

Dublin City Council and PSQ
Developments Ltd (Joint
Applicants)

Parnell Square Cultural Quarter

Outline Construction
Management
& Waste Management Plan

239031-00

Issue 1 | 4 September 2018

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 239031-00

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1 Introduction

The following outline Construction and Waste Management Plan has been produced as part of the overall planning application for the development at Houses 28-23 and 20-21 in Parnell Square in Dublin City.

This document presents an outline construction management plan, supported by possible construction methodologies and techniques that may be adopted during the construction of the proposed development. This outline plan seeks to demonstrate how such works can be delivered in a logical, sensible and safe sequence with the incorporation of specific measures to mitigate the potential impact on people, property and the environment. This document also presents an outline waste management plan for the construction stage of the project, and outlines mitigation measures and strategies for the creation and management of construction related waste material.

Nothing stated in this document shall supersede or be taken to replace the terms of the contract, the detailed design description issued with the contract tender or the conditions of planning.

This methodology will be required to be interrogated by the main contractor prior to commencing works on site. It is noted that this document should be viewed as an outline plan with the construction management plan to be developed by the main contractor in consultation with statutory undertakers/ authorities and affected stakeholders prior to works commencing on site.

1.1 Project Description

The proposed development of a new Dublin City Library and public plaza at Parnell Square North, Dublin 1, comprising in summary:

- The adaptive re-use of Nos. 20-21 & Nos. 23-28 Parnell Square North (all Protected Structures)
- The construction of a new 5-storey over basement extension, with roof gardens, for library and cultural use (c.5,720 sq m gross floor area, and associated demolition of existing 3-storey gymnasium / hall, single storey atrium and 2-storey return, to the rear of Nos. 23-28 Parnell Square North.

- Improvements to the public realm to facilitate a new public plaza, including reconfiguration of vehicular roadway (2-lane), parking and set down areas, street furniture, street art and public lighting, widening of footpaths, and relocation of Dublin Bikes Station, at Parnell Square North, in the area between Parnell Square West and East and the Garden of Remembrance.
- Modifications to Bethesda Place and Frederick Lane North to facilitate access by service and emergency vehicles to Frederick Lane North.

The overall site area measures c. 9900 sq m, and includes Nos. 23 – 28 Parnell Square (Scoil Mhuire) and Nos. 20 – 21 Parnell Square (All Protected Structures). The Georgian houses are located either side of Hugh Lane Gallery (Protected Structure). The site is otherwise generally bounded by Parnell Square North, East & West, the Garden of Remembrance to the south, Bethesda Place, Frederick Lane North and the Sheridan Court Residential Apartments to the North.

It may be noted that the existing library facility currently located at the Ilac Centre will be moved to this new City Library building, and the space at the Ilac Centre will become available for reuse subject of any necessary planning permission being granted.

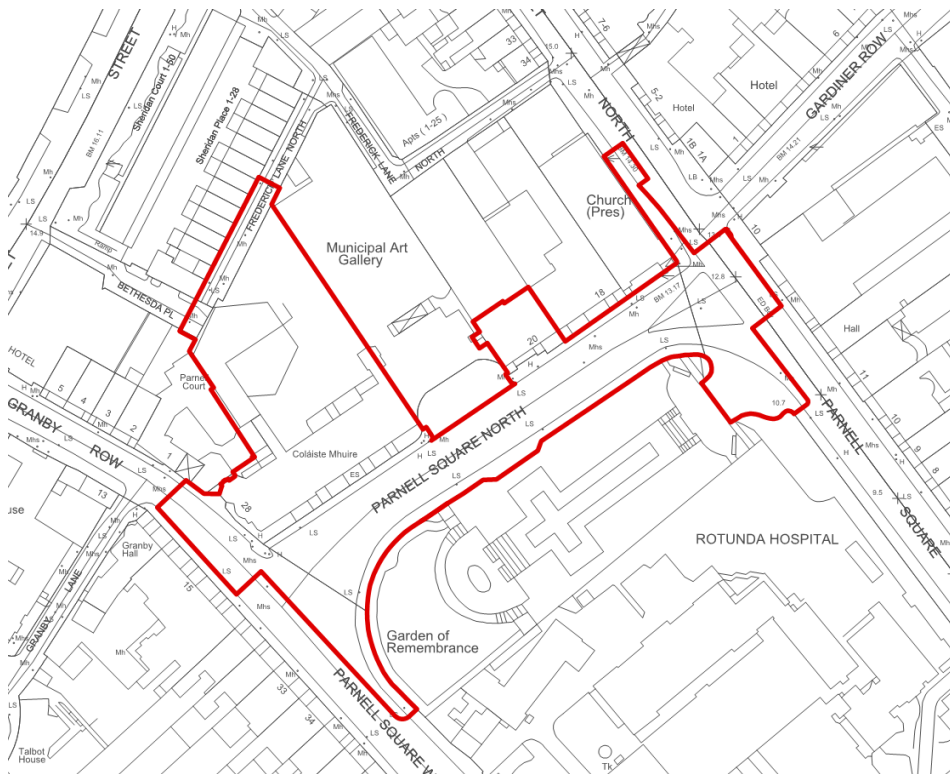


Figure 1. Red Line Boundary Drawing

1.2 Key Interfaces

The site adjoins a number of roadways, a public park and a public art gallery. Parnell Square to the south of the development features the Garden of Remembrance landmark. The Hugh Lane Gallery is to the east of House 23 and extends along the full length of the site to Bethesda Place to the rear. A series of buildings in Parnell Court interfaces the site boundary to the west of the site. Similarly, along the northern boundary of the site is a series of apartment buildings at Bethesda Place and Sheridan Place. The eastern boundary of houses 20 & 21 is bound by the Dublin Writer's Museum and Chapter One restaurant, with the Hugh Lane Gallery to the rear.

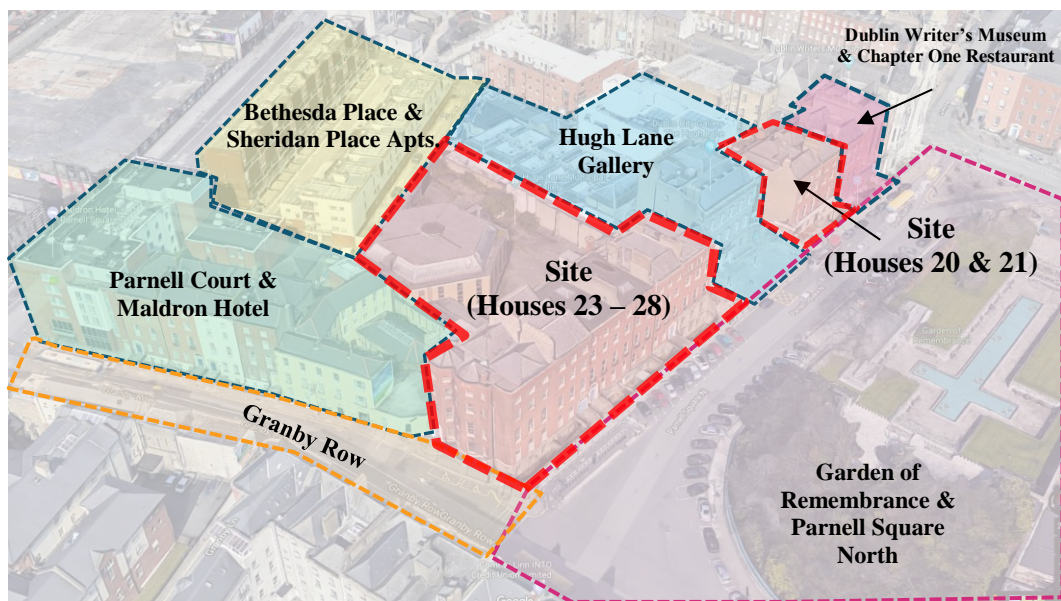


Figure 2. Key Site Interfaces

1.3 Existing Buildings

The site is largely occupied by a number of existing buildings. The majority of these buildings are protected structures, namely Houses 28-23 and Houses 20 & 21, and will be retained and restored as part of the proposed development. The hexagonal shaped extension built onto the rear of House 27, which served as an extension to the Colláiste Mhuire School, is to be demolished as part of the enabling works phase of the project. A wing to the rear of House 23 is also to be demolished as part of the enabling works phase. The existing buildings have all remained unoccupied for a number of years and are in a current state of disrepair.

