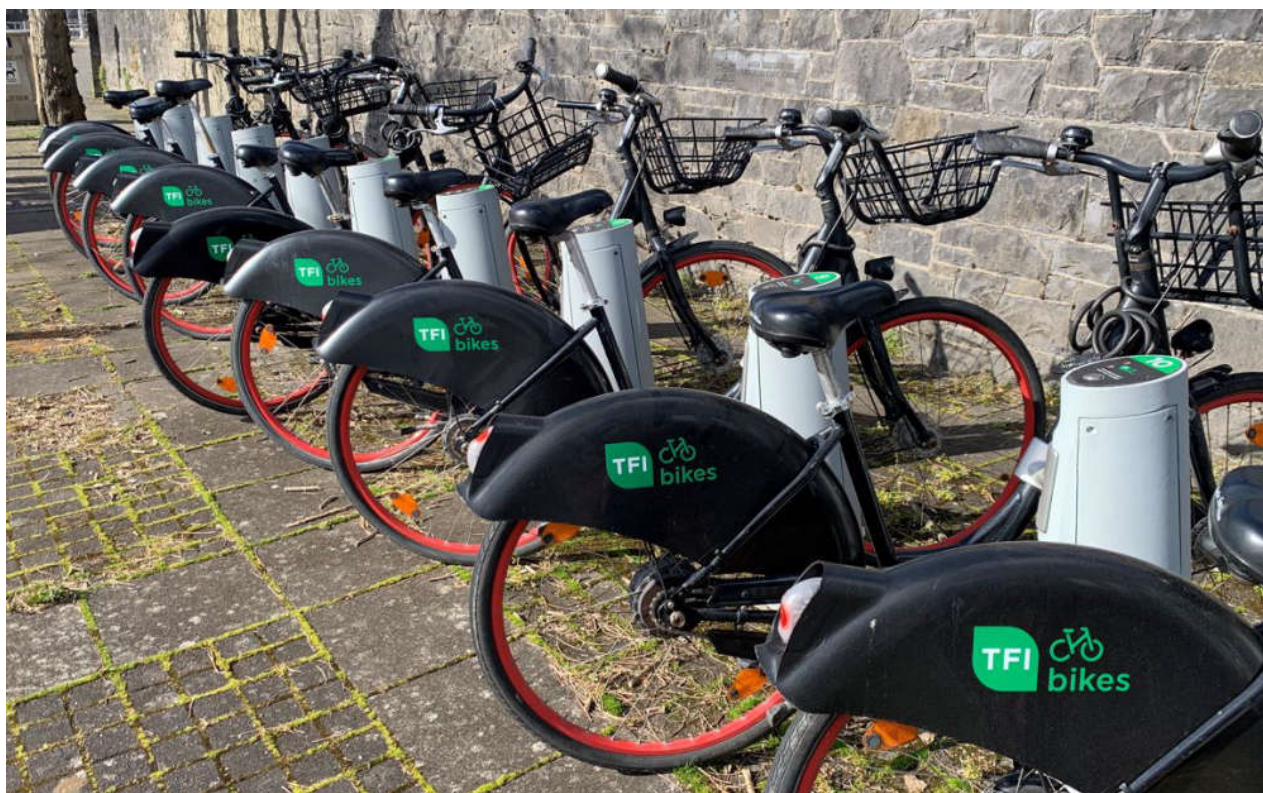


Figure 18: The TFI Bikes station at the University of Limerick (source: Live 95)

³⁵ TFI Bikes (n.d.) Home. Available at: <https://www.bikeshare.ie/>. Accessed June 2025.

D.7 Fixotekets

Since 2016, the City of Gothenburg in Sweden has had a circular economy strategy, called ‘Circular Gothenburg’. The ‘fixoteket’ (which roughly translates to ‘fixary’ or ‘fixing library’) was an initiative under the Circular Gothenburg strategy. In 2017, four fixotekets were established in residential neighbourhoods in Gothenburg with different socioeconomic profiles. The fixotekets have regular opening hours and provide local residents with free facilities to carry out DIY/repairs, including an extensive range of tools and equipment, as well as workshop space. They also provide space for the exchange and borrowing of used goods – clothing, tools and equipment, books and other media. They have also become popular community meeting places and provide a space for schoolchildren to gather after school. For the first three years, the fixotekets were run as an innovation project, funded by the Swedish Innovation Agency, VINNOVA; the Swedish Energy Agency; and the Swedish Research Council for Sustainable Development. In 2019, the innovation funding ended. Three of the fixotekets are now managed by a public benefit housing organisation in collaboration with the municipality, while the fourth is run by a local non-profit. The fixotekets are operated by a mix of paid and volunteer staff.



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