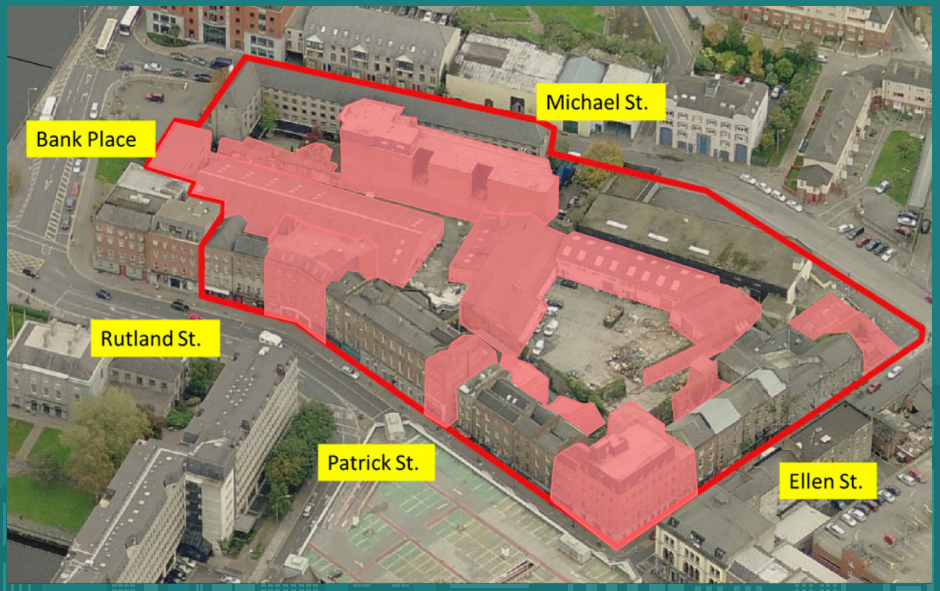
WHY DEMOLITION AND ENABLING WORKS MATTER

Demolition and Enabling Works are preparatory activities required to prepare a site for the main construction works. These works make the site "ready" for the contractor to start the project. These works can include demolition, site clearance, utility diversions, temporary works (e.g. piling mat) and environmental measures (such as removal hazardous materials).

Demolition and enabling works are often seen as waste-heavy phases. By planning for material recovery and reuse at the outset, projects can significantly reduce environmental impacts, cut transport movements, and create local value. Prevention of construction and demolition (C&D) waste and reducing the amount of C&D waste generated is required if Ireland is to transition to a net-zero carbon, resource-efficient and a circular economy.



Opera Project Site (demolition works shown in red)

BACKGROUND

The Circular Economy Construction demonstrator project (CE-CON) aimed to utilise the Limerick Twenty Thirty Opera Square development in Limerick as a Lighthouse Demonstrator Project for the Circular Built Environment. It was funded by the Environmental Protection Agency (EPA) and led by the Irish Green Building Council (IGBC) in collaboration with partners Atlantic Technological University (ATU), Limerick Twenty Thirty Designated Activity Company (LTT DAC) and the Southern Region Waste Management Office (SRWMO).

This factsheet illustrates how circularity can be embedded at the demolition and enabling phase, using Opera Square as a case example.

KEY FINDINGS FROM OPERA SQUARE CASE EXAMPLE

15,040 tonnes	of Materials Reused (on-site)
899 tonnes	of Materials Reused (off-site)
759 tonnes	of Materials Recycled
98%	Diversion from Landfill
~1,600	Truck Movements avoided
~66%	Carbon Reduction

OPERA SQUARE (LIMERICK)

Opera Square is a brownfield site located in the heart of Limerick City Centre. It contained various building structures dating from the 18th to the 20th century. The perimeter of the site, bordering Rutland Street, Patrick Street and Ellen Street is predominantly made up of terraced buildings dating from the Georgian period. There are several buildings on the site with varying levels of heritage value.

The main redevelopment plan involved the demolition of all the twentieth-century buildings and later additions to the rear of existing heritage structures to facilitate new-build elements and proposed renovation and adaptive re-use of the Protected Structures and the other structures of heritage value within the site.

Prior to demolition, a pre-demolition audit was undertaken. The purpose was to identify the type and quantities of the materials that would arise from the demolition works and possible opportunities to implement circular economy principles.

- The project achieved a diversion rate for construction and demolition material from landfill of 98% through on-site and off-site re-use of construction materials and the re-use of material as a piling mat diverted 87 % of construction and demolition material from landfill.
- A life cycle analysis was undertaken and determined a reduction of at least 66% in the embodied carbon global warming potential compared to a business-as-usual construction practice for the piling mat.
- The project reduced truck movements through Limerick City and environs by circa 1,600.

There are lessons learned from this project that can be applied to future projects, one being the full realisation of opportunities for further re-use of material through the end-of-waste and by-product mechanisms. Achieving the full potential of a circular economy in the built environment requires collaboration among stakeholders, with initiatives that promote community engagement being particularly impactful in creating both social, environmental and economic benefits through a Circular Economy.