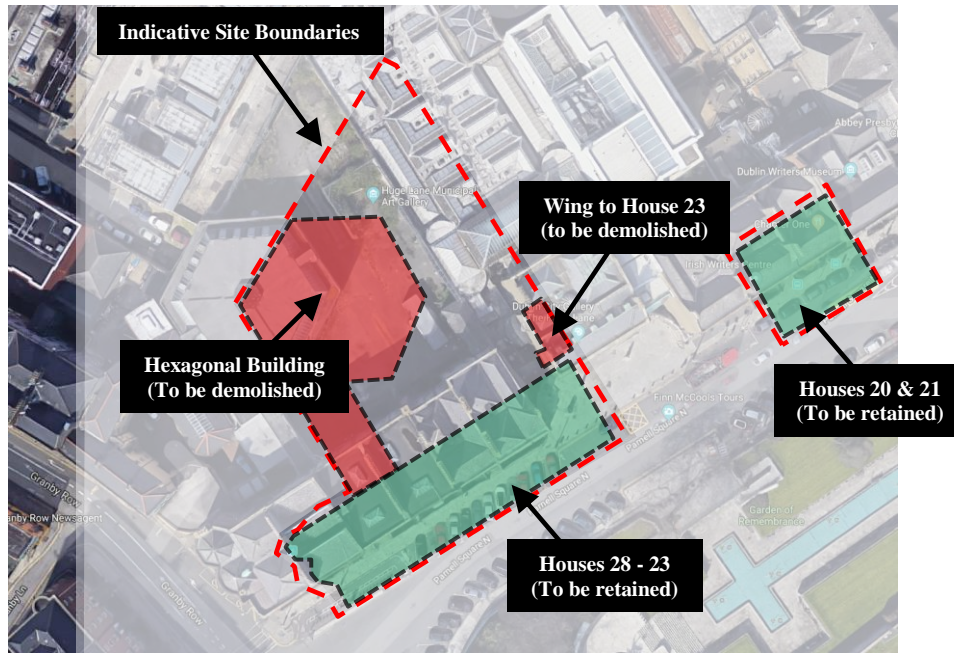


Figure 3. Existing Buildings

1.4 Proposed Development

The proposed development consists of the following:

- The construction of a new 5-storey over basement extension, with roof gardens, for library and cultural use (c.5,720 sq m gross floor area, and associated demolition of existing 3-storey gymnasium / hall, single storey atrium and 2-storey return, to the rear of Nos. 23-28 Parnell Square North.
- The adaptive re-use of Nos. 20-21 & Nos. 23-28 Parnell Square North (all Protected Structures)
- Improvements to the public realm to facilitate a new public plaza, including reconfiguration of vehicular roadway (2-lane), parking and set down areas, street furniture, street art and public lighting, widening of footpaths, and relocation of Dublin Bikes Station, at Parnell Square North, in the area between Parnell Square West and East and the Garden of Remembrance.
- Modifications to Bethesda Place and Frederick Lane North to facilitate access by service and emergency vehicles to Frederick Lane North.

Land Use	Total Area (GIA)
New Build Library, Conference Centre & Ancillaries	1983m ²
Existing Houses 23 – 28 & 20 – 21	1080m ²
Total	3063m ²

Table 1. Summary of Proposed Land Usage

1.5 Project Participants

Role	
Client	Dublin City Council & PSQ Developments Limited (Joint Applicants)
Project Manager	Linesight
Architect	Grafton Architects / Shaffrey Architects
Civil and Structural Engineers	Arup Consulting Engineers
Contractor	T.B.A
Mechanical and Electrical Engineers	Arup Consulting Engineers
Quantity Surveyor	KSN Construction Consultants
PSDP	Chris Mee Group
Fire Consultant	Michael Slattery Associates
Landscape Architect	Bernard Seymour Landscape Architects
Planning Consultant	Stephen Little & Associates
Environmental Consultant	AWN
Traffic Consultant	Aecom/Waterman Moylan

Table 2. List of Project Participants

2 Construction Sequencing and Programming

The potential sequencing for the project may be as follows:

- **Phase 1 :** Enabling Works
(incl. Surveys, Site Preparation & Demolition, Service Diversions)
- **Phase 2 :** Substructure Works
(incl. Temporary Works, Excavation, Foundations and Concrete Works.)
- **Phase 3:** Superstructure Works
(incl. Main Structural Elements, Envelope, External Finishes & Internal Fit Out)

A detailed programme will be developed in advance of the works commencing with each phase addressed and necessary dependencies highlighted.

The development is expected to take some 2-3 years to construct including the public realm.

2.1 Phase 1 – Demolition

2.1.1 Site Establishment

The site establishment works, to be carried out by the appointed contractor, will include erecting perimeter hoardings around the site, constructing the site compound and storage areas, forming site access and egress points, enacting the traffic management plan, providing site security and erecting cranes. These items are discussed further in Section 3 below.

2.1.2 Pre-demolition and Condition Surveys

A pre-demolition survey will be undertaken to provide sufficient information for the main contractor to prepare a detailed demolition plan, giving methodology and work sequences for the demolition phase.

This survey will inform the design team and specialist demolition contractor of the structural framing, floor and wall construction,

so that measures can be put in place to ensure the safe deconstruction of each building and to avoid uncontrolled collapse of any part of the structure.

This survey will also provide information on non-structural elements that will form part of the initial soft strip out works. This information will also assist in the preparation of a detailed Waste Management Plan for these waste streams.

This survey will be accompanied by a detailed risk assessment to identify potential hazards, and necessary mitigation measures for safe demolition.

Dilapidation surveys will also be carried out on all adjoining properties, roads and footpaths and issued to the property owners and local authorities in advance of the demolition works.

The Design Team and Conservation Architect will help prepare the specification for and review the results of both Pre-demolition and Condition Surveys.

2.1.3 Service Diversions

Where the excavation strategy or temporary works require any temporary diversion of local services or utilities within the site perimeter, this will be undertaken strictly with prior agreement of the relevant service providers and authorities. Similarly, where service diversions are required as part of the overall scheme, these will be also be undertaken strictly with prior agreement of the relevant service providers and authorities.

2.1.4 Asbestos Surveys

Due to the age of the existing buildings, there is a risk of asbestos being present on site. A Refurbishment/ Demolition Asbestos Survey is to be undertaken by a specialist asbestos surveying company to assess the risk of encountering asbestos containing materials (ACM's).

Prior to commencement of the demolition works, all ACM's identified will be removed by a suitably trained and competent asbestos removal contractor. ACM's will only be removed from site by a suitably permitted waste contractor and will be brought to a suitably licenced facility in accordance with the appropriate regulations.

2.1.5 Soft Strip

For the buildings to be demolished all loose internal fixtures and fittings such as furniture, kitchen fittings and other unattached items shall be removed by hand and segregated on site, where practical, into skips to allow for collection and transport by an approved waste carrier. The approved waste contractor will provide appropriate skips to facilitate on-site segregation of waste materials.

Fixed soft stripped material such as plasterboard, wood panelling and other waste materials will be removed by hand, brought to the segregation points and loaded into the skips and subsequently removed from site in skips or using haulage trucks. An exclusion zone shall be set up within the works area to provide a safe and operational area for skips and demolition waste and to prevent operatives from entering.

2.1.6 Structural Demolition

The strategy for structural demolition must ensure de-construction is undertaken in a carefully pre-planned sequence, using methodologies that ensure that buildings under demolition and any adjoining buildings are not affected in any way, weakened or de-stabilised during the works. All demolition works will be carried out with due consideration toward mitigating noise and vibration pollution to minimise disturbance to the surrounding area. Dust suppression systems, such as misters, will be used during the demolition operations, keeping air pollution to a minimum.

In order to comply fully with works specification, planning conditions, environmental and safety requirements and adhering to demolition best practice, the works should be undertaken by adopting a methodology that combines the following operations:

- Demolition by hand or using hand-held tools:

This method will be adopted in all sensitive locations. These works can be undertaken from existing floors, crash decks or from mobile elevated work platforms.

- Saw cutting and lifting:

Again, these methods will be adopted in sensitive locations. These works can be undertaken from existing floors, crash decks or from mobile elevated work platforms.

- Mini excavators and breakers:

The use of mini excavators and breakers may be adopted in constricted locations around the site where larger machinery may not be appropriate.

- Use of a long reach excavator fitted with specialist concrete munching / pulverising equipment to allow for controlled demolition of the existing buildings.
- Hydraulic concrete breaking equipment:

The use of breaking equipment will be employed to break out ground floor slabs and any external areas of hard-standing, such as car parking areas. The breaker will typically be fitted to a 20T excavator but there may be some hand held tools utilised in isolated or constricted locations.

2.2 Phase 2 – Substructure Works

2.2.1 Excavations

A site survey indicates that the existing ground levels varies from around +15.5 to +13.5, with the existing basement structure at approximately +10.0. The proposed level of excavation will be to approximately +9.5m OD and +12.5m OD for the new build basement structure and ground floor level slab formation level respectively. There are limited site investigations to date on ground conditions, however it is envisaged that there is a large depth of boulder clay on bedrock, inferred from existing site data from the surrounding area. It is currently proposed that the principle substructure will consist of suspended slab and piled foundations, piled down to bedrock.

There is a risk of contaminated material being present on site. A separate environmental report forms part of this application. All disposal of any identified contaminated materials will be done in accordance with the Council Decision of 19th December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of Annex II to Directive 1999/31/EC (2003/33/EC) and the "List of Waste & Determining If Waste Is Hazardous or Non-Hazardous, Valid from 1st June 2015" published by the EPA. The disposal of any excavated material will be done in line with the Construction & Demolition Waste Management Plan developed by the appointed main contractor and will utilise site investigation data and the Soil Classification Report as the basis for the soil disposal.

2.2.2 Piling & Basement Construction

The retaining elements of the basement structures will consist of standard RC retaining walls, which will be constructed with an open dig construction where feasible. However, some retaining elements which run alongside the existing boundary at Parnell Court may require localised secant piling to prevent the undermining of adjacent structures.

Prior to the excavation works being carried out, underpinning to all adjoining structures, namely along the Hugh Lane Gallery and Parnell Court interfaces, will be performed to the required depths that ensure there is no threat to their structural integrity during the excavation works required for the new build to the rear of the site.

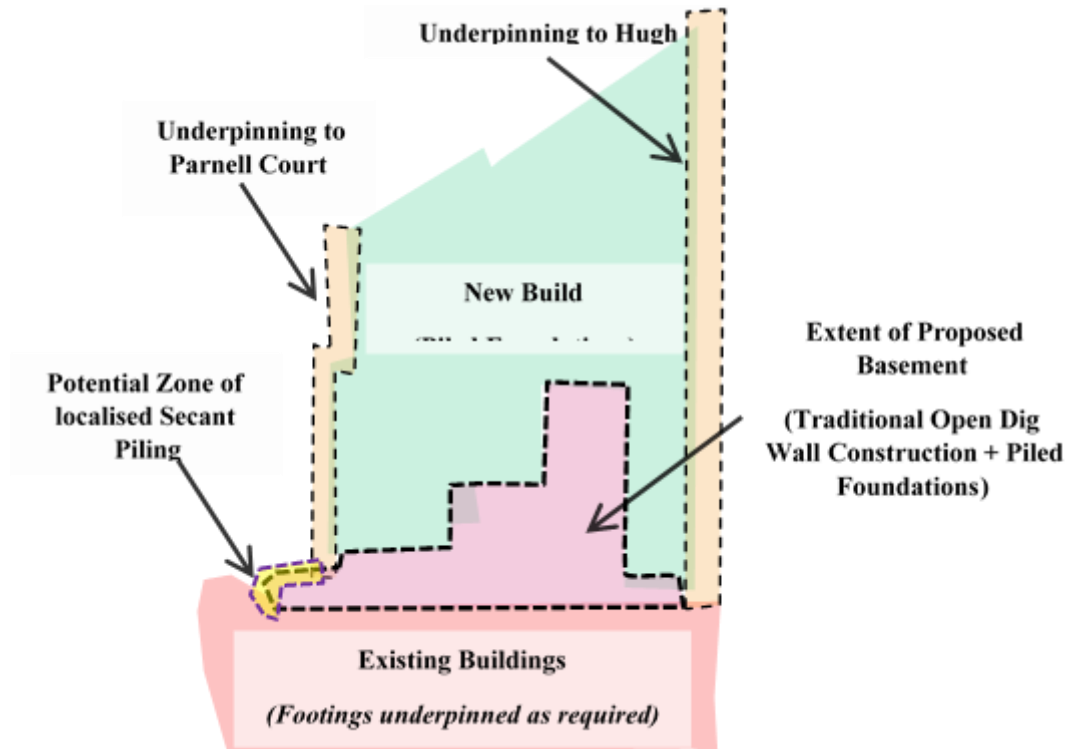


Figure 4. Proposed Substructure & Piling

2.2.3 Underpinning

Concrete underpinning to the strip footings of the existing buildings will be required in order to ensure they have sufficient bearing capacity and to facilitate the lowering of the existing basement levels. Underpinning works are also required along the Hugh Lane Gallery and Parnell Court interfaces. These works are to ensure the integrity of the neighbouring structures during any excavation works required. The quantity and depth of underpinning required will not become clear until further site investigative works investigating the current existing condition of the foundations for both the existing buildings and adjacent boundary structures are completed. All underpinning works will be carried out to detailed method statements and works will be agreed with all relevant stakeholders in advance.

2.2.4 Basements

The proposed development requires the construction of a single level basement structure to the rear of the existing buildings. The basement in the new build will consist of a library, a restaurant kitchen and plant area and have a total GIA of 779m². Where possible, the walls of the basement will be constructed using open dig construction. It is envisaged that a small portion of the walls will require secant piling wall construction where the basements are too close to adjoining boundaries to accommodate an open dig.

Underpinning of the rear walls of the existing buildings as well as the neighbouring properties will be carried out prior to any basement construction/excavation in order to ensure the integrity of the neighbouring structures as noted in 2.2.3 above. The basement slab will have a suspended slab construction and be supported by piled pad and strip footings down to rock level.

The existing building basements have a GIA of 1,154m² and will have their respective levels altered and lowered to accommodate the building use, which will consist of a library, kitchen and garden area. Additional underpinning to the footings of the structural walls of the existing buildings will be carried out in order to accommodate the lowering of basement levels and to ensure that the buildings have a stable and suitable foundation.

2.2.5 Foundations

The areas of the new build to the rear of the development that do not have a basement substructure will consist of a suspended slab supported by RC footings on piles. The piled RC footings will be offset near boundary locations to prevent interference with the structural integrity of any adjacent structures.

The existing buildings will require underpinning works to their masonry wall footings to ensure the structural integrity of the buildings is maintained. Further site investigation works are required to determine the condition of the existing footings and the quantum of underpinning required.

2.3 Phase 3 – Superstructure Works

On completion of the required substructure and enabling works for the new build element of the proposed development, the construction of the superstructure can then commence.

The concrete framing will be constructed on a sequential basis with the concrete pumped/lifted into place. The floor slabs will be supported using temporary props as necessary to ensure the stability of the structure at all times during the construction process. Concrete will be delivered to site using a 'just-in-time' approach. This will mitigate against traffic congestion as well as reducing the amount of space required for material storage on site.

The superstructure works to the existing buildings will largely consist of stabilisation measures, strengthening of the existing flooring and general structural intervention works. The contractor is to provide a safe methodology for all of the required structural interventions in the existing houses. The contractor is to also ensure at all times that there is adequate propping, fall arrest systems and other appropriate mitigation measures to ensure safety of personnel at all times on site and to preserve the structural integrity of the buildings for the duration of the works.