One Opera Square (https://oneoperasquare.ie/)

Piling Mat spread across the Opera Square site

Material Category	Pre-Demolition Audit	Smart Waste
Concrete and Blocks	12,213	15,003 [a]
Red Clay Brick	1,658	10 [b]
Natural Stone	2,202	889 [c]
Metal	214	354 [d]
Bituminous Stone	195	200 [d]
Timber	177	200 [d]
Gypsum-based Material	111	*nr*
Asphalt / Bituminous	71.3	*nr*
ACM	46	156
Composite (glazing etc.)	22	1
Clay / Ceramic Tiles	19	*nr*
Textiles	17	*nr*
Mineral fibre ceiling tiles	16	*nr*
Electrical (light fittings)	6	*nr*
Plastic	5	*nr*
Other Fittings	3	*nr*
Green Waste	*nr*	5 [d]
General Waste	*nr*	430 [e]
Total	**16,973 tonnes**	**17,248 tonnes**

Table: *Estimated (pre-demolition audit) and actual quantities from the demolition and enabling phase (all figures in tonnes)*

Key	
nr	Not recorded
ACM	Asbestos Containing Material (removed and sent for disposal at hazardous waste facility
(a)	**On-site re-use (15,003) comprising:** Concrete)In-situ) 7,503t, Bricks (engineering) 5,000t, Blocks (concrete) 2,500t
(b)	**Off-site re-use:** Canal Harbour building 8t and in **On-site re-use** in future phase of project: Gerorgian red brick 2t
(c)	**Off-site re-use:** annacotty 75t, Herbertstown 75t, Askeaton 50t, Limerick City Build 650t and Civil trust 2t and **On-site re-use** in future phase of project: Cobble stones 12t, Limestone Door Case 25t
(d)	Recycled
(e)	The General Waste was sent to an authorised waste facility. All mixed loads received are segregated and treated to minimise waste sent to landfill; the recovery rate for all mixed loads is 75% or higher.

Further Reading on Opera Square Project:

Fahy, K., Kelly, M. & Newell, S. Analysis of Circular Economy Interventions during the Demolition and Enabling Phase of a Construction Project: An Irish Case Study. Circ.Econ. Sust. (2025). https://doi.org/10.1007/s43615-025-00670-9

One Opera Square (under construction)

LESSONS LEARNED

The following lessons learned from the Opera Project can be applied to future projects to maximise the re-use of materials and minimise the generation of C&D waste:

Early Planning

- Early collaboration at the concept stage among stakeholders, contractors, clients and waste consultants is integral to the success of the waste management process.
- It is advised that the earlier circular opportunities and interventions are considered, the greater their potential impact and ease of implementation. If a client, advised by a project team, formulates their ambitions and objectives at the start of the planning and tender development stage, the likelihood that they will be considered in the design development and implementation stages increases.

Material Recovery & Reuse

- The pre-demolition audit process is the best tool for establishing effective material recovery strategies and options. This output from the pre-demolition audit should occur in the early planning stage to integrate material recovery and re-use considerations into scope and project contract documents.
- Integrating material recovery and re-use considerations into project contract documents ensures the opportunity is provided to cost and schedule the works required to realise the opportunities.

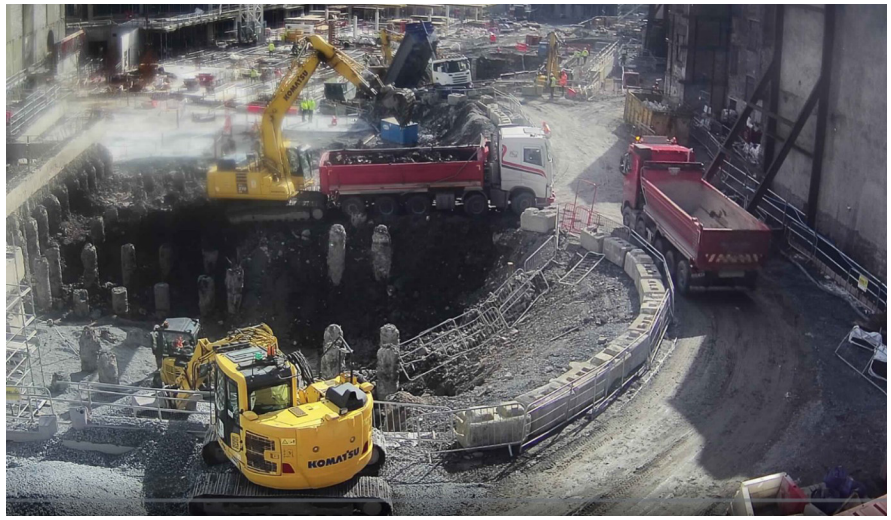
Contracts

- Including circular requirements, practices and principles in contract documentation at the concept stage can lead to a significant reduction in the environmental impact of the construction process.
- If selective demolition is a client requirement to enable recovery of materials, the client must appropriately include it in contract documentation when circular economy principles are a client expectation of a demolition project.
- Well-prepared scope and project contract documents that address material re-use will enhance a project's execution and environmental outcomes.

KPIs & Tracking

- The establishment of separate recovery targets for each waste stream will enhance environmental outcomes.
- Setting clearly defined definitions and targets linked to KPIs for material re-use within a project is important to promote accountability in material recovery.
- The methodology for resource and waste characterisation, continuous communication and a transparent waste-tracking approach is crucial for maintaining efficiency and managing costs.

GALLERY



One Opera Square (under construction)

852 tonnes of natural stone reused across various projects throughout Limerick City and County

Gates and stone pillars re-used by Limerick Civic Trust

Canal Harbour Building (2,000 bricks from Opera project utilised for repairs)

GALLERY

Limestone door recovered for reuse

Natural Stone from Opera Square in the construction of a stone sculpture

Stone from Opera project used in stone mason training scheme (Limerick City Build regeneration project)