Prior to the works commencing, the main contractor will hold a number of workshops and site reviews with the design team and conservation architect to establish the repair thresholds and review the general condition of the existing houses. The main contractor will carry out a dilapidation survey of the listed structures. This will be used in conjunction with the Conservation Architects report, to develop a number of specific method statements for each element of the work for approval prior to the works commencing.

Sample repairs will be completed for approval and sign off. Sample units (e.g. windows) that may be required will be manufactured for approval and signed off. Prior to the works commencing monitoring locations will be agreed with the design team. Vibration monitors and tell-tales to monitor cracking will be installed. The main contractor should ensure that as works progress a continuous inspection process with the conservation architect is established.

Superstructure works for both the existing and new build elements of the scheme are envisaged as progressing concurrently. Methods of construction to be implemented are to be approved by all necessary stakeholders in advance of the works being carried out.

Once the building structure has been well advanced, the completion of the facades can commence as can the installation of mechanical and electrical services and building finishes.

Final drainage and utilities connections will be completed towards the end of the construction programme. These will be completed during the project programme duration when best suited to the phasing of the project.

As the project nears completion, external finishes to the public realm will commence. This will require adjustment to the site perimeter conditions and interaction with the local authorities in relation to paving finishes.

- At an appropriate time, welfare facilities will be established within the newly constructed building space and the external setup will initially be reduced in size and eventually decanted to allow the public realm works to progress.
- The sequence and timing of any changes will be such that necessary facilities will always be available and that appropriate unloading/storage facilities will be in place to allow for a safe working environment in accordance with the agreed programme.
- The indicated traffic lane will always be available as requested with any necessary closures to be arranged for 'out of hours' time.

The Construction Traffic Management Plan, prepared by the traffic consultant, Aecom, includes further information on this sequencing.

3 Site Management

Discussed below are a number of areas which the main contractor will be required to address during the works.

3.1 Health and Safety

The primary aim of planning for safety on this site is ensuring the safety of people involved in and affected by the development. This includes pedestrians, road users, neighbours, site staff and visitors to site.

The following are examples of some site specific issues that will have to be addressed during the construction of the proposed development:

- Managing demolition works and disposal of demolished materials
- Managing and controlling occupancy levels in the existing Georgian buildings for the duration of the works.

- Managing and limiting the storage of materials in the existing Georgian buildings for the duration of the works.
- Identifying, storing and handling of hazardous and contaminated materials
- Protecting existing roadways and buildings against damage.
- Identifying, diverting, maintaining and connecting to existing live services.
- Managing vehicular and pedestrian traffic on the surrounding roadways for the duration of the construction works.
- Managing crane movements to limit lifting over live buildings and roadways.
- Ensuring adequate temporary works are designed and installed in the existing buildings as required for the duration of the construction phase of the project.

All contractors must progress their works with reasonable skill, care and diligence and, at all times, proactively manage the works in a manner most likely to ensure the safety, health and welfare of those carrying out construction works, pedestrians, road users and other interacting stakeholders.

All contractors are further required to ensure that, as a minimum, all aspects of their works and project facilities comply with legislation, good industry practice and all necessary consents.

Health and Safety requirements will be further expanded and developed within the main contractor's Construction Management Plan and Construction Stage Health and Safety Plan required to be prepared by the Project Supervisor Construction Stage (PSCS), prior to the commencement of works on site.

Full dilapidation surveys will be completed during the preconstruction phase of the project. These will be used to develop the site specific method statements and risk assessments for each element of the works.

3.2 Hours of Working

Hours of construction are to be between the hours of 07:00 and 19:00, Monday to Friday, and 07:00 to 14:00 on Saturdays.

Due to the specific nature of some construction activities, or to mitigate disruption to the local environment, there may be a requirement for working outside these hours. Should this be required, it will be by agreement with Dublin City Council (DCC).

3.3 Public Relations

The site is located beside a number of museums, a high profile public art gallery (Hugh Lane), a national monument (Garden of Remembrance), as well as number of nearby residences and local businesses. The main contractor will be required to ensure that all agents, sub-contractors and suppliers act in a manner to minimise disruption to the surrounding locality. The main contractor will register the site with the Considerate Constructors Scheme and be expected to abide by the Code of Considerate Practice, designed to encourage best practice beyond statutory requirements.

Keeping people informed of site operations will help create and maintain good relationships, fostering a co-operative atmosphere. A liaison manager will be appointed by the main contractor, whose responsibility would include:

- Regular briefings with local neighbour and business representatives on progress and issues.
- Liaison with DCC and emergency services as appropriate.
- Liaison with An Garda Síochána, particularly in relation to traffic movements and permits.
- Preparation of reports for the site meetings on neighbourhood issues.

3.4 Hoarding

Following possession of the site, the main contractor will erect a suitably robust hoarding around the perimeter of the site. This will provide separation of the construction works from the adjacent roadways and buildings. The plan alignment of the hoarding may not remain constant for the entire works and is likely to change to meet the particular requirements and constraints of construction sequence.

The hoarding will typically take the form of standard plywood hoarding to a height of 2.4m, as illustrated in Figure 5 below. Controlled access points to the site, in the form of gates or doors, will be kept locked for any time that these areas are not monitored (e.g. outside working hours).

The hoarding will be painted, well maintained and may contain graphics portraying project information.



Figure 5. Example of Typical Hoarding

3.5 Site Security

The main contractor will be responsible for the security of the site for the duration of the works. All reasonable precautions will be taken to prevent unauthorised access to the site, the works and adjoining property. Adequate safeguards will be put in place to protect the site, the works, products / materials, plant and any existing buildings affected by the construction works from damage, theft and trespass.

The proposed main entrance to the site will be on Parnell Square North across the front of Houses 23 to 28. It is currently proposed that roadway on Parnell Square North will be locally reduced in width during the construction phase of the project, with appropriate traffic and pedestrian diversions in place. This will accommodate site cabin offices, covered pedestrian walkways, material handling and deliveries. This localised reduction in road width is to the front of Houses 23-28 during the construction phase only and is to be agreed in full with all relevant authorities. Bus drop-off in front of Hugh Lane is to be preserved. A secondary entrance will be utilised to the rear at Bethesda Place, as shown in Figure 6 below. This rear entrance will provide an alternative means of delivering and unloading materials to site.

As part of their site security responsibilities, the main contractor will be required to:

- Install and maintain adequate site hoarding to the site boundary with adequate controlled access and egress points.
- Maintain site security at all times.
- Install access security in the form of turnstiles and gates for staff.
- Ensure restricted access is maintained to the works.
- Monitor and record all deliveries to site and materials / waste taken off site.

All staff will be made fully aware of their individual responsibilities with regard to safety and security and will undertake their work in accordance with such guidelines. All staff and operatives will be fully inducted into the security, health and safety and logistic requirements on site.

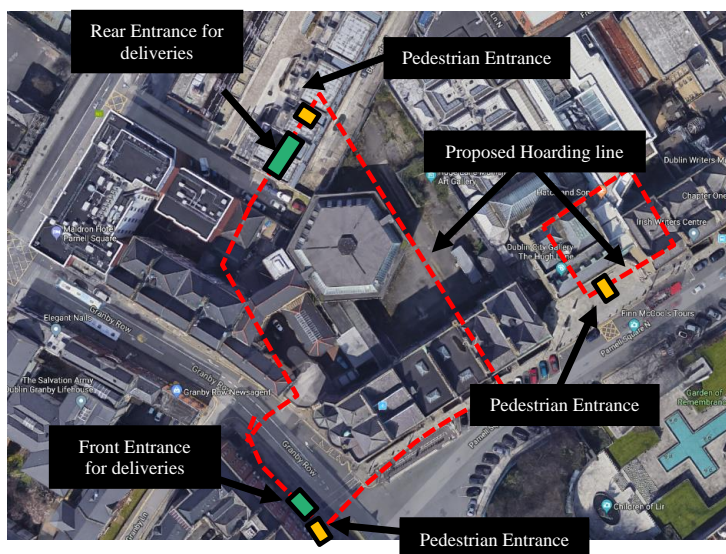


Figure 6: Proposed Hoarding Line with Indicate Site Entrances

3.6 Site Compound and Material Storage

The extent of compound and storage space required by the main contractor will vary for the duration of the works.

For the enabling works, the main contractor will likely require a compound for storage and segregation of hazardous and non-hazardous excavated material. For the main construction works, the main contractor will again require a large compound and material storage area.

It is envisaged that a compound area will be required on Parnell Square North. This will be required for material and waste storage as well as offices and welfare facilities. The contractor is to ensure that a suitable hoarding strategy is used to minimise any visual impact on the area arising from the compound area.

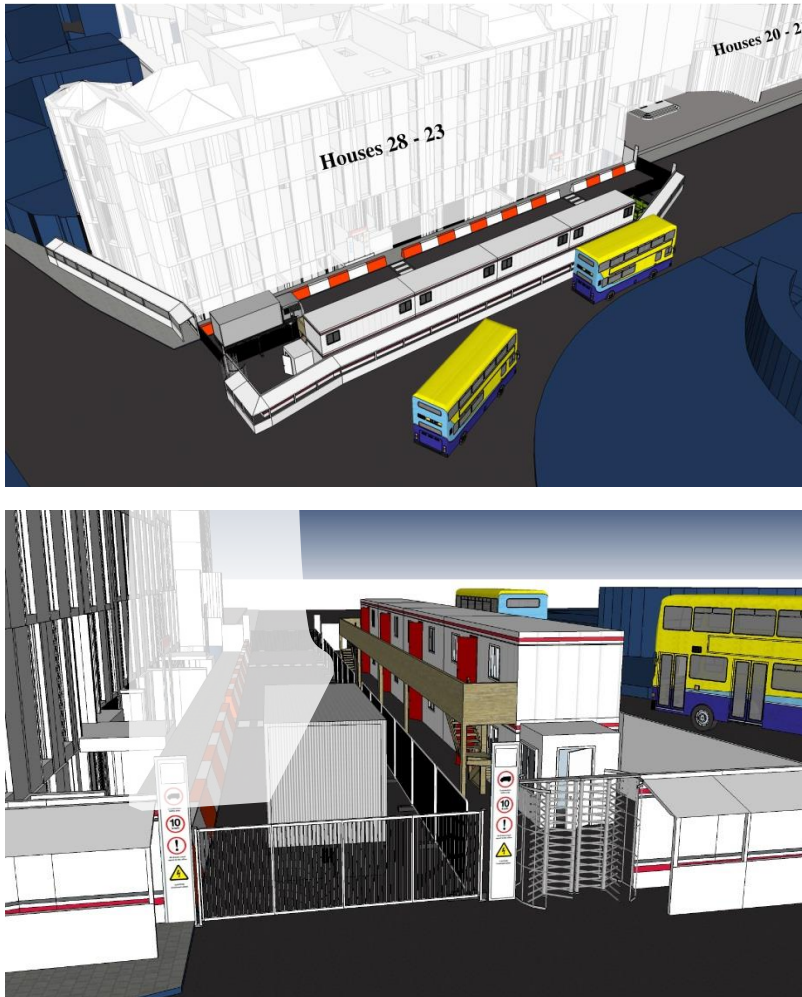


Figure 7. Compound Storage Area

The main contractor is responsible for obtaining all necessary permissions from relevant statutory bodies, including local authorities, for the disposal of water off site. Standing water should be cleared as soon as is practicable, or treated with an approved product at least once a week.

The main contractor is to also ensure that there is no hazardous build-up of water and is to provide for temporary disposal of rainwater from the site during the course of the works. Any water that is potentially contaminated is to be treated on site by way of sediment/filtration tanks and comply with a waste disposal licence obtained by the contractor from the Local Authority.

The main contractor is to devise a strategy to ensure there is no excessive loading to the existing buildings caused by material storage or otherwise. The contractor is to compose a safe loading plan for each of the rooms in the existing buildings and to have an agreed strategy for controlling the storage of materials.

3.7 Quality Control

A site specific Quality Management Plan, including site specific inspection and test plans, will be developed to ensure project is managed in line with the stakeholder's requirements. This plan will form part of the contractor's project execution plan for the project.

We would advise the main contractor has a clear understanding of client expectations and the role to be undertaken. The main contractor should provide the optimal organisation structure ensuring that the best team with strong leadership skills are allocated to the project.

3.8 Craneage

The construction works will require the use of a tower crane on site. It is envisaged that 2 No tower cranes may be required to provide the necessary site coverage. The cranes will be required for the moving of building materials on site such as formwork for concrete, reinforcement, precast concrete, steelwork, façade elements, plant and general building materials. Mobile cranes may also be utilised to assist in some elements of the construction works such as façade installation. The main contractor will develop a crane management plan to limit lifting operations over live buildings and roadways. The layout of cranes to achieve maximum coverage of the site will be determined by the main contractor.

3.9 Dust

A dust minimisation plan will be formulated for the demolition and construction phase of the project. Particular account will be taken of key neighbours, the Hugh Lane Gallery & the Rotunda Hospital. The main contractor shall put in place a regime for monitoring dust levels in the vicinity of the site during works using the Bergerhoff Method (German Standard VDI 2119, 1972). The minimum criteria to be maintained shall be the limit specified by the Environmental Protection Agency (EPA) for licenced facilities in Ireland which is 350mg/m²/day as a 30-day average. The main contractor shall monitor dust during construction to ensure the limits are not breached throughout the project.

The level of monitoring and adoptions of mitigation measures will vary throughout the construction works depending on the type of activities being undertaken and the prevailing weather conditions at the time. For instance, additional monitoring and mitigation such as damping down of earth mounds on site would be undertaken if the prevailing weather conditions are dry and windy.

3.10 Dirt

Given the volumes of traffic generated by aspects of the construction works, particularly during the bulk excavations, it shall be a requirement that the main contractor shall ensure, where appropriate:

- A number of wheel wash facilities are provided at each egress point from the site. The wheel wash will be a drive through type and all vehicles will be required to pass through the wheel wash facility before exiting the site. The wheel wash must be kept in place and used throughout the critical dirt generating activities of the construction works. Where appropriate, water supplies servicing the wheel wash will be from recycled sources. All waters shall be drained through appropriate filter material prior to discharge.
- The main contractor will endeavour to mitigate the risk of blockage of local gullies and drains due to construction materials and will carry out drain clearing as required.

3.11 Noise

The main contractor is required to monitor the baseline noise levels at the site prior to commencement of the project, with a noise monitoring regime being developed for the duration of the construction works on site as part of a Noise and Vibration Management Plan (NVMP). The main contractor shall implement measures to minimise noise levels during construction. Particular account will be taken of key neighbours, the Hugh Lane Gallery & the Rotunda Hospital. Specifically, noise levels shall be kept below those levels specified in Table 3, or further limits if imposed by the Local Authority. The limits for residential developments in the vicinity of the development site are identified in Table 3.

Table 3: Noise limit criteria

Period over which criterion applies		Noise impact criterion (LAeq, 1hr)
Monday to Friday	Day: 7.00am to 7.00pm	70 dB
	Evening: 7.00pm to 10.00pm	60 dB*
	Night: 10.00pm to 7.00am	The higher of 45 dB or the ambient level*
Saturday: Day:	Day: 7.00am to 2.00pm	65 dB
Sundays and Bank Holidays	Sundays: Day: Noise Limit Criteria 8.00am to 2.00pm	60 dB*

Note: *Construction activity at these times, other than that required for emergency works, will require the explicit permission of the relevant Local Authority.

3.12 Vibration

A specialist sub-contractor shall be engaged by the main contractor to monitor, collate and report on vibration results for the duration of critical work activities, as part of the Noise and Vibration Management Plan (NVMP). Particular account will be taken of key neighbours, the Hugh Lane Gallery & the Rotunda Hospital.

Vibration monitoring stations should continually log vibration levels using the Peak Particle Velocity parameter (PPV, mm/s) in the X, Y and Z directions in accordance with BS ISO 4866:2010: Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures. Vibration monitors, of both aural and visual type, with real time outputs are to be located at agreed points.

Traffic light system to be in place consisting of:

- Green – vibrations below all threshold limits – OK to proceed.
- Amber – Vibrations exceed first threshold limit – Stop and check.
- Red – Vibrations exceed second threshold – Stop and action.

Table 4 sets out the vibration criteria to be adopted at nearby soundly constructed buildings to avoid cosmetic damage.

Table 4: Allowable vibration during construction phase for soundly constructed buildings

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration		
Less than 10 Hz	10 to 50 Hz	50 to 100 Hz (and above)
15 mm/s	20 mm/s	50 mm/s

Table 5 sets out the vibration criteria for buildings that are considered more sensitive due to their construction type or condition. These lower vibration limits are taken from the German Standard DIN 4150-3 (199-02) Structural Vibration- Effects of vibration on structure.

Table 5: Allowable vibration during construction phase for sensitive buildings

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration		
Less than 10 Hz	10 to 50 Hz	50 to 100 Hz (and above)
3 mm/s	3 to 8 mm/s	8 to 10 mm/s

3.13 Fire Management During Construction

The main contractor will implement a fire management plan during the works. This will include a hot-works permitting system. There shall be no on-site storage of flammable material & tidiness audits will be carried out to ensure that potentially flammable material is not allowed to gather on-site. There will be a network of fire extinguisher points across the site & operatives will have been trained in their use. The sensitivity of the neighbouring Hugh Lane Gallery is noted and the plan will take specific account of this.

3.14 Road and Footpath Maintenance

In addition to the dirt control measures listed above, the following measures will be taken to ensure that the site and surroundings are kept clear, tidy and well maintained:

- A regular programme of site tidying will be established to ensure a safe and orderly site.
- Food waste will be strictly controlled on all parts of the site.
- Scaffolding will have debris netting attached to prevent materials and equipment being scattered by the wind.
- In the event of any fugitive solid waste escaping the site, it will be collected immediately and removed to storage on site, and subsequently disposed of in the appropriate manner.
- If the existing roads or footpaths around the site are damaged as a consequence of the construction, the contractor will carry out repairs to same.

3.15 Environmental Impact Assessment Report (EIAR)

In addition to the various measures noted above, a series of impact mitigation measures have been set out in the Environmental Impact Assessment Report (EIAR). The contractor shall implement these measures. These measures are summarised in a chapter of the EIAR & this chapter has been included in the appendices of this document for information.

4 Construction Traffic Management

4.1 Construction Traffic Routing

4.1.1 Construction Activities

For the construction phase of the project, it is envisaged that construction traffic routing will take two different routes. One route will be to the front of the existing buildings, along Parnell Square North. A second route will be provided to the rear of the site along Frederick Lane (see Figure 8 below).

Local reductions in the width of the Parnell Square North road will be required to the front of Houses 28 to 23 for the duration of the construction phase of the project (see Figure 8). This is required in order to create a securely hoarded site compound space, in which will be site offices, material storage areas as well as a through route for construction related deliveries to the site. A second delivery route to the rear of the site will also facilitate deliveries along Frederick Lane.

The busiest period with regards to traffic generation is expected to be the enabling works stage, which will include the removal of demolition waste and excavated material away from the site. This work will be undertaken early in the construction process. It is envisaged that the route to the rear of the site along Frederick Lane will be the primary route during these works.

An appropriate Traffic Management Plan will be developed by the main contractor in consultation with DCC to ensure safe access and egress procedures are implemented at all times during the works, and to also ensure that disruptions to traffic in the area are minimised.

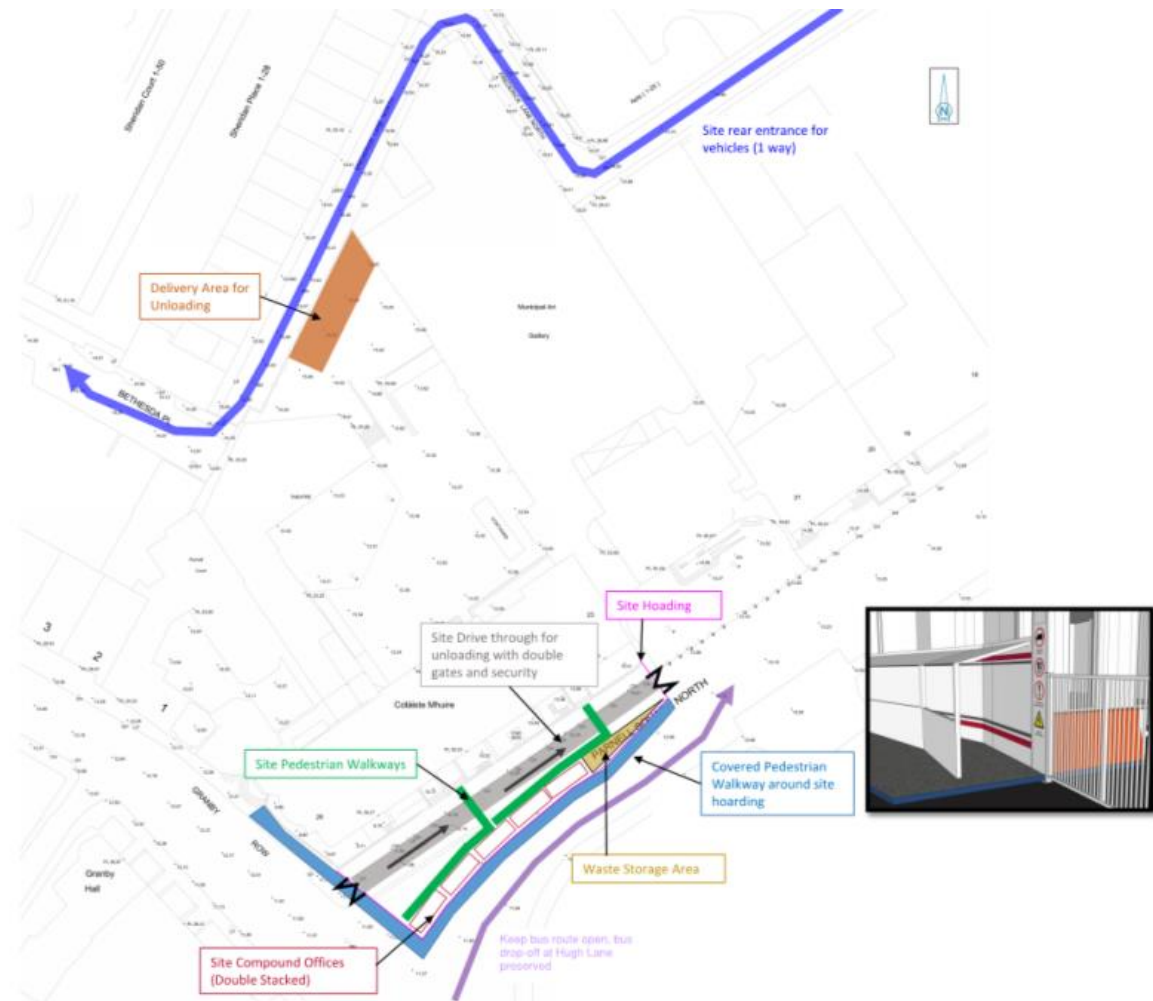


Figure 8. Proposed Construction Traffic Routes to the Site

4.1.2 Staff

A maximum of approximately 250/275 workers and an average of 100/125 workers are expected on site for the construction phase.

The site is located in the heart of the city centre and is serviced by a number of Dublin Bus routes, many of which stop directly outside the site. These bus routes include the No. 1, 4, 7, 9, 11, 13, 16, 16c 38, 40, 44, 46, 116, 123 and 140, all of which stop in close proximity to the site. The Parnell and Abbey Street Luas stops are approximately 500 and 900 meters from the site respectively, which provides a robust alternative means of public transport in addition to the numerous bus routes. The DART line is also a viable means of transport, as the site is approximately 15 minutes walking distance to both the Tara Street and Connolly DART stations.

The site has very limited capacity to facilitate staff parking and driving to the site should not be encouraged. The car parking on the surrounding streets and in the nearby city centre areas are generally subject to high charges, therefore there will be only a very limited number of staff that will drive to the wider area. The majority of these movements will occur before 7:00, hence not impacting on the peak traffic conditions.

4.1.3 Minimising Construction Vehicle Movements

Construction vehicle movements will be minimised by:

- Use of 'just-in-time' approach for removal of materials from site and delivery of materials to site.
- Ensuring vehicle intensive operations occur outside of peak traffic periods.
- Providing adequate storage space on site, or alternatively off-site.
- Use of prefabricated elements (where possible).
- Developing a strategy to minimise construction material quantities as much as possible.
- Promoting use of public transport and offering staff incentives for using them, e.g. Travel to Work Scheme benefits.

4.1.4 Construction Phase - Mobility Management Measures

The contractor will be encouraged as part of the contract to introduce a Mobility Management Plan for its workforce to encourage access to the site by another means other than by private car. The following section identifies some of the measures the contractor will provide as part of the Mobility Management Plan. The Mobility Management Plan will form part of the Construction Management Plan and will be agreed with DCC prior to works beginning on site.

There is good connectivity between the site and public transport links which serve the area. This includes a vast number of bus services, as well the Luas Green and Red Lines, the DART and a Dublin Bikes Station all of which are within walking distance from the site.

Where driving to site is required, car sharing among the construction staff should be encouraged, especially from areas where construction staff may be clustered. Such a measure offers an opportunity to reduce the proportion of construction staff driving to the wider site area and will minimise the potential traffic impact on the road network surrounding this facility.

With regard to public transport, the contractor will issue an information leaflet to all staff as part of their induction on site highlighting the location of the various public transport services in the vicinity of the construction site.

5 Construction and Demolition Waste Management

This project is committed to ensuring on-site segregation and on and off site reuse/recycling/recovery in terms of waste materials arising from the project. The appointed contractor shall have regard to pollution prevention measures to be implemented during the construction phase of the proposed works. These will be outlined in the detailed *Construction and Demolition Waste Management Plan* prepared by the main contractor. This plan will outline the proposals and methodology to achieve compliance with the current waste management and associated planning and EPA legislation.

The appointed contractor shall be vigilant in ensuring that no activities will give rise to pollution of surface water pathways onsite with suspended solids or other polluting substances.

5.1 Waste Management Objectives

The principal objective of sustainable resource and waste management is to use material resources more efficiently, where the value of products, materials and resources are maintained in the economy for as long as possible and the generation of waste is minimised. To achieve resource efficiency there is a need to move from a traditional linear economy to a circular economy (see Figure 9).

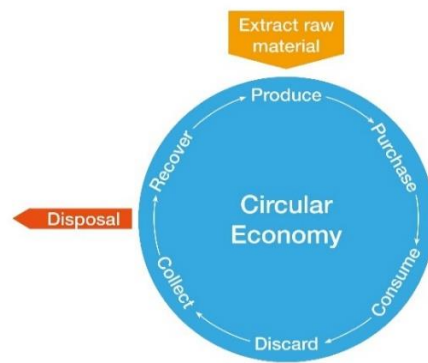


Figure 9. Circular Economy

However, where residual waste is generated, it should be dealt with in a way that follows the waste hierarchy (see Figure 10) and actively contributes to the economic, social and environmental goals of sustainable development.



Figure 10. Waste Hierarchy

5.2 Waste Management Legislation, Policy and Best Practice Guidance

5.2.1 General

The key components of EU, national and local policy, legislation and guidance relevant to the construction phase of the project are summarised as follows:

- prevention and minimisation of waste is the preferred option;
- where construction waste is generated it should be source separated to facilitate recycling and maximise diversion of waste from landfill;

- where waste may not be prevented or recycled it should be transported and disposed of in accordance with applicable legislation and without causing environmental pollution; and
- waste may only be transferred by a waste collection permit holder and delivered to an authorised waste facility.

5.2.2 Waste Management Legislation

Relevant legislation with regard to waste management includes:

- Waste Management Acts, 1996, as amended (No. 10 of 1996);
- Waste Management (Collection Permit) Regulations, 2007 as Amended (S.I. 820 of 2007);
- European Communities (Waste Directive) Regulations 2011 (S.I. 126 of 2011);
- European Communities (Waste Directive) Regulations 2011 (S.I. 126 of 2011).

5.2.3 Review of Relevant Policy and Best Practice Guidance

The following policy and guidance documents were consulted in the preparation of this report:

- Department of the Environment, Heritage and Local Government, 2006. Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects;
- Environmental Protection Agency (EPA), 2016. Ireland's Environment 2016 – An Assessment;
- Dublin City Council, 2016. The Dublin City Development Plan 2016-2022;
- FÁS and the Construction Industry Federation, 2002. Construction and Demolition Waste Management – A Handbook for Contractors & Site Managers; and

In addition, the following EPA waste reports were consulted:

- EPA, 2017, Ireland's Environment – An Assessment 2016;
- EPA, 2015, Waste Classification – List of Waste and Determining if Waste is Hazardous or non-Hazardous;
- EPA, 2014, National Waste Report 2012; and
- EPA, 2013, National Waste Report 2011.

The following section provides a brief overview of the most relevant policy and guidance documents.

5.2.4 Policy and Best Practice Guidance

5.2.4.1 Eastern-Midlands Region Waste Management Plan 2015-2021

The Eastern-Midlands Region for waste planning purposes consists of 12 no. local authorities, stretching from Dublin in the east, to Louth in the north and Wicklow in the south. The Region includes Dublin City Council in which the proposed development will be located.

The Eastern-Midlands Region Waste Management Plan 2015-2021 came into force in May 2015 and emphasises the need to move from a linear to a circular economy to make better use of resources and for the region to become more resource efficient.

5.2.4.2 Dublin City Development Plan 2016-2022

The Dublin City Development Plan 2016-2022 sets out Dublin City Council's policies and objectives for the development of the County over the Plan period. The Council includes four waste management policies and five waste management objectives as part of Chapter 9 Sustainable Environmental Infrastructure. These policies are predicated on the waste hierarchy of prevention, preparing for re-use, recycling, energy recovery and sustainable disposal.

5.2.4.3 Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects

These guidelines were published by the Department of the Environment, Heritage and Local Government (DoEHLG) in July 2006. They were developed in conjunction with the National Construction and Demolition Waste Council (NCDWC) as part of the Voluntary Construction Industry Initiative and give advice on planning for Construction and Demolition (C&D) waste management. They also give guidance on source separation of waste, the diversion of waste from landfill and encourage construction companies to work towards achieving the national recycling target of 85% as outlined in the Government Policy Document 'Changing Our Ways' (DOEHLG).

5.3 Receiving Environment

C&D waste is the waste type that will be most relevant to the construction phase of the proposed development.

The most recent complete figures published by the EPA relating to C&D waste are for the year 2011 with some limited hazardous construction and demolition waste data published relating to the year 2012 and preliminary data for 2014. Approximately 3 million tonnes of C&D waste were collected in Ireland in 2011. Almost 2 million tonnes of this was soil and stones. In addition, just over 1 million tonnes of 'other' C&D waste was generated, and comprised metal, wood, glass etc. From 2010 to 2011, there was a 10% decrease in the total quantity of construction waste collected in Ireland. C&D waste collection has decreased annually from a peak of almost 18 million tonnes in 2007. This decrease is reflective of the significant downturn which occurred in the construction industry at this time. In addition to the data above relating to 2011, the EPA reported that in 2012 excluding natural soil and stone, 97% by weight of C&D waste was prepared for reuse, recycling and other material recovery (including beneficial backfilling using waste as a substitute).

In 2014, 3.31 million tonnes of C&D waste was generated according to preliminary EPA data.¹

The national policy document, Changing Our Ways, published in 1998, set a target of 85% recycling of C&D waste by 2013. More recently the 2008 EU Waste Framework Directive set a target of 70% by weight for C&D waste, excluding natural soils and stones and hazardous waste and C&D wastes. As such, with a recovery rate of 97% in 2012, Ireland exceeded the targets by a considerable margin.

An indicative breakdown of the composition of C&D waste is set out in Table 6 below. These figures should be considered as a guide only as C&D waste can vary significantly from one project to another, depending on the nature of the development and the waste management practices employed on-site.

¹ EPA (2017) Ireland's Environment – An Assessment 2016.

Table 6. Composition of Construction and Demolition (C&D) Waste (non-hazardous)

Category	Composition
Soil and Stone	45%
Concrete, brick, tiles and ceramics	31%
Asphalt/Tar	1%
Metals	6%
Wood	7%
Other	10%

The construction sector also generates hazardous waste such as lead-acid batteries, waste electrical and electronic equipment, asbestos solvent-based paints and varnishes, pesticides and waste oils.

5.4 Waste Generation

Surplus materials which will be generated during the construction phase of the project (encompassing the demolition, excavation and construction stages) are described in the sections below.

5.4.1 Demolition Stage

The principle existing structures on site to be demolished as part of the proposed development are the hexagonal extension to Colláiste Mhuire and the wing to the rear of House 23. The Colláiste Mhuire extension primarily comprises of a reinforced concrete frame building with masonry infill walls. The wing to the rear of House 23 is a traditional masonry and timber construction. The combined GIA of the buildings to be demolished on site is 2000m².

Typical waste types likely to arise during the proposed demolition work, including their respective European Waste Catalogue (EWC) Codes, are outlined in Chapter 17 of the EPA List of Waste (EPA, 2002) (see **Appendix B**).

The waste streams depicted in **Appendix B** are also relevant for categorising excavation and construction wastes which are discussed in the following sections.

Table 7. Estimated Volumes of Demolition Waste

Building	Concrete	Masonry	Timber	Hardcore/ Asphalt	Steel
Hexagonal Building	415m ³	235m ³	0.5 Tonnes	-	19.5 Tonnes
Wing to House 23	-	55m ³	1.8 Tonnes	-	-
Rear Yard/ Frederick Lane	-	-	-	600m ³	-
Existing Bldgs./ Misc.	235m ³	160m ³	2.7 Tonnes	-	12 Tonnes
Total	650m³	450m³	5 Tonnes	600m³	31.5 Tonnes

A large portion of demolition waste is expected to be inert waste such as concrete, brick and glass. These wastes will be segregated where possible for reuse or recycling in accordance with the relevant guidelines.

An asbestos audit will be carried out on the building prior to demolition works. Any asbestos discovered will be removed in accordance with the relevant legislation and disposed of by specialist contractors to an appropriately licensed facility.

5.4.2 Excavation Stage

Excavation will take place on site to facilitate the construction and installation of structures and services. It is estimated that approximately 9,000 m³ of material will be excavated.

The existing ground conditions are unknown, however, based off historic site investigation works carried out in the vicinity, it is believed that the site consists of a substantial depth of boulder clay over rock. Excavated material is anticipated to predominantly comprise black and brown boulder clay at circa 9.0m-12m OD. Possibilities for re-use of clean non-hazardous excavation material as fill on the site or in landscaping works are likely to be limited, but will be considered in so far as is possible. Where excavated material may not be re-used within the proposed works the contractor will endeavour to send material for recovery or recycling so far as is reasonably practicable.

The contractor will ensure that any interim storage or waste management facilities for excavated material have the appropriate waste licences or waste facility permits in place.

5.4.3 Construction Stage

Construction waste is defined as waste which arises from construction and renovation activities. Also included within the definition are surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities.

Construction waste can vary significantly from site to site but typically would include the following non- hazardous fractions:

- Soil and stone;
- Concrete, brick, tiles and ceramics;
- Asphalt/tar;
- Metals;
- Wood; and
- Other.

The hazardous waste streams which could arise from construction activities may include the following:

- Waste electrical and electronic components;
- Batteries;
- Asbestos;
- Wood preservatives;
- Liquid fuels; and
- Contaminated soil.

The UK Department of the Environment, Food and Rural Affairs and the Building Research Establishment (BRE) published benchmark construction waste figures which are suitable for use for planning purposes. These figures have been compiled from over 100 projects that entered waste data in the BRE SMARTwaste construction waste tool.

The total floor area of the proposed development is 11,198m². Using the BRE benchmark for waste generation from public use and educational buildings, a tonnage of 20.9 tonnes of waste per 100m² of floor area has been assumed in the calculation of the total proposed waste arising from the construction phase of the proposed development. It was found that the total estimated construction waste from the proposed development is approximately 2,345 tonnes.

Measures to minimise waste generation during the construction stage and effectively manage those wastes which arise are outlined in the next section.

5.5 Waste Management Measures

5.5.1 Preparation of Construction Waste Management Plan

The recommended mitigation for the demolition, excavation and construction stages of the proposed development comprises the preparation of a Construction Waste Management Plan (CWMP), which meets the requirements of the DoEHLG Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects (DoEHLG, 2006a).

Where waste generation cannot be avoided this will maximise the quantity and quality of waste delivered for recycling, facilitating its movement up the waste hierarchy away from landfill disposal and therefore reducing its environmental impact.

The appointed Contractor will be required to produce a CWMP prior to commencement of construction.

5.5.2 Demolition Stage

In addition to the general measures outlined above a demolition audit in accordance with the ICE Demolition Protocol 2008 or similar guidance will be considered at detailed design stage.

The ICE Demolition Protocol describes how the demolition and design processes for buildings can be managed to ensure that resource efficiency is increased by minimising waste and maximising the displacement of primary materials where viable.

The Demolition Protocol provides methodologies which:

- Ensure that the principles of the waste hierarchy are adopted in the decision making process for evaluating buildings, the fit out materials and structures;
- Offer a process-driven approach to setting targets for deconstruction, reclamation, reuse and appropriate disposal as required;
- Provide a Deconstruction/Demolition Recovery Index (DRI) – this is the percentage of building elements, products or materials to be reused, recovered or recycled;
- Estimate bulk quantities through a pre-demolition audit, summarised in a Demolition Bill of Quantities (D-BOQ); and
- Provides a new build recovery index (NBRI) – describing the percentage of building elements, products or materials recovered for use in the new build.

5.5.3 Excavation Stage

Possibilities for re-use of clean non-hazardous excavation material as fill on the site or in landscaping works are likely to be limited, but will be considered in so far as is possible. Where excavated material may not be re-used within the proposed works the Contractor will endeavour to send material for recovery or recycling so far as is reasonably practicable.

The Contractor will ensure that any interim storage or waste management facilities for excavated material have the appropriate waste licences or waste facility permits in place.

Where excavated material cannot be re-used/recycled the contractor will dispose of such material to appropriately licensed facilities.

5.5.4 General Management Measures

The following general mitigation measures will be implemented during the construction phase:

- Source Segregation: Where possible metal, timber, glass and other recyclable material will be segregated during demolition works and removed off site to a permitted/licensed facility for recycling. Waste stream colour coding and photographs will be used to facilitate segregation;
- Material Management: 'Just-in-time' delivery will be used so far as is reasonably practicable to minimise material wastage;
- Waste Auditing: The contractor will record the quantity in tonnes and types of waste and materials leaving site during the construction phase. The name, address and authorisation details of all facilities and locations to which waste and materials are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material which is recovered and disposed of;
- This assessment has shown that there are already very high recovery rates for construction wastes in Ireland. Material arising from the development site will be subject to recovery dependent on its suitability and the implementation of the management measures set out in this report;
- Fuels/oils that will be required for use by equipment on site during construction may be considered hazardous. Such materials will be stored in a secure, bunded area on site;
- Paints, sealants and hazardous chemicals etc. will be stored in secure, bunded locations; and
- Temporary toilets and wash facilities will also be provided for construction workers. These facilities will require periodic waste pumping and waste offsite haulage. This will be carried out by an authorised sanitary waste contractor.

5.6 References

BRE Waste Benchmark Data, 2012.

[http://www.smartwaste.co.uk/filelibrary/benchmarks%20data/Waste Benchmarks for new build projects by project type 31 May 2012.pdf](http://www.smartwaste.co.uk/filelibrary/benchmarks%20data/Waste%20Benchmarks%20for%20new%20build%20projects%20by%20project%20type%2031%20May%202012.pdf)

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Waste Management Acts, 1996 as amended

